

ALBERTA WEST NILE VIRUS

2008 Summary Report

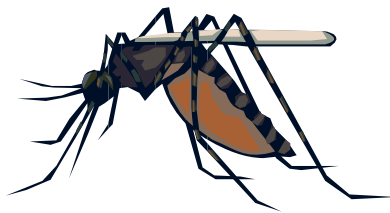


Table of Contents

1.	Introduction	1
2.	Epizootiology of West Nile virus	3
3.	Communications	7
4.	Human Surveillance	11
5.	Mosquito Surveillance Program	12
6.	Provincial Laboratory for Public Health	21
7.	Wild Bird Surveillance	22
8.	Horse Surveillance	24
9.	Acknowledgements	27

1. Introduction

West Nile virus Interdepartmental Committee

Alberta's provincial West Nile virus (WNV) program was initiated in 2002. An interdepartmental committee meets each year and prepares a provincial response plan to address potential WNV risks in Alberta. The interdepartmental committee also prepares a summary report at the end of the season. The interdepartmental committee in 2008 included the following members:

Dr. Richard Musto	Acting Chief Medical Officer of Health (Chair) Alberta Health and Wellness
Leonor Tavares	WNV Provincial Co-ordinator Alberta Health and Wellness
Lisa Lachance	Communicable Disease Nurse Consultant Alberta Health and Wellness
Pamela Steppan	Epidemiologist Alberta Health and Wellness
Edi Skoropad	Information Officer Alberta Health and Wellness
Jock McIntosh	Pesticide Specialist Alberta Environment
Dr. Julie Fox	Medical Virologist Provincial Laboratory for Public Health
Brett Oliver-Lyons	Data and Research Analyst Alberta Agriculture and Rural Development

Dr. Margo Pybus and Dr. Mark Ball, from the Fish and Wildlife Division, Alberta Sustainable Resource Development, provided information regarding bird surveillance.

West Nile virus Plan

The WNV plan in 2008 was comprised of two primary components:

Communication: Through coordination by the Alberta Health and Wellness (AHW) Communications Branch, a province-wide public awareness campaign, *Fight the Bite*, provided ongoing information through news releases, radio, newspaper and magazine ads, brochures, posters, and online. A new addition to the public awareness campaign was a series of informational radio interviews called *Let's Go Outdoors*, involving dialogue on various WNV topics.

Surveillance: The provincial surveillance programs focused on human and mosquito testing. Physicians monitored human illness and selected municipalities collected and submitted *Culex tarsalis* mosquitoes for testing.

Bird and horse surveillance were not targeted as provincial programs in 2008. However, any outbreak situations involving clusters of dead birds were reported to a Fish and Wildlife office in Alberta. Veterinarians were asked to report suspect or confirmed WNV infections in horses as WNV became a provincially notifiable disease under the *Animal Health Act* and regulations. In 2008, a new one-page form to collect data on horses suspected or confirmed to have WNV was initiated that included location, vaccination and travel information, as well as a request for clinical symptoms.

The surveillance programs identified the presence of WNV in natural regions of the province, which assisted in determining the health risks to humans throughout the province. Surveillance programs also allowed for appropriate province-wide information to be provided to health care professionals and to the public.

Summary Report

The purpose of this report is to summarize and record communication and surveillance information on WNV in humans, mosquitoes, birds and horses in Alberta in 2008.

Alberta WNV background materials for the public and health professionals can be found on the following websites:

Alberta Health and Wellness:

fightthebite.info

health.alberta.ca/health-info/WNV-fight-the-bite.html

health.alberta.ca/health-info/WNV-professionals.html

Alberta Agriculture and Rural Development:

[1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex5455?opendocument](http://1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex5455?opendocument)

Fish and Wildlife Division of Alberta Sustainable Resource Development:

srd.gov.ab.ca/fishwildlife/livingwith/diseases/westnilevirus.aspx

2. Epizootiology of West Nile virus

Overview

WNV is transmitted by *Culex tarsalis* mosquitoes while feeding on the blood of birds, humans, and other mammals.

The transmission cycle of WNV is complex, requiring several hosts to complete its lifecycle. The cycle begins when an infected adult *Culex tarsalis* mosquito takes a bloodmeal from a bird and at the same time injects virus-containing saliva thus infecting the bird. Within the bird, WNV multiplies in various tissues and circulates in the blood. When a second mosquito feeds on the infected bird, the mosquito becomes infected and after two weeks is able to transmit WNV to another host. The bird to mosquito cycle continues, and may or may not lead to disease in the bird, depending on the species of bird; most birds are not affected by WNV.

The lifecycle of WNV is influenced by the complex interaction of biological and non-biological factors. The species, distribution, migration, immune response and previous exposure to WNV all affect its success in birds. Similarly, mosquito species distribution and life stage affect its success in mosquitoes. Infected birds and mosquitoes must also overlap in time and space in sufficient numbers to establish and maintain a viral population.

Humans, horses and other small mammals and pets act as dead-end, incidental hosts for WNV. When a mosquito feeds on and infects a human or a horse, WNV may cause disease; however, WNV does not circulate in the blood of these hosts and therefore cannot be transferred to a mosquito, thus ending the cycle.

There is no evidence to suggest that humans can transmit WNV by coming into contact with someone who is infected, or from a health care worker who has treated an infected person. Likewise, there is no evidence to date to show that WNV can spread from infected animals to people¹. In a very small number of cases, there has been evidence of WNV being transmitted via blood transfusions, organ transplants, breastfeeding and during pregnancy from mother to baby².

WNV first appeared in Alberta in the late spring/early summer of 2003. WNV came in migrating birds and established local viral populations in *Culex tarsalis* mosquitoes. By the end of summer 2003, there was evidence of extensive viral activity in birds, mosquitoes, horses and humans throughout the southern and central areas of Alberta.

