SUMMARY REPORT

WEST NILE VIRUS IN ALBERTA 2007

FIGHT the BITE

Alberta

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I. Introduction

West Nile virus Interdepartmental Committee

Alberta's provincial West Nile virus (WNv) program initiated in 2002. Since then, an interdepartmental committee has met to prepare a provincial response plan to address potential WNv risks in Alberta. The interdepartmental committee also prepares a summary report at the end season. The interdepartmental committee in 2007 included the following members:

Dr. Karen Grimsrud	Acting Chief Medical Officer of Health (Chair) Alberta Health and Wellness
Leonor Tavares	WNv Provincial Coordinator Alberta Health and Wellness
Lisa Lachance	Communicable Disease Consultant Alberta Health and Wellness
Kim Simmonds	Epidemiologist Alberta Health and Wellness
Edi Skoropad	Information Officer Alberta Health and Wellness
Jock McIntosh	Pesticide Specialist, Alberta Environment
Dr. Peter Tilley	Medical Microbiologist Provincial Laboratory for Public Health

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

Dr. Gerald Ollis and Lisa Morin from the Office of the Provincial Veterinarian of Alberta Agriculture and Rural Development, provided information regarding horse surveillance.

West Nile virus Plan

The WNv plan in 2007 was comprised of two primary components: communication and surveillance:

- Communication occurred through a province-wide public awareness campaign, *Fight the Bite*, which provided messaging through news releases, radio, newspaper and magazine ads, brochures, brochure stands and posters, and information posted on departmental web pages.

- The provincial surveillance programs focused on human and mosquito testing. For example, 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 2007. However, individuals discovering an outbreak situation involving clusters of dead birds were asked to report it to a Fish and Wildlife office in Alberta. Similar to 2006, veterinarians were only asked to report suspect and confirmed horses in 2007. Only those horses that tested positive for WNv were investigated further.

  The surveillance programs were designed to identify the presence of the virus in natural regions of the province and thereby assisted in assessing the health risks to humans and in providing appropriate province-wide information to health care professionals and to the public.

Summary Report

The purpose of this technical report is to summarize and record communication and surveillance information on WNv in humans, mosquitoes, birds and horses in Alberta in 2007. The report is a compilation of work by members of the Interdepartmental Committee.

Alberta WNv background materials for the public and health professionals can be found in the following websites:

Alberta Health and Wellness
www.fightthebite.info

Alberta Agriculture and Rural Development
http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex5455?opendocument

Fish and Wildlife Division of Alberta Sustainable Resource Development
http://www.srd.gov.ab.ca/fishwildlife/livingwith/diseases/westnilevirus.aspx

II. Epizootiology of WNv

Overview

The transmission of all viruses is driven by a complex interaction of biological and non-biological factors. In the case of WNv, this involves birds, mosquitoes, and weather. The species, distribution, migration, immune response, and previous exposure to the virus all affect its success in birds. Similarly, the species distribution and life stage (only adults transmit the virus) affect the success of the virus in mosquitoes. Infected birds and mosquitoes must overlap in time and space in sufficient numbers to establish and maintain a viral population. In 2003, these components all came together in Alberta: the virus was introduced in late spring/early summer by migrating birds and established local viral populations in *Culex tarsalis* mosquitoes. During a relatively hot and dry summer, the virus multiplied and spread in at least three generations of suitable mosquito vectors. Extensive mortality was seen in crows and magpies throughout southern and central Alberta in 2003[1], and the virus also was detected in mosquitoes, horses, and humans in the same wide geographic distribution. By the end of the summer in 2003, there was evidence of extensive viral activity throughout the southern and central areas of Alberta.

Surveillance in United States and Canada

WNv occurs in a wide geographic area throughout the world. It was first detected on the North American continent in 1999 in northeast United States (U.S.). To date, WNv in humans, birds, horses or mosquitoes have been reported in all states except Hawaii, Alaska, and Oregon[2]. While the total number of human cases decreased in 2007 compared to 2006, the number of cases in California increased as the virus became established along the west coast (Figure 1).

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 now occurs from the Atlantic and Gulf Coast States westward to southern California. In northern areas, WNv can also overwinter in a few dormant individual mosquitoes. The virus is still extending its continental range and establishing populations within Mexico as well as Central and South America.

In Canada, the virus 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 the virus in birds and suitable mosquitoes.

The 2007 surveillance information on human cases of WNv throughout Canada shows a greater number of cases than previous years with no human cases reported in the Territories or Maritimes with the exception of one travel case in Nova Scotia (Table 1). Consistent warm and dry weather favored the amplification of the virus in record