¹ Public Health Agency of Canada: phac-aspc.gc.ca/wn-no/transmission-eng.php

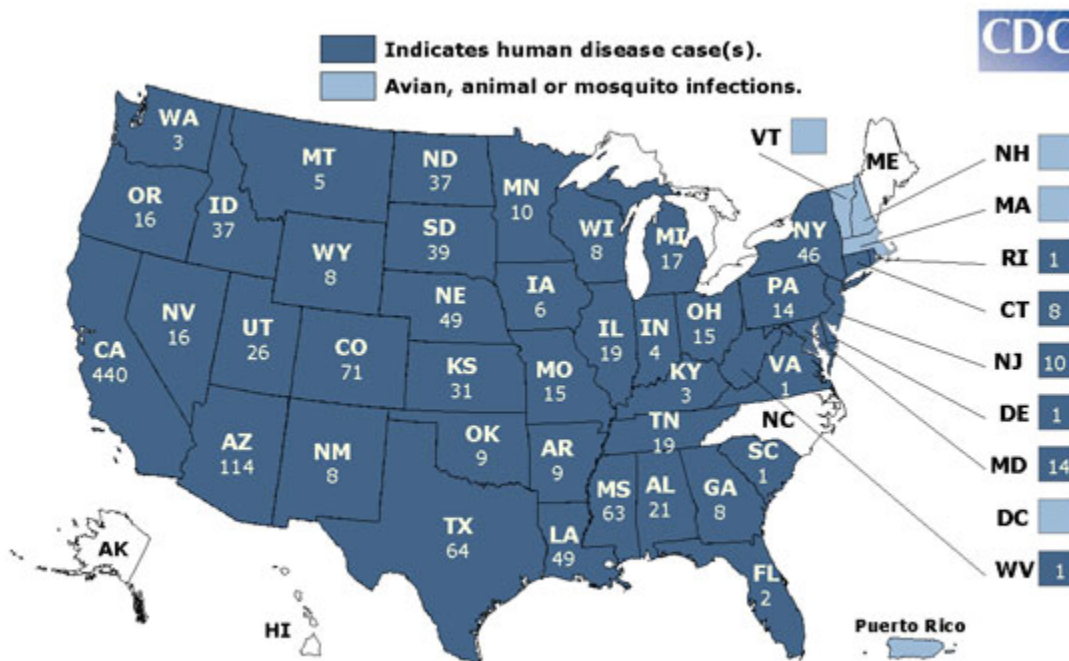
² U.S. Centers for Disease Control: cdc.gov/ncidod/dvbid/westnile/wnv_factsheet.htm

Surveillance in the United States and Canada

WNV was first detected in North America in 1999 in the northeastern United States (U.S.). To date, WNV in humans, birds, horses or mosquitoes has been reported in all states except Hawaii and Alaska. While the total number of human cases decreased in the U.S. in 2008 compared to 2007, the number of cases in California and Oregon increased as WNV continued to establish along the west coast (Figure 1)³.

In many areas of the southern U.S., *Culex* species do not go dormant during the winter months and thus year-round transmission of WNV occurs from the Atlantic and Gulf Coast regions of the U.S. westward to southern California. In northern areas, WNV can overwinter in a few dormant individual mosquitoes. WNV is still extending its continental range and establishing populations within Mexico as well as Central and South America.

Figure 1: West Nile virus Activity in the United States in 2008



Map shows the distribution of avian, animal, or mosquito infection occurring during 2008 with number of human cases if any, by state. If West Nile virus infection is reported to CDC from any area of a state, that entire state is shaded.

In Canada, WNV has spread south and east of the Rocky Mountains. Virus activity in northern areas is limited to summer months when environmental and biological conditions support amplification of WNV in birds and suitable mosquitoes.

The 2008 surveillance information on human cases of WNV throughout Canada shows a lower number of cases than the previous year with no human cases reported in the

³ Source: U.S. Centers for Disease Control:
<http://www.cdc.gov/ncidod/dvbid/westnile/Mapsactivity/surv&control08Maps.htm>

Territories or Maritimes (Table 1). Cooler weather dampened the amplification of WNV across the country compared to the last few years (Table 2).

Table 1: 2008 Human West Nile Virus Cases and Asymptomatic Infections (Canada)

Province/Territory	Neurological Syndrome	Non-Neurological Syndrome	Unclassified/Unspecified	Total *	Asymptomatic Infection**
Newfoundland and Labrador	0	0	0	0	0
Prince Edward Island	0	0	0	0	0
Nova Scotia	0	0	0	0	0
New Brunswick	0	0	0	0	0
Quebec	1	0	1	2	1
Ontario	1	2	0	3	1
Manitoba	2	9	1	12	0
Saskatchewan	1	16	0	17	0
Alberta	0	1***	0	1***	0
British Columbia	0	1***	0	1***	0
Yukon	0	0	0	0	0
Northwest Territories	0	0	0	0	0
Nunavut	0	0	0	0	0
TOTAL	5	29	2	36	2

* Total probable and confirmed clinical cases is the sum of WNV Neurological Syndrome + WNV Non-Neurological Syndrome + WNV Unclassified/Unspecified

** Most asymptomatic infections reported to PHAC are identified through testing blood donors. Asymptomatic infections will not be included in the total

*** All cases likely related to travel outside the province/territory

Source: Public Health Agency of Canada, 2009

Table 2: West Nile virus Human Cases Reported Across Canada 2002 - 2008

Province	2002	2003	2004	2005	2006	2007	2008
British Columbia	0	20*	0	0	0	19*	1*
Alberta	2*	275**	1*	10**	40**	320**	1*
Saskatchewan	0	947**	5*	61**	20**	1456**	17
Manitoba	0	143**	3	58	51	587	12
Ontario	394	89**	14*	101**	42**	15**	3
Quebec	20	17	3*	5	1	2*	2
Maritimes	0	3*	0	3*	0	1*	0
Territories	0	1*	0	0	0	0	0
Canada***	416	1495	26	238	154	2401	36

* All travel-related cases

** One or more travel-related case included in total

*** Total includes West Nile virus Asymptomatic Infection

Source: Public Health Agency of Canada, 2009

3. Communications

Introduction

The primary objectives of Alberta's WNV communication plan were to inform Albertans about the annual risks and consequences associated with WNV infection, and the steps individuals could take to prevent being bitten by mosquitoes, especially in southern Alberta's medium and high-risk zones for WNV.

The 2008 media campaign's messaging reminded public to use what continues to be the best personal protective measures of wearing long-sleeved shirts and pants when outdoors during peak periods of mosquito activity, and to wear insect repellent containing DEET.

The goals for the communication strategy included the following:

- Inform Albertans across the province about WNV symptoms, protective measures, increased risk should it occur during the WNV season and general WNV information so individuals could take appropriate precautions to protect their health.
- Heighten awareness about the risks of WNV infection, especially for Albertans residing in the medium and high-risk zones of the province.
- Provide access to reliable information on a regular basis and to provide resources to guide the public in reducing the risk of infection with WNV, particularly active seniors aged 50+ and outdoor enthusiasts as well as health professionals.
- Inform stakeholders about specific WNV strategies and responses.
- Provide public, professionals and government ministries with up-to-date information on WNV surveillance in Alberta.
- Provide a planning document (*West Nile virus: Alberta's Response Plan 2008*) to all government MLAs and constituency offices, health region chief executive officers, medical officers of health and health region communications contacts.

Communication Strategy

The 2008 communication strategy was similar to the 2007 campaign. Results from a survey conducted on 1000 Albertans in the fall of 2007 indicated that Albertans were well informed about WNV. WNV information was still made widely available to all Albertans but outdoor enthusiasts and active seniors were particularly targeted due to their increased risk of acquiring WNV.

A new addition to the awareness portion of the advertising campaign was developed using a series of paid informational radio interviews called *Let's Go Outdoors*. Also, an additional week of radio advertising was purchased for two high-risk area markets, as

were two additional insertions in weekly newspapers for high risk areas, plus one additional magazine insertion.

***Fight the Bite* Public Awareness Campaign**

The *Fight the Bite* public awareness campaign began in July and ended in the middle of September, informing Albertans of the low risk but potentially high consequences of contracting WNV and what measures to take to protect themselves.

The 2008 WNV season had low mosquito activity, with no recorded positive mosquito pools. However, the promotional/awareness campaign which included radio, daily and weekly newspapers, brochures and posters was targeted to and included travellers within the province, outdoor enthusiasts and active seniors who are known to be at a higher risk of more severe consequences.

The public awareness campaign included:

- newspaper ads coordinated through the government's Public Affairs Bureau and an agency. Ads appeared in daily, weekly and community newspapers province-wide from July through to the end of August.
- magazine ads published in senior and sport enthusiast publications like Calgary and Edmonton Senior, Alberta Caregiver, Western Grandparent and Sport Fishing Regulations 2008. Ads were placed in prominent positions for readability.
- a new series of paid informational radio interviews called *Let's Go Outdoors* with Michael Short aired from the middle of July to the middle of September. *Let's Go Outdoors* 30 second radio spots involved a dialogue on various WNV topics such as infection and symptoms, immunity and vaccine, children and insect repellents, pregnancy, transplant and protecting yourself. Responses were provided by the Acting Chief Medical Officer of Health for Alberta.
- radio ads, created the year previously, also ran throughout the province with a greater frequency of play in the southern, at risk portions of the province.
- print materials including a poster, brochure holder and small foldout brochures were distributed to regional health authorities, municipalities, golf courses, senior's organizations, parks, and campgrounds. These were distributed in May.
- fact sheets were available on the website at fightthebite.info

News releases

Two releases were distributed province-wide in 2008.

- The first was an information bulletin called Fight the bite to prevent West Nile Virus infection this summer. The release was sent out June 27 promoting general awareness that WNV season was starting. It covered information on what WNV precautionary measures Albertans could take in 2008, the symptoms

of WNV infection, and that suspected or confirmed WNV horse cases were to be reported to the chief provincial veterinarian.

- A news release on August 25, called First human case of West Nile virus confirmed, identified the first adult (male) in Alberta infected with WNV non-neurological syndrome, which was acquired while travelling in Saskatchewan.

Online Information

Online WNV information found at fightthebite.info was linked directly from the Alberta Health and Wellness (AHW) homepage health.alberta.ca. Both links provide the public with up-to-date WNV information. Links to resources available on other websites, Health Canada, U.S. Communicable Disease Control and other reputable sources were also established on the health ministry's website.

The public had access through the WNV season to reports of cumulative numbers of cases of humans infected with WNV. The number of positive mosquito pools, of which there were none in 2008, was posted weekly on the Alberta Health and Wellness website. The site also provided responses to commonly asked questions, and public had access to printable materials like posters and brochures used in the public awareness campaign.

Call Centre

The government's Service Alberta telephone operators and Health Link Alberta operators provided general WNV information as well as specific information on personal protective measures.

Service Alberta:	310-4455 throughout Alberta
Health Link Alberta:	780-408-5465 in Edmonton 403-943-5465 in Calgary 1-866-408-5465 elsewhere in Alberta

Media Relations

Media inquiries regarding WNV information were handled by the ministry's communications branch. Generally, the media coverage was positive because there were no serious issues that arose during the WNV season. Media requesting WNV case numbers or any other information were directed to either fightthebite.info or health.alberta.ca after the first human case was reported.

Evaluation

A WNV public survey was not conducted in 2008; a WNV campaign survey had just been completed in November of 2007. Should a high volume of human WNV cases have occurred over the summer months, this decision could have been reassessed, but in the end it was not required.

Measures evaluating the 2008 public awareness WNV campaign included the following:

- Media calls to Alberta Health and Wellness Communications branch: about 10 inquiries during August.
- Alberta media coverage (newspaper articles and television clips and their repeat programs aired in the morning, late afternoon and evening between June 1 and October 1): about 30 inquiries.
- Let's Go Outdoors paid informational radio interviews: aired about 900 times between June and September.
- AHW's main website page received 5,149 visits from June 1 to September 15, 2008. The top three WNV web pages visited out of 20 available WNV pages were:
 - Evidence page: 2555 visits
 - Symptoms page: 1955 visits
 - Common questions: 1681 visits

WNV activity during 2008 was minimal as compared to all previous years.

4. Human Surveillance

The surveillance of WNV in humans continued in 2008 via physician requests for blood testing, blood donor screening, and organ/tissue testing. All positive laboratory results were reported to AHW by the Provincial Laboratory of Public Health (PLPH).

The 2008 WNV season was very different from the 2007 season with only one confirmed travel-related case of West Nile Non-Neurological Syndrome (WN Non-NS) reported in Alberta. No indigenous cases of WNV were reported. This contrasts with 2007 when 320 human cases were reported: 21 West Nile Neurological Syndrome (WNNS), 296 West Nile Fever (WNF), and three West Nile Asymptomatic Infection (WNAI). Two deaths related to WNV infection were reported in Alberta in 2007.

Cooler weather throughout the summer resulted in extremely low numbers of *Culex* mosquitoes with low infection rates. This limited the spread of WNV from birds to mosquitoes and ultimately, there were few infected mosquitoes to bite humans.

West Nile Virus Cases in Alberta

A confirmed case (PCR positive) of WN Non-NS, related to travel in Saskatchewan, was reported with an onset date in mid-August 2008.

Two suspect WNV cases were reported but the suspect WNV case either did not meet the case definition, convalescent serology was inconclusive, or other disease events were in progress. Both cases were determined to have false positive immune globulin M (IgM) results.

Canadian Blood Services (CBS) Screening

There were no WNV positive blood donors detected by CBS in 2008, in contrast to three blood donors found positive by CBS in 2007. There has not been any Canadian transfusion-transmitted WNV infections detected since CBS began testing blood donors in July 2003.

5. Mosquito Surveillance Program

Introduction

The surveillance of mosquitoes assists in understanding the relationships between the success of WNV as a vector-borne disease and how it is influenced by mosquito species and numbers, and how they are both influenced by climatic conditions.

The WNV mosquito surveillance program component of the *West Nile virus in Alberta: Response Plan for 2008* was again established throughout six regional health authorities in Alberta (Table 3). The plan was implemented in 2008 with the cooperation of 16 Alberta municipalities, the Medicine Hat College in Medicine Hat, and the Canadian Forces Base Suffield.