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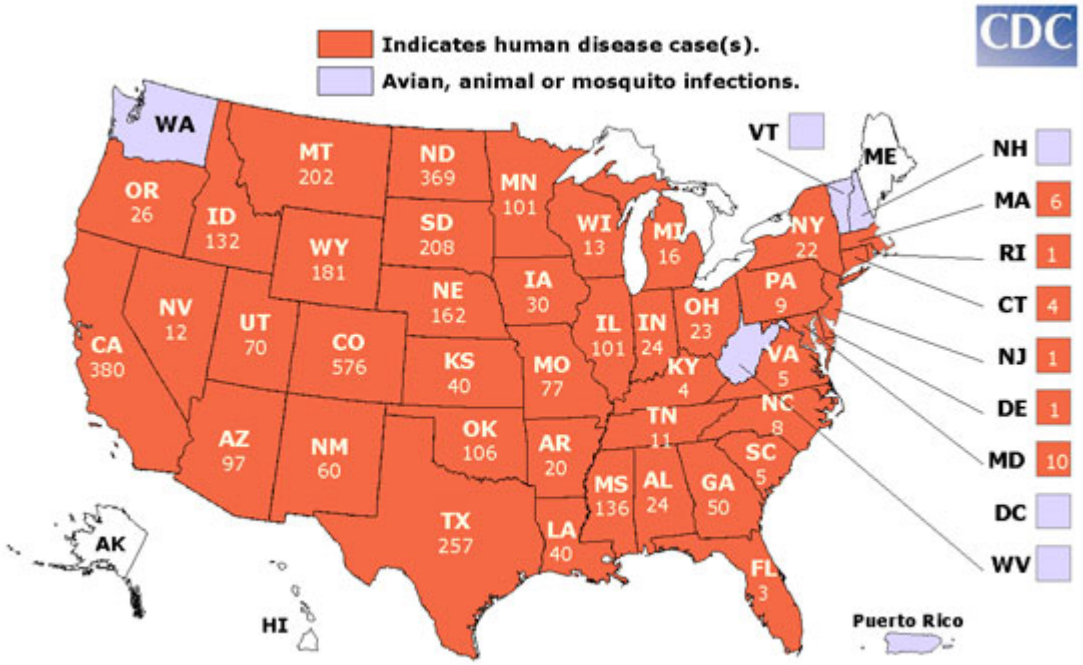
[1]Alberta West Nile virus wild bird surveillance, 2003
http://www.srd.gov.ab.ca/fishwildlife/livingwith/diseases/pdf/WNvSurveillance2003.pdf

[2] U.S. Centres for Disease Control : http://www.cdc.gov/ncidod/dvbid/westnile/background.htm

numbers in regions of Alberta, Saskatchewan and Manitoba compared to previous years (Table 2).

Figure 1: West Nile virus Activity in the United States in 2007



Map shows the distribution of avian, animal, or mosquito infection occurring during 2007 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.

Source: Centers for Disease Control and Prevention, figures updated as of April 1, 2008

Table 1: Human West Nile virus Clinical Cases and Asymptomatic Infections in Canada, 2007

Province/Territory	Neurological Syndrome	Non-Neurological Syndrome	Unclassified/ Unspecified	Total[b,c]	Asymptomatic Infection[d]
Newfoundland and Labrador	0	0	0	0	0
Prince Edward Island	0	0	0	0	0
Nova Scotia	0	0	1	1[1]	0
New Brunswick	0	0	0	0	0
Quebec	2	0	0	2[2]	0
Ontario[a]	2	11	0	13[5]	3
Manitoba	66	495	15	576	8
Saskatchewan	40	419	963	1422	14
Alberta[a]	21	299	0	320[41]	3
British Columbia	7	10	2	19[19]	0
Yukon	0	0	0	0	0
Northwest Territories	0	0	0	0	0
Nunavut	0	0	0	0	0
Total	**138**	**1234**	**981**	**2353**	**28**

[a] These totals include both probable and confirmed WNv cases.
[b] Total clinical cases is the sum of WNv Neurological Syndrome + WNv Non-Neurological Syndrome + WNv Unclassified/Unspecified.
[c] Totals indicated in superscript include cases related to travel outside the province/ territory.
[d] Satisfies West Nile virus diagnostic test criteria in the absence of clinical criteria.
Source: Public Health Agency of Canada, 2008

Table 2: West Nile virus Human Cases Reported Across Canada 2003-2007					
Province	**2007**	**2006**	**2005**	**2004**	**2003**
British Columbia	0	0	0	0	19 (19)
Alberta	320 (41)*	40 (3)	10 (3)	1 (1)	275
Saskatchewan	1422	19 (3)	58	10	848
Manitoba	576	50	54	3	139
Ontario	13	42 (3)	95 (4)	13	89
Quebec	(2)	0	7	1	17
Maritimes	(1)	0	3 (3)	0	3 (3)
Territories	0	0	0	0	1 (1)
Canada	2353	151	227	28	1391
Note: *Travel cases are indicated in brackets					

III. Communications

Submitted by: Edi Skoropad, *Alberta Health and Wellness*

Introduction

The primary goal of Alberta's WNv communication plan was to continue to inform Albertans about the risks of WNv infection. Main messaging and target areas reminded public to take steps to prevent and protect themselves from infection by wearing insect repellent with DEET and wearing long-sleeved shirts and pants when outdoors during peak periods of mosquito activity.

The goals for the communication strategy included:

- Ensure Albertans across the province are informed and have the knowledge to take appropriate precautions to protect their health.
- Provide an awareness to the public about the risks of WNv infection, especially Albertans in the medium and high-risk zones of the province.
- Provide access to reliable information and resources to guide the public, particularly active seniors aged 50+ and outdoor enthusiasts as well as health professionals in reducing the risk of infection with WNv.
- Inform stakeholders about specific strategies and responses.
- Provide public and professionals with up-to-date information on WNv surveillance in Alberta.
- Provide all government MLAs and constituency offices, opposition MLAs, health region chief executive officers and medical officers of health and health region communications contacts with copies of *West Nile virus: Alberta's Response Plan (2007)*.

Communication Strategy

The 2007 communication strategy utilized material similar to those available in 2006. One change to the messaging included the discontinuance of bird surveillance in 2007.

Information was made widely available to all Albertans, however outdoors enthusiasts and active seniors were particularly targeted due to their increased risk of acquiring WNv.

The strategy included:

Fight the Bite Public Awareness Campaign

The *Fight the Bite* public awareness campaign, which included radio, daily and weekly newspapers, brochures and posters began in June and ended early September to inform Albertans of the low risk but high consequences of WNv infection and how to protect themselves. The campaign was targeted to travellers within the province, outdoor enthusiasts and active seniors who are known to be at a higher risk of more severe consequences. Testimonials used in 2006, from two Albertans who had experienced more serious effects of the diseases in 2003, were included in the 2007 magazine, newspaper, brochure and radio advertisement to provide a more local perspective.

The public awareness campaign included:

- Newspaper ads were coordinated through the Public Affairs Bureau and an agency. Ads appeared in June through to the end of August in daily and weekly newspapers province-wide.
- Magazines ads were published in senior and sport enthusiast publications like Calgary and Edmonton Senior, Western Grandparent and Sportfishing Regulations 2007. Some ads were increased in size and placed in more prominent positions for readability.
- Radio spots 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, senior's organizations, parks, campgrounds and golf courses at the beginning of February.
- Fact sheets were available on the website at www.fightthebite.info

News releases

Three news releases in total were distributed province-wide in 2007:

- **June 1** - *Albertans encouraged to prepare for West Nile virus season* – covered information on protective clothing and insect repellent containing DEET, what to do if a horse was suspected or confirmed to have West Nile and that Albertans should no longer turn in dead birds for WNv testing.
- **July 23** – *West Nile virus confirmed in Alberta mosquitoes* – identified mosquitoes with WNv were found in Provost, Taber, Raymond, Calgary, Brooks and Burdet.
- **July 30** – *First human case of West Nile virus for 2007 confirmed in Alberta* – identified the first adult (female) in Alberta infected with WNv in Palliser Health Region.

Website

The *Fight the Bite* website www.fightthebite.info continued to provide public with up-to-date WNv information or public could visit www.health.gov.ab.ca, the Alberta Health and Wellness' homepage.

Links to resources available on other provincial department websites, Health Canada, U.S. Communicable Disease Control and other reputable sources were linked here as well. The website also provided responses to commonly asked questions and printable materials like posters and brochures used in the public awareness campaign.

Cumulative numbers of cases of humans infected with WNv and number of positive mosquito pools were posted weekly on the Alberta Health and Wellness website.

Call Centre

Service Alberta and Health Link Alberta operators provided general WNv information as well as information on personal protective measures.

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

Media Relations

Media calls requesting information on evidence of WNv appearing in Alberta were handled promptly by the Communications Branch. News releases, when there was evidence of WNv, were distributed immediately to ensure Albertans knew a risk of possible infection had increased. After the first human case was reported, media requesting WNv case numbers or other information were directed to the website. Information on WNv cases was updated weekly on the website.

Evaluation

A variety of measures were used to evaluate the 2007 public awareness WNv campaign. The following were monitored:

Media inquiries (newspaper/radio/television): approximately 65 WNv inquiries were responded to from March to October in 2007.

The WNV website main page received 10,861 visits between June 1 to October 15.

The top three WNv web pages visited out of 20 available pages were:

1) Common questions with 3,952 visits
2) WNv symptoms with 3,358 visits and
3) 2007 WNv evidence with 2,795 visits.

A population based survey (n=1000) was implemented by a marketing research firm in November of 2007 to determine Albertan's knowledge of WNv and behaviour change in relation to the campaign. Results indicated that over half of the participants had recently seen or heard WNv information. Wearing mosquito repellent with DEET was the main protection measure identified with close to half of the participants considering it as essential. Most of these participants considered their decision to wear mosquito repellent with DEET to be influenced by WNv information or campaign messages.

IV. Human Surveillance

Submitted by: Lisa Lachance, *Alberta Health and Wellness*

Introduction

Most people (80%) who become infected with WNv have no symptoms and are considered to have West Nile Asymptomatic Infection (WNAI). When infection does cause illness, symptoms will usually appear within 2 to 14 days. Symptoms vary from person to person. In cases of West Nile Non-Neurological Syndrome (WN Non-NS), formerly known as West Nile fever, symptoms can include fever, severe headache, chills and body aches. Some people may also develop a rash or swollen lymph glands.

In more severe cases, known as West Nile Neurological Syndrome (WNNS), symptoms include the rapid onset of severe headache, high fever, nausea, difficulty swallowing, vomiting, drowsiness, confusion, decreased level of consciousness, tremors, lack of coordination, muscle weakness and paralysis. In rare cases, these conditions can be fatal. Persons over 50 years of age and individuals with weaker immune systems are at greater risk of developing more severe symptoms and health effects that are more serious.

In 2007, there were three categories of WNv infection reported to Alberta Health and Wellness: WNAI, WN Non-NS and WNNS.

Methods

The method of reporting WNv cases to Alberta Health and Wellness varies by the category of WNV infection. Both confirmed and probable cases of WNNS are reportable by fastest means possible in addition to the standard reporting requirements for notifiable diseases in Alberta. Both WN Non-NS and WNAI require only the standard reporting requirements for notifiable diseases in Alberta. All three categories of WNv infection require the completion of the Alberta Enhanced Surveillance Report Form for West Nile Infection.