Objectives of Surveillance

The overall objectives of the 2008 Mosquito Surveillance Program were to:

- alert the public when WNV had built up to the point of detection in the mosquito species that competently transmit WNV.
- perform WNV testing of *Culex* mosquito pools in different geographical areas of the province. Other species were to be monitored for WNV in the event that it became active in *Culex* populations.

Methods of Mosquito Surveillance

Surveillance Centres

Municipalities and other partners participating in the 2008 surveillance program included those listed in Table 3 (mosquito surveillance centres are also indicated in Figure 2).

Table 3: Participating partners in WNV mosquito surveillance for 2008

Regional Health Authority	Participating Partners
Capital	City of Edmonton
East Central	County of Vermilion River, Municipal District of Provost, County of Flagstaff, County of Camrose
David Thompson	City of Red Deer, Town of Drumheller, County of Stettler, Special Areas 2
Calgary	City of Calgary, Vulcan County, Municipal District of Willow Creek
Palliser	City of Brooks, County of Newell, Special Areas 3, County of Forty Mile, Medicine Hat College, and the Canadian Forces Base Suffield
Chinook	City of Lethbridge, County of Warner

Source: Alberta Environment, 2008

Operational Procedure and Testing

At the onset of the program, mosquito identification training and Alberta specific taxonomic keys were provided to municipal staff to enable separation of *Culex* species from all other mosquito species captured in the traps.

The standard Centre for Disease Control (CDC) model⁴ traps were used for monitoring diseases in insects. At least two traps were issued to all surveillance centres and operated in accordance with the WNV National Steering Committee Guidelines (i.e. baited with carbon dioxide through release from pressurized tanks, and operated without lights).

Municipalities commenced operation of the traps on the week of June 23 and terminated operation during the week of August 17, 2008. A maximum of sixty CDC traps operated one night per week over the nine week surveillance period for a total of 514 trapping events. Live adult female mosquitoes were collected, killed by freezing, identified to species, and sorted into pools of *Culex tarsalis* of no more than 50 adults per pool. The pooled mosquitoes were placed in vials and shipped to the Provincial Laboratory for Public Health in Calgary.

The Provincial Laboratory analyzed the mosquito pools for presence of WNV using both Nucleic Acid Sequence Based Amplification (NASBA) and Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) methods. Alberta Environment provided the results on a one-week turnaround basis to Alberta Health and Wellness, regional health

⁴ Model 1012-CO₂, available from J.W. Hock Company, California

authorities and participating municipalities. Results were posted on the Alberta Health and Wellness website.

Results

The amplification of the *Culex tarsalis* population throughout southern Alberta in 2007 and the warmer average weather conditions throughout winter of 2008 laid the foundation for an expected increase in WNV activity for the 2008 season. However, the summary of mosquito numbers captured weekly throughout the 2008 mosquito surveillance program (Figure 3) indicates a marked reduction in host-seeking activity compared to 2007. The total *Culex tarsalis* captured in the traps from the onset of the program until mid July, 2008 (Figure 4) was minimal and was attributed to the cooler weather conditions experienced during this period.

In 2008, the province experienced cooler than average spring temperatures. During the month of June, *Culex tarsalis* adult females that successfully overwintered are observed in traps, near the end of the same month, typically biting and attempting to establish a first generation of new adults. The colder daily temperatures prevented successful interaction (blood-feeding) with bird populations nesting in proximity to their larval development sites.

Over the nine week surveillance period, from June 23 (week 26) until August 17 (week 34), a total of 270,099 adult female mosquitoes were captured and counted, of which 2,970 *Culex tarsalis* adult females were separated, identified, and sorted into 282 pools/batches and submitted for WNV testing. The surveillance program did not confirm the presence of any WNV positive pools of *Culex tarsalis* (Table 4) for 2008.

Once again in the 2008 season, the collective effort of the participating municipal staff that obtained, sorted and identified mosquito samples, and WNV analysis conducted by the Provincial Laboratory in Calgary provided timely, weekly reports on mosquito-virus activity. This was delivered on a weekly basis to Alberta Health and Wellness and other provincial health officials, regional medical officers of health, health inspectors, municipal participants and officials, agricultural fieldmen, and other interested parties.

In 2008, the accumulations of average daily temperatures were monitored again through data provided by Agriculture and Agri-Food Canada. Accumulated degree-days⁵ above 16°C are the optimal developmental temperature for *Culex tarsalis*. In past years, virus activity in mosquitoes has been observed when the accumulated degree-days reach the range of 150 to 200. In 2007, the first mosquito-virus activity was observed again in mid July (Week 29) within this range. The accumulation of degree-days to this range was not achieved in 2008 until the latter part of July (Weeks 30 and 31) and with very low *Culex tarsalis* population numbers. At the time of the year when *Culex* typically reaches its population peak, accumulated degree-days continued to remain low and were contributing to this species failing to thrive through the season.

⁵ Accumulated degree days are a seasonal accumulated number of mean daily degrees above a base temperature determined for insect development.

Adult female *Culex* mosquitoes captured in traps during typical peak population activity in early August (Week 32) were less than five per cent of what was experienced in 2007. In addition, the number of submitted mosquito pools submitted for WNV analysis at this peak period was 41, as opposed to 164 pools in 2007.

Maps of the accumulated degree-days above 16°C are presented in Figures 5 to 7 for Week 32, which is the first full week in August that follows the holiday long weekend. This is the week that has been observed over the past six years of WNV mosquito surveillance where the *Culex tarsalis* populations reach peak biting activity (Figure 3).

Figure 5 demonstrates the cooler temperatures experienced to this time in 2008 and is a marked difference compared to 2007 and 2006 (Figure 6, 7). After Alberta's first experience with WNV in 2003, which was a warm and dry summer, cooler summer weather was experienced in 2004 and 2005 and found to suppress *Culex tarsalis* reproductive and biting activity. A similar host-seeking trend to these two years was observed in 2008.

Figure 2: 2008 West Nile virus mosquito surveillance centres

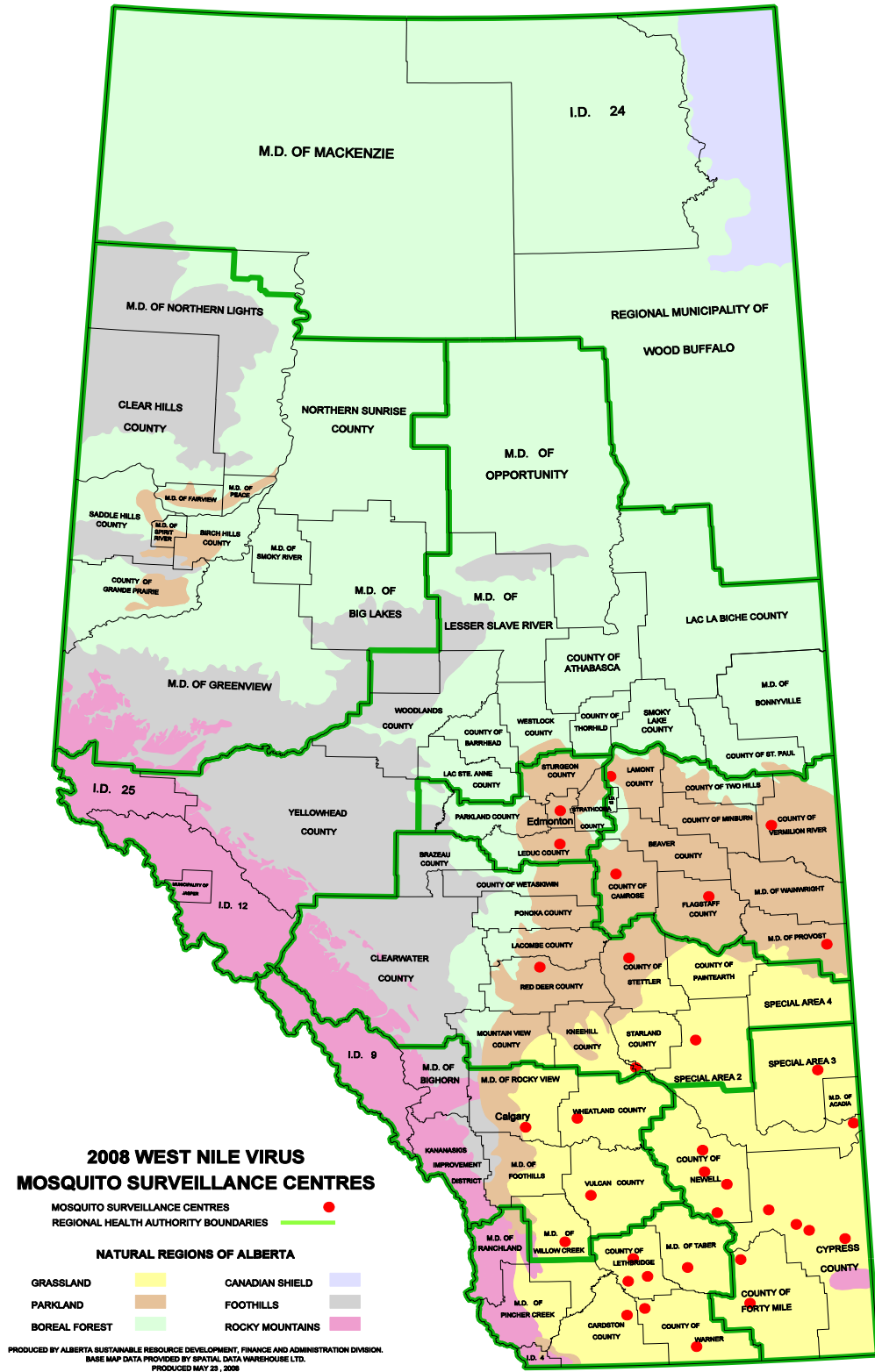
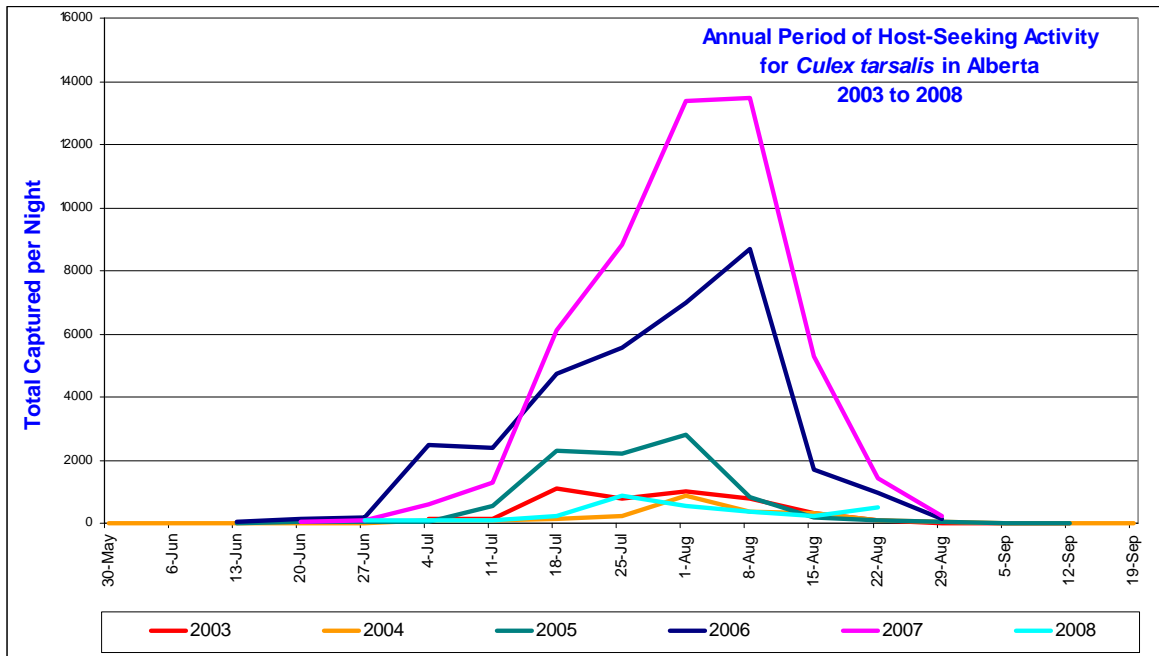
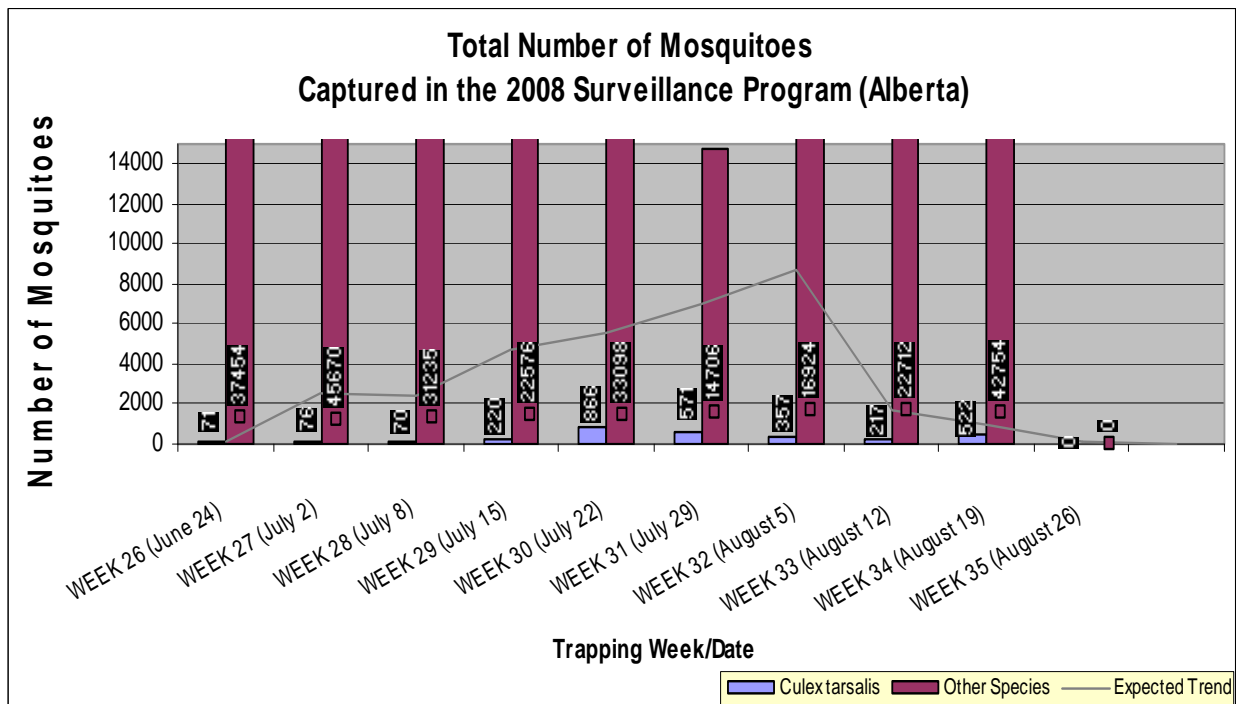