Results

Number of Cases

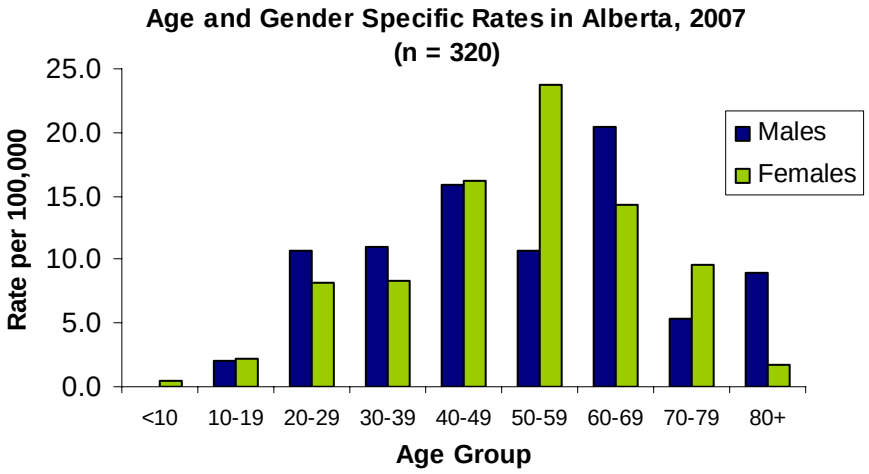
There were 320 cases of WNv reported in Alberta in 2007. WN Non-NS accounted for 296 (92.5%) of cases, while there were 21 cases (6.5%) of WNNS. There were three asymptomatic cases (WNAI).

Gender

Of the 320 cases, 154 (48%) of the cases of WNv infection were males and 166 (52%) were females. Two of the cases were pregnant. Of the two pregnant cases, to date one has delivered a healthy infant. No virus or antibody to WNv was isolated from the infant.

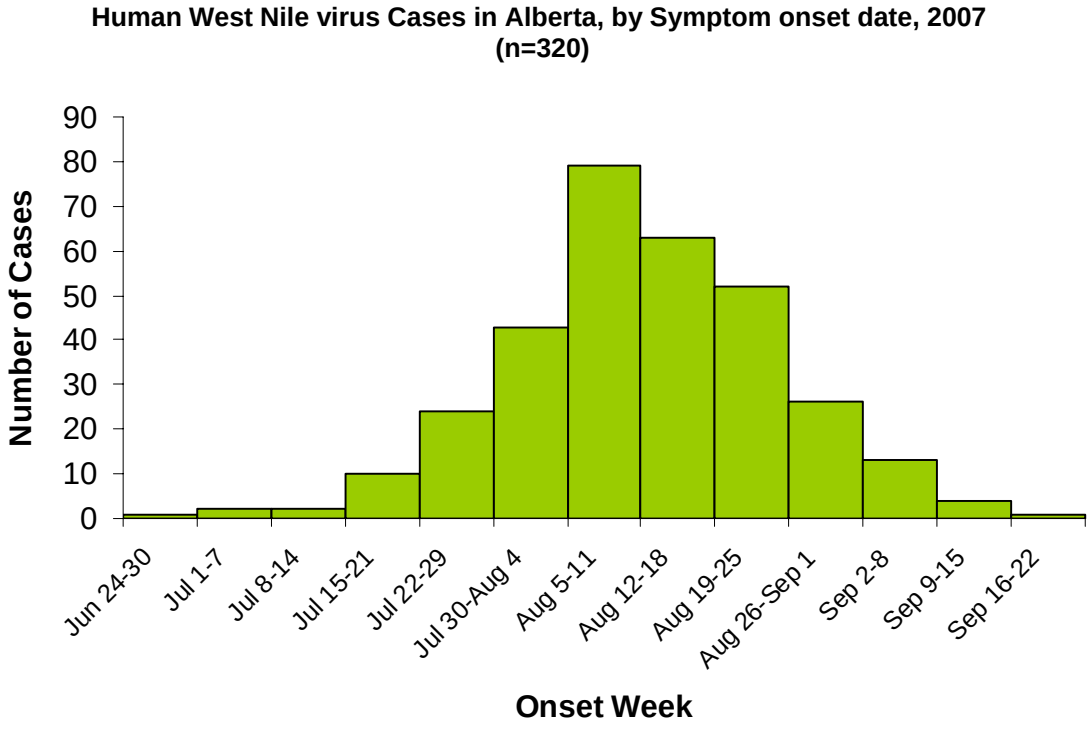
Age Distribution

Mean age at symptom onset is 46 years, with an age range of 8 to 84 years. The 50-59 age group for males and the 60-69 age group for females had the highest age-specific rates of WNv infection.



Epi Curve

The 320 cases of West Nile virus infection had symptom onset between June 29 and September 17, 2007. The incubation period for WNv infection is variable, between two and 15 days after exposure. In 2007 the majority of cases were exposed to the virus between late July and early August. The first cases had symptom onset earlier than previous years.



Geographical Distribution

There were 38 cases of WNv infection that were likely acquired through travel outside of the health region of where the person resides. The following map illustrates that the highest incidence of locally-acquired WNv cases (282) continues to occur in the southern most health regions (Figure 1).

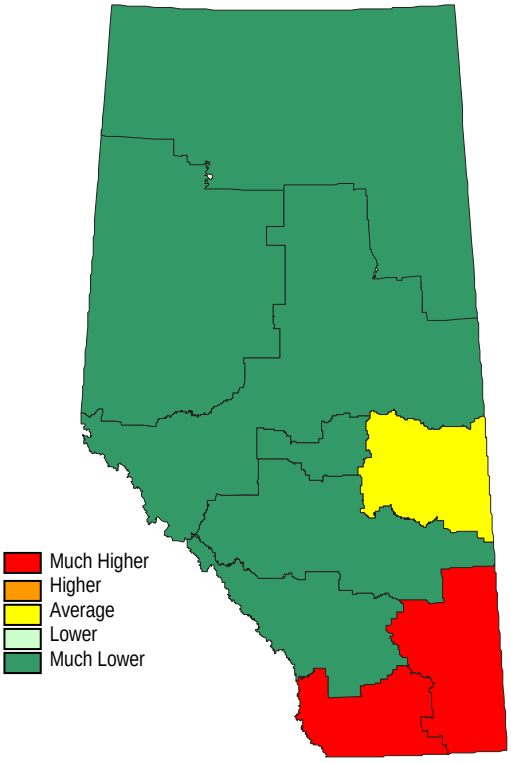


Figure 1: Distribution of WNv Cases in Alberta, 2007

Hospitalization/Deaths

Of the 320 WNv cases in 2007, two resulted in death. Thirty-one of the 320 cases were reported as hospitalized as result of their infection, including 19 of the 21 WNNS cases.

Summary

Despite the substantial number of cases (275) of WNv infection in Alberta in 2003, there were no locally acquired cases in 2004 and only seven in 2005. In 2006, there was an increase to 40 cases. The 2007 season brought with it the highest number of WNv cases so far with 320 cases. The geographic distribution of cases indicates that residents of the south eastern most region of the province are most at risk for WNv infection, likely due to the higher concentration of *Culex* mosquito population in the area.

V. Mosquito Surveillance Program

Submitted by: Jock McIntosh, *Alberta Environment*

Introduction

The surveillance of mosquitoes assists in understanding the relationship 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 mosquito surveillance program component of the *West Nile virus: Alberta Response Plan 2007* was again established throughout six regional health authorities in Alberta (see table below). The plan was implemented in 2007 with the cooperation of 16 Alberta municipalities and the Canadian Forces Base Suffield.

Objectives of Surveillance

The overall objectives of the 2007 Mosquito Surveillance Program were to:

- to perform WNv testing of *Culex* mosquito pools in different geographical areas of the province.
- alert the public when the virus had built up to the point of detection in the mosquito species that competently transmit the virus.

Methods of Mosquito Surveillance

Surveillance Centres

Municipalities participating in the 2007 surveillance program included those listed in the following table (trapping centres are also indicated on the following map).

Regional Health Authority	Participating Municipalities
Capital	City of Edmonton
East Central	City of Lloydminster, MD of Provost
David Thompson	City of Red Deer, Town of Drumheller, Special Areas 2
Calgary	City of Calgary, Vulcan County, MD of Willow Creek
Palliser	City of Brooks, City of Medicine Hat, County of Newell, Special Areas 3, County of Forty Mile
Chinook	City of Lethbridge, County of Warner

In addition, surveillance was conducted out of the Canadian Forces Base Suffield.

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 the other mosquito species captured in the traps.

Traps used to capture mosquitoes were the standard Centre for Disease Control (CDC) model[3] 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 in the form of dry ice or pressurized tanks, and operated without lights).

Municipalities commenced operation of the traps on June 19 and terminated operation on August 29, 2007. A maximum of fifty-five CDC traps operated one night per week over the 11-week surveillance period for a total of 537 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 regional health authorities and participating municipalities, and they were also posted on the Alberta Health and Wellness website.

Results

Mosquito activity in past years of surveillance lead to an expectation heading into the 2007 mosquito season, that if similar to 2006, *Culex* populations would thrive and build up in numbers throughout the entire southern half of the province. This is exactly what was observed (Figure 1), and the increase in standing water in central Alberta further contributed to a rise in *Culex* numbers later in the summer that had not been observed in several years. Figure 2 demonstrates the rise in population numbers from mid-June to mid-July that exceeded the trend of 2006 (indicated by the grey line).

The trapping event on July 17 (Week 29) was the first confirmation of presence of the virus in 2007 and was found through the eastern and southern quarter of the province (Provost, Calgary, Taber, Raymond, Brooks, Burdett and Foremost). The following week (Week 30) virus activity was confirmed throughout most of the trapping centres across the part of the province south of Highway #1 (Trans Canada) and north along the eastern Saskatchewan border to Provost. In addition, the first provincial human case of WNv was reported.

Dry, warm weather continued in southern Alberta throughout the summer with intermittent rain events. Much of the standing water disappeared in the Grassland Natural Region resulting in a decline in annoyance levels created by other mosquito species. As *Culex tarsalis*

[3] Model 1012-CO_2, available from J.W. Hock Company, California

favors dry conditions, their numbers continued to increase in remaining shallow and warm standing water created by irrigation events. Near the end of July, numbers of *Culex* were far exceeding those recorded in previous years, and in some of the trapping centres the *Culex* component exceeded over 95% of the total mosquitoes captured. As is typically found now in each year of surveillance, the *Culex* populations peaked in early August and by mid-August their numbers dramatically declined. At this time, the *Culex* mosquito enters diapause, a state of suspended biting and reproductive activity in preparation for colder climate.

Over the 11-week surveillance period, from June 19 (week 25) until August 29 (week 35), there was over a total of 217,658 adult female mosquitoes captured and counted, of which 50,684 *Culex tarsalis* adult females were separated, identified, and 31,943 were sorted into 929 pools/batches and submitted for WNv testing. The surveillance program confirmed 223 WNv positive pools of *Culex tarsalis* (Table I).