Figure 3: Comparison of the annual period of host-seeking activity for *Culex tarsalis* in Alberta determined through CDC trap surveillance from 2003 to 2008



Source: Alberta Environment, 2008

Figure 4: 2008 Weekly mosquito populations captured in surveillance traps indicating the proportion of *Culex tarsalis* mosquitoes captured

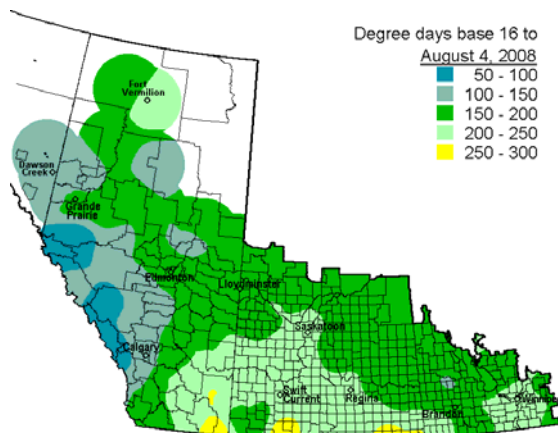


Source: Alberta Environment, 2008

Table 4: Summary of analysis results for *Culex tarsalis* mosquito specimens that were captured, pooled/ grouped and analyzed for West Nile virus in 2008

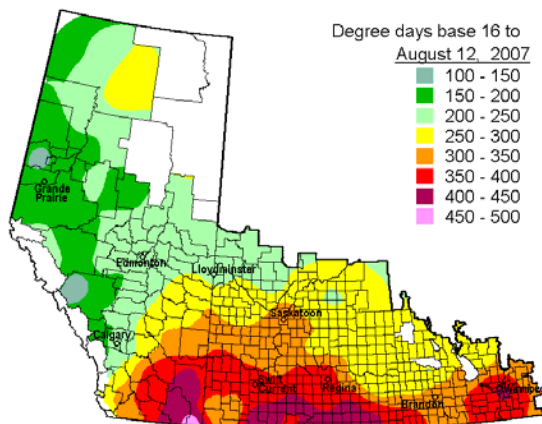
WEEK #	DATE	Total Mosquitoes Captured	Number of <i>Culex</i> of Total Captured	Number of <i>Culex</i> Pools Tested	Cumulative Number of <i>Culex</i> Pools Tested	Number of <i>Culex</i> Pools Positive for WNV
26	Jun 22 – Jun 28	37525	71	17	17	0
27	Jun 29 – Jul 5	45746	76	22	39	0
28	Jul 6 – Jul 12	31305	70	11	50	0
29	Jul 13 – Jul 19	22796	220	30	80	0
30	Jul 20 – Jul 26	33964	866	46	126	0
31	Jul 27 – Aug 2	15277	571	45	171	0
32	Aug 3 – Aug 9	17281	357	41	212	0
33	Aug 10 – Aug 16	22929	217	32	244	0
34	Aug 17 – Aug 23	43276	522	38	282	0
TOTALS		270099	2970	282	282	0

Figure 5: Accumulated Degree Days Above 16° - August 4, WEEK 32, 2008



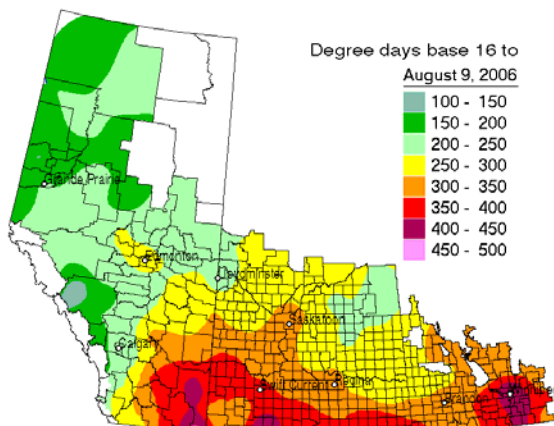
Source: Agriculture and Agri-Food Canada, Saskatoon Research Centre

Figure 6: Accumulated Degree Days Above 16° - August 12, WEEK 32, 2007



Source: Agriculture and Agri-Food Canada, Saskatoon Research Centre

Figure 7: Accumulated Degree Days Above 16° - August 9, WEEK 32, 2006



Source: Agriculture and Agri-Food Canada, Saskatoon Research Centre

Summary

Since the arrival of WNV into Alberta, first detected in 2003, the annual provincial mosquito surveillance program continues to confirm that *Culex tarsalis* is the most competent mosquito species transmitting WNV. This species, predominant in the warm and dry climate of southern Alberta, becomes active in late May or early June when average daily temperatures reach above 16°C and day lengths exceed 14 to 16 hours. In favourable weather conditions *Culex tarsalis* remains active until mid to late August when it suspends biting and reproductive activity in preparation for colder weather.

In 2008, the amplification of WNV activity to detectable levels was suppressed by cooler weather conditions during June and early July. This contributed to *Culex tarsalis* mosquito populations failing to develop, bite and reproduce at levels similar to what were experienced in 2004 and 2005, and contrary to what were experienced in the overall warmer, drier, more virus active summers of 2003, 2006 and 2007.