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

The potential correlation between weather, mosquito activity and risk of human infection is examined each year by all provinces. In 2007, the accumulations of average daily temperatures were monitored again through data provided by Environment Canada. Accumulated degree-days[4] 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 150 to 200. In 2007 the first mosquito-virus activity (Week 29) was observed again within this achieved range (Figure 3). This range was not achieved in the mid to northern half of the Parkland Natural Region until the following week, however there was still no trap evidence of *Culex* activity in this area. At the end of August (Figure 4), low numbers of larvae and adults were detected along the northern margins of the Parkland Natural Region, where the accumulated degree-days were reaching the range of 250 to 300 (yellow area) and human and horse cases were now being reported. This suggests that the WNv was present in the area and that conditions, now ideal for *Culex tarsalis*, were contributing to population increases and their becoming infective in a short period of time.

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


2007 WEST NILE VIRUS
MOSQUITO SURVEILLANCE CENTRES
MOSQUITOS SURVEILLANCE CENTRES
REGIONAL HEALTH AUTHORITY BOUNDARIES
NATURAL REGIONS OF ALBERTA
GRASSLAND
PARKLAND
BOREAL FOREST
CANADIAN SHIELD
FOOTHILLS
ROCKY MOUNTAINS
PRODUCED BY ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT, FINANCE AND ADMINISTRATION DIVISION.
BASE MAP DATA PROVIDED BY SPATIAL DATA WAREHOUSE LTD.
PRODUCED JUNE 20, 2007
I.D. 24
M.D. OF MACKENZIE
M.D. OF NORTHERN LIGHTS
REGIONAL MUNICIPALITY OF WOOD BUFFALO
M.D. OF CLEAR HILLS
NORTHERN SUNRISE COUNTY
M.D. OF OPPORTUNITY
M.D. OF FAIRVIEW
M.D. OF PEACE
SADDLE HILLS COUNTY
M.D. OF SPIRIT RIVER
BIRCH HILLS COUNTY
M.D. OF SMOKY RIVER
COUNTY OF GRANDE PRAIRIE
M.D. OF BIG LAKES
M.D. OF LESSER SLAVE RIVER
LAKELAND COUNTY
COUNTY OF ATHABASCA
M.D. OF GREENVIEW
M.D. OF BONNYVILLE
WOODLANDS COUNTY
WESTLOCK COUNTY
COUNTY OF THORHILD
SMOKY LAKE COUNTY
COUNTY OF BARRHEAD
COUNTY OF ST. PAUL
STURGEON COUNTY
LAC STE. ANNE COUNTY
LAMONT COUNTY
COUNTY OF TWO HILLS
I.D. 25
YELLOWHEAD COUNTY
PARKLAND COUNTY
Edmonton
STRATHCONA COUNTY
COUNTY OF MINBURN
COUNTY OF VERMILION RIVER
BRAZEAU COUNTY
LEDUC COUNTY
BEAVER COUNTY
MUNICIPALITY OF JASPER
I.D. 12
COUNTY OF WETASKIWIN
COUNTY OF CAMROSE
M.D. OF WAINWRIGHT
PONOKA COUNTY
FLAGSTAFF COUNTY
M.D. OF PROVOST
LACOMBE COUNTY
CLEARWATER COUNTY
COUNTY OF STETTLER
COUNTY OF PAINTHEARTH
RED DEER COUNTY
SPECIAL AREA 4
MOUNTAIN VIEW COUNTY
KNEEHILL COUNTY
STARLAND COUNTY
I.D. 9
M.D. OF BIGHORN
M.D. OF ROCKY VIEW
SPECIAL AREA 2
SPECIAL AREA 3
M.D. OF ACADIA
Calgary
WHEATLAND COUNTY
KANANASKIS IMPROVEMENT DISTRICT
M.D. OF FOOTHILLS
VULCAN COUNTY
COUNTY OF NEWELL
M.D. OF RANCHLAND
M.D. OF WILLOW CREEK
COUNTY OF LETHBRIDGE
M.D. OF TABER
CYPRESS COUNTY
COUNTY OF FORTY MILE
M.D. OF PINCHER CREEK
CARDSTON COUNTY
COUNTY OF WARNER
I.D. 4

Table I. Weekly summary of occurrences and locations of West Nile virus positive mosquito (*Culex tarsalis*) pools during the 2007 mosquito surveillance program.

WEEK #	*CAPTURE DATE*	*NUMBER OF WNV POSITIVE POOLS*	*CUMULATIVE NUMBER OF WNV POSITIVE POOLS*	*AREA OF TRAP LOCATIONS WHERE POSITIVE POOL CONFIRMED*
25	Jun 19	0	0	
26	Jun 25	0	0	
27	Jul 3	0	0	
28	Jul 10	0	0	
29	Jul 17	13	13	Provost, Calgary, Taber, Raymond, Brooks, Burdett, Foremost
30	Jul 24	25	38	Milk River, Taber, Picture Butte, Coaldale, Raymond, Magrath, Brooks, Tilley, Rolling Hills, Medicine Hat, Redcliff, Burdett, Foremost
31	Jul 31	43	81	Provost, Hanna, Drumheller, Calgary, Strathmore, Milk River, Taber, Picture Butte, Lethbridge, Raymond, Magrath, Brooks, Oyen, Empress, Medicine Hat, Burdett
32	Aug 7	62	143	Provost, Strathmore, Milk River, Picture Butte, Coaldale, Raymond, Magrath, Brooks, Tilley, Rolling Hills, Oyen, Empress, Medicine Hat, Redcliff, Irvine, Burdett, Foremost
33	Aug 14	53	196	Provost, Milk River, Taber, Picture Butte, Coaldale, Lethbridge, Raymond, Magrath, Oyen, Empress, Brooks, Tilley, Rolling Hills, Medicine Hat, Redcliff, Irvine, Foremost
34	Aug 21	23	219	Milk River, Picture Butte, Coaldale, Raymond, Magrath, Tilley, Empress, Medicine Hat, Redcliff
35	Aug 28	4	223	Brooks, Tilley, Medicine Hat, Redcliff