The mosquito surveillance program, with the cooperation of municipalities and regional health authorities, has been an effective tool for observing the build up of *Culex tarsalis* mosquito populations and confirming the geographical presence, amplification and spread of WNV. Surveillance conducted over the past six years in Alberta has demonstrated a consistent relationship between virus activity and *Culex tarsalis* populations. Each season *Culex tarsalis*, which is known to prefer birds for a blood meal, tends to become a more opportunistic feeder following bird nesting season, shifting to feed on other animal species and humans. Observations have shown that the ability of *Culex tarsalis* to amplify WNV and transmit it to other animal species is closely tied to seasonal weather conditions. Consistent warm summer weather contributes to high biting activity and population increases, in addition to shortening the time between *Culex tarsalis* becoming infected with WNV and being capable of transmitting WNV. The period of virus activity typically amplifies to a point of detection in mid-July and begins to decline when this mosquito suspends reproductive and biting activity in mid-August. As a result, the risk of humans acquiring WNV by mosquito bites is greatest during this same time period.

Trapping mosquitoes at various points throughout the southern part of the province where *Culex tarsalis* is most prolific is an effective means of confirming the presence and risk of WNV activity and has served well in providing confidence in the timing of public alerts and taking personal protective measures to reduce the risk of infection.

Based on the past six years of monitoring virus activity in mosquito populations in this province, Albertans can expect that the risk of infection of WNV will continue to be greatest from mid-July until late August. WNV activity will typically be located in the southeast corner of the province and extend north and westward through the summer, and should remain confined to the southern half of the province. Amplification of WNV will be dependent on presence of WNV and the success of *Culex tarsalis* mosquitoes re-establishing their population numbers each season during an accumulation of warm, dry days.

6. Provincial Laboratory for Public Health

Diagnostic Testing

The same combined serology/molecular approach used in 2007 was implemented in 2008. Nucleic acid amplification testing (NAAT) of plasma or CSF was undertaken on acute cases. WNV IgM was the main screening serological test, and was always confirmed by background subtraction to rule out non-specific binding. Immunoglobulin G (IgG) testing was performed to document rising antibody levels and to show low-avidity (recently formed) antibody.

Transplantation

NAAT testing on plasma specimens continued for 2008 on organ donors and recipients, as requested by the individual transplant programs. Testing was performed from June 1 until November 1, 2008. In addition, transplant screening was undertaken outside of this time if requested for out-of-country donors or those with a travel history. Beginning September 8, 2008 tissue and eye bank screening for WNV was transferred to Mount Sinai for testing using the Health Canada and FDA approved GenProbe assay. Organ donors continued to be screened at Provincial Laboratory for Public Health.

Mosquito Testing

In collaboration with Alberta Environment, NAAT testing was performed on 307⁶ mosquito pools in 2008. All samples were negative for West Nile RNA.

Table 5: WNV human testing summary for January 1 to December 31, 2008

Test	Population	Specimens tested	Specimens / Patients Positive
Serology (IgM screen with follow up IgM extraction, IgG and avidity testing as required)	human diagnostic	1119	10 IgM positive samples after background subtraction from 7 patients. 3 patients IgG positive (high avidity) and designated past infection. 3 patients IgM false positive (no IgG seroconversion and NAT negative) 1 non AB case seroconversion for IgM and low avidity IgG (see NAAT)
CSF NAAT	human diagnostic	190	0
Plasma NAAT	human diagnostic	740	1 NAAT positive case was IgM negative on first sample. Seroconversion was later confirmed.
Plasma NAAT	transplant screen	621	0
Total tests		2670	

NAAT: Nucleic Acid Amplification Test (= PCR or NASBA)

Source: Provincial Laboratory for Public Health, 2008

⁶ The number of mosquito pools tested (307) differs from the number in Table 4 (282) because 307 includes test runs that were completed.

7. Wild Bird Surveillance

Overview

When WNV arrived in Alberta in 2003, local bird populations had not been previously exposed and they had no natural immunity or resistance to infection. Members of the crow family (Corvidae: crows, magpies, jays, and ravens) were particularly susceptible and many died as a result of WNV infection. These dead birds became an early warning system to show where and when WNV was active in the province. Health professionals, veterinarians, and the public used the information to assess the risk of possible infection.

However, since dead bird surveillance was initiated in Alberta, a great deal has been learned on WNV activity. We now know that suitable conditions for WNV are limited largely to the Grassland Natural Region of southeastern Alberta where conditions are most favourable for development of *Culex tarsalis*. In addition, the number of dead corvids each summer has declined significantly since WNV first appeared, although the populations of crows and magpies did not decline. It is likely that crows and magpies, as well as all the other birds species exposed to WNV, adapted to the presence of WNV in the ecosystem and developed protective immunity.

The monitoring of dead birds was discontinued in 2007 because it no longer provided new information about WNV; however testing is conducted on suspect cases as a response to public concern.

Specimen Information

Table 6: Summary information of birds submitted in 2008 to Alberta Fish and Wildlife for WNV testing

Species	Location	Date Collected	Test Result
1 Common Crow (<i>Corvus sp.</i>)	Edmonton, Alberta	June 16, 2008	Test Negative
1 Common Crow (<i>Corvus sp.</i>)	Athabasca, Alberta	July 23, 2008	Test Negative
1 Black-billed Magpie (<i>Pica hudsonia</i>)	Stettler, Alberta	October 9, 2008	Test Negative

Bird specimen collected from Edmonton, Alberta

A juvenile crow was collected upon receiving a call from an Edmonton resident whom observed a crow on her property falling over and having trouble keeping upright. Members of the wildlife disease unit arrived on the property to find the juvenile crow with broken legs. The crow was euthanized on site and taken to the OS Longman laboratory for WNV testing. The crow tested negative for WNV.

Bird specimen collected from Athabasca, Alberta

A crow was submitted by Boyle Veterinary Service. The crow was flopping and acting strangely in water at the south end of Flat Lake (12-65-20-W4). The crow was submitted to the OS Longman for WNV testing. Results showed the crow tested negative for WNV.

Bird specimen collected from Stettler, Alberta

A magpie was collected on a reindeer farm near Stettler, Alberta. This magpie was of particular interest as several reindeer on this farm were sero-positive for WNV and one individual reindeer exhibited abnormal neurological signs. The magpie was submitted to the OS Longman for WNV testing. The magpie tested negative for WNV.

Summary

In 2008, a total of three birds were tested for WNV as a response to public concern. These birds included two American crows (*Corvus brachyrhynchos*) and one magpie (*Pica hudsonia*). All birds tested negative for WNV.