Figure 1. Comparison of the annual period of host-seeking activity for *Culex tarsalis* in Alberta determined through CDC trap surveillance from 2003 to 2007

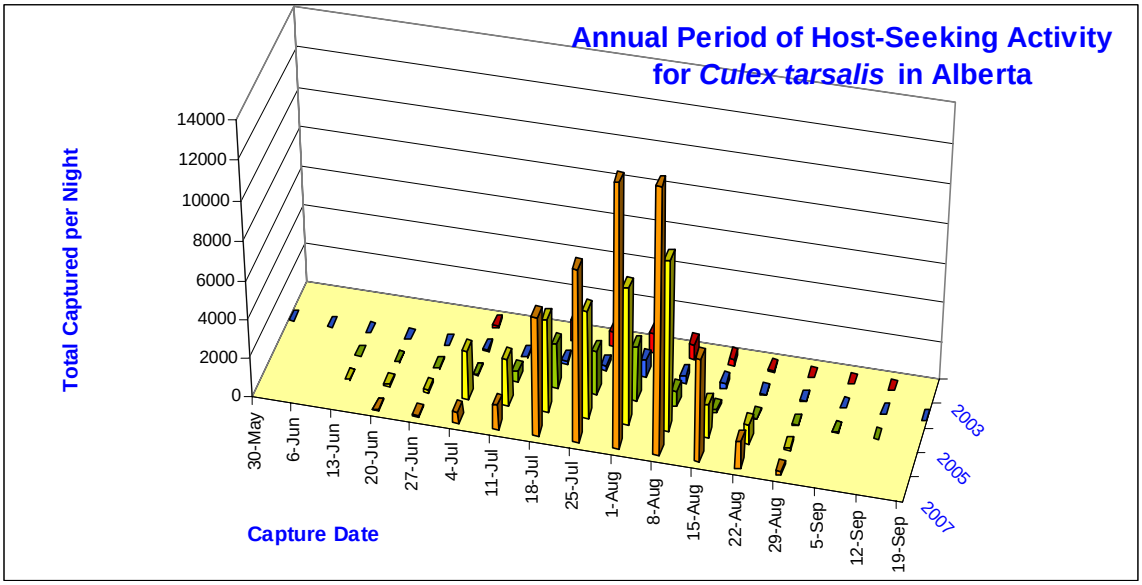


Figure 2. 2007 Weekly mosquito populations captured in surveillance traps indicating proportion of *Culex tarsalis* mosquitoes captured.