8. Horse Surveillance

Introduction

Horses become infected with WNV when they are bitten by mosquitoes carrying WNV. Research suggests that most horses bitten by infected mosquitoes will not develop clinical disease, but instead eliminate WNV asymptotically. Symptoms of WNV can include weakness, depression, muscle tremors, and an inability to rise. There is no specific treatment for horses affected with WNV. Up to 35 percent of horses that develop clinical signs may die or have to be euthanized due to complications from the illness.

WNV in horses became a provincially reportable disease in Alberta in 2003, meaning all suspected or confirmed cases must be reported to the Office of the Chief Provincial Veterinarian (OCPV).

From 2003 to 2005, Alberta Agriculture and Rural Development, asked Alberta veterinary practitioners to complete surveys on each horse suspected of having WNV. In 2003 and 2004, the surveys focused on horse location, clinical signs and vaccination information. Potential environmental and age/sex/breed risk factors were also queried, in order to gain some insight into what factors may contribute to a horse becoming infected. Surveys in 2005 were shortened to only include location, clinical signs and vaccination history. In 2006 and 2007, veterinarians were asked to provide additional information only on horses that tested positive for WNV, not suspect cases. For 2008 a new one page form was developed that included location, vaccination and travel information, as well as a request for clinical symptoms.

WNV in all species of animals is immediately notifiable under Canada's *Health of Animals Act*, which means veterinary laboratories are required to contact the Canadian Food Inspection Agency (CFIA) when diagnosing the disease.

Table 7: Summary of WNV in horses in Alberta from 2003 to 2008

Year	Positives	Deaths (%)
2003	170	59 (34.7%)
2004	4	1 (25.0%)
2005	3	1 (33.3%)
2006	9	unknown
2007	46	19 (41.3%)
2008	0	0

Source: Alberta Agriculture and Rural Development, 2008

Objectives

The objectives of the 2008 WNV surveillance program were to:

- Determine the number of horses tested as positive for WNV in Alberta,
- Determine the location of positive horses in the province, and
- Determine vaccine usage and clinical signs of positive cases.

Methods

Because WNV in horses is a reportable disease in Alberta, all veterinary practitioners examining a horse with clinical symptoms suggestive of WNV must report it to the OCPV. Veterinarians and/or private diagnostic laboratories are to notify the OCPV of positive cases and the results of laboratory tests (IgM Elisa serology), to confirm the disease.

Results

The first suspected case of WNV in horses was reported in late July, with reporting continuing until late October, 2008. Nine horses were suspected of having WNV in the 2008 season; however none were confirmed positive for WNV by lab testing. One horse had been vaccinated in 2008, two additional horses had been vaccinated in previous years and the remaining six horses had never been vaccinated.

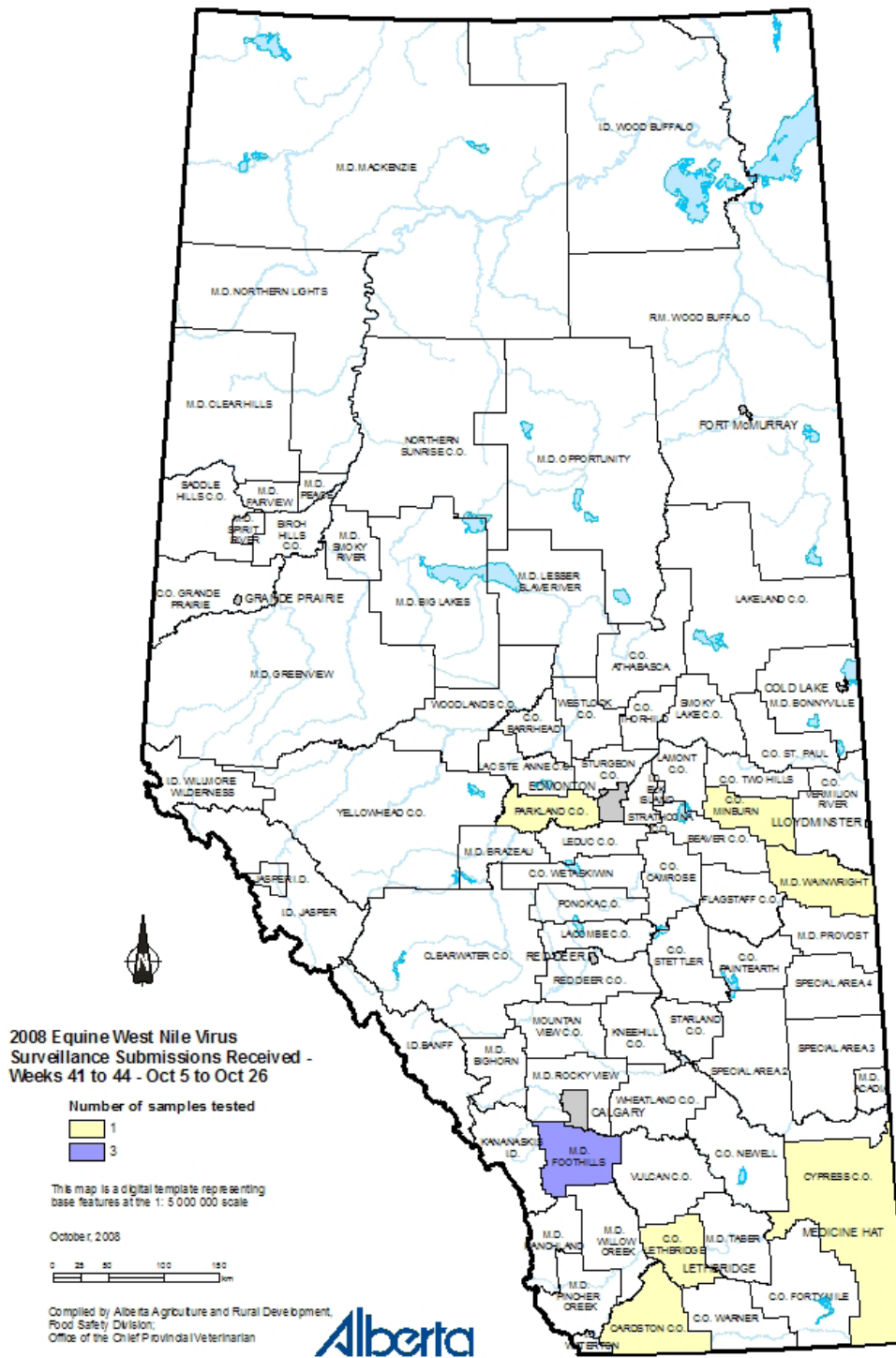
Geographic Distribution

The geographic distribution of suspect equine (horse) samples received and tested is illustrated in Figure 8.

Summary

In 2008, no horses were confirmed positive for WNV in a laboratory in Alberta.

Figure 8: Geographic distribution of laboratory-tested suspected cases of equine (horse) WNV in Alberta (2008)



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Bird Surveillance

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Horse Surveillance

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