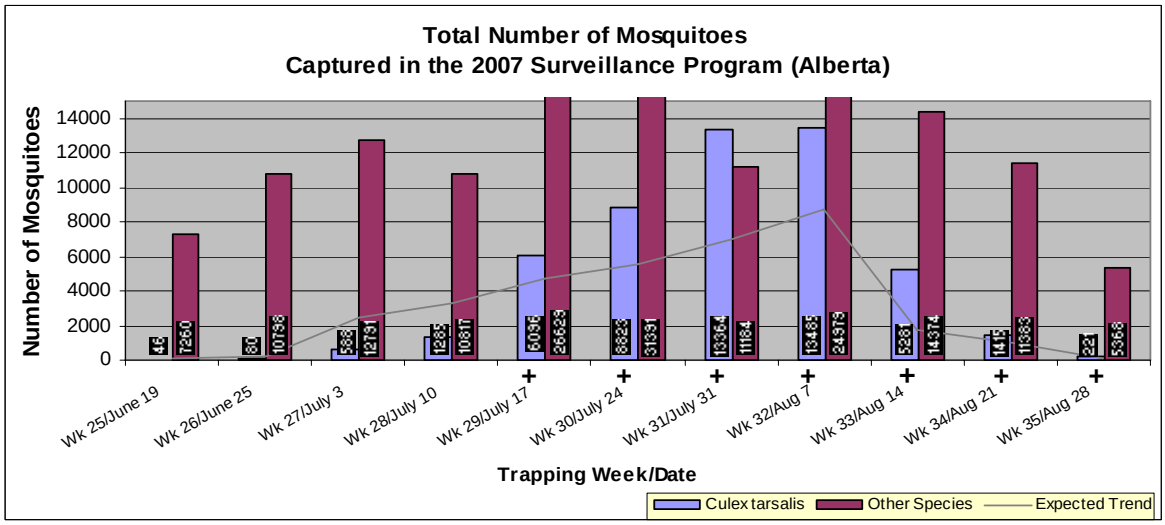


Figure 3. WEEK 29, 2007

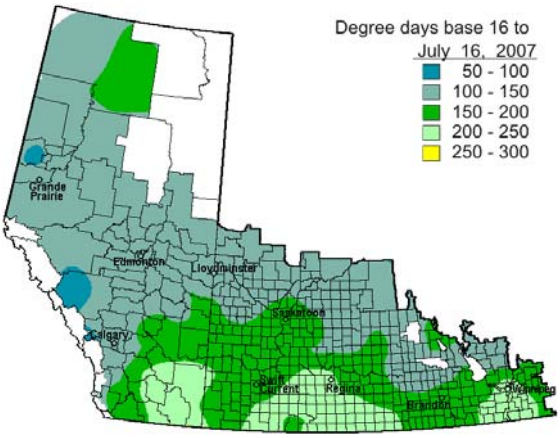
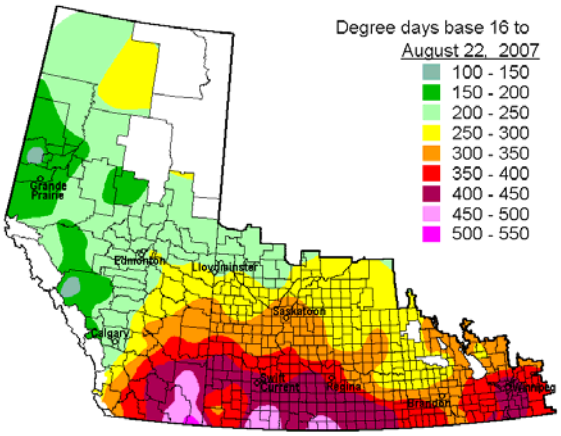


Figure 4. WEEK 34, 2007



Summary

Since the arrival of WNv into Alberta, first detected in 2003, the annual provincial mosquito surveillance program continues to confirm that the most competent mosquito species transmitting the virus within Alberta is *Culex tarsalis*. This species, predominant in the warm, 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. *Culex tarsalis* remains active until late August when it suspends biting and reproductive activity in preparation for colder weather.

The mosquito surveillance program, with the cooperation of municipalities and regional health authorities, is 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 five years in Alberta is demonstrating a consistent pattern of activity in *Culex tarsalis* populations. Each season *Culex tarsalis*, which is known to prefer birds for a blood-feeding, tends to become a more opportunistic feeder following bird nesting season, shifting to feed on other animal species and humans. The ability of *Culex tarsalis* to amplify the virus and transmit it to other species becomes dependent on weather conditions. Consistent warm summer weather contributes to high biting activity and population increases, in addition to shortening the time between becoming infected with WNv and being capable of transmitting the virus. 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 through this same time period. Through the establishment of trapping centres at various points throughout the southern part of the province where *Culex tarsalis* is most prolific, virus activity can be determined to confirm presence and risk of WNv. Public alerts and messaging on personal protective measures can be adjusted according to the activity information gathered.

VI. Provincial Laboratory for Public Health

Submitted by: Dr. Peter Tilley, *Provincial Laboratory for Public Health*

Diagnostic Human Testing

The combined serology/molecular approach was used for testing of human WNv samples in 2007. A record number of samples were tested this year (see below). Nucleic acid amplification testing (NAAT) of plasma or serum was most successful in acute cases. WNv IgM was the main serological test, and was always confirmed by background subtraction to rule out non-specific binding. IgG testing was performed to document rising antibody levels and to show low-avidity (recently formed) antibody. Most confirmed and probable WNv cases were identified by this test panel, but there were a few cases where blood tests were performed late, and stable high levels of medium-high avidity antibody were seen. These few cases did not meet the case definition.

Transplantation

Nucleic acid amplification testing (NAAT) on plasma specimens continued during 2007 on organ donors and recipients, as requested by the individual transplant programs. Testing was performed from June 1 to November 1, 2007 and on request for travelers. All transplant screens were negative in 2007.

Mosquito Testing

In collaboration with Alberta Environment, NAAT testing was performed on mosquito pools in 2007.

WNV Testing Summary

Jan 1st – Dec 31st, 2007

Test	Population	Specimens tested	Specimens Positive
Serology	human diagnostic	3332	390
CSF NAAT	human diagnostic	230	1
Plasma NAAT	human diagnostic	3084	205
Plasma NAAT	transplant screen	565	0
Mosquito pool NAAT	mosquito pools	936 pools	224 pools

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

VII. Wild Bird Surveillance

Submitted by Dr. Margo Pybus and Mark Ball, *Sustainable Resource Development*

Introduction

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 the virus 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 initiated in Alberta, a great deal has been learned from viral activity. We now know that suitable conditions for the virus 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 the virus first appeared. Yet 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 the virus in the ecosystem and developed protective immunity.

From these learnings, we can safely predict that WNv will reappear each year in July and August in southeastern Alberta. Thus, the monitoring of dead birds was discontinued in 2007 because it no longer provides new information about WNv.

Methods

As in previous years, outbreak situations involving clusters of dead birds found in a small area and over a short time frame were reported to a Fish and Wildlife office.

Results

Table 1 contains summary information regarding each of the tested birds submitted to Alberta Fish and Wildlife in 2007. Details of each reported incident follows.

Table 1: Dead Birds Tested in 2007			
Species	**Location**	**Date Collected**	**Test Result**
Great Grey Owl (*Strix nebulosa*)	Alberta Birds of Prey Centre Coaldale, Alberta	August 15, 2007	Test Positive
Great Grey Owl (*Strix nebulosa*)	Alberta Birds of Prey Centre Coaldale, Alberta	August 15, 2007	Test Positive
Snowy Owl (*Bubo scandiacus*)	Alberta Birds of Prey Centre Coaldale, Alberta	August 15, 2007	Test Positive
Snowy Owl (*Bubo scandiacus*)	Alberta Birds of Prey Centre Coaldale, Alberta	August 15, 2007	Test Positive
Peregrine falcon (*Falco peregrinus*)	Alberta Birds of Prey Centre Coaldale, Alberta	August 15, 2007	Test Negative
Common Crow (*Corvus sp.)*	Lethbridge, Alberta Twp 15, Rg 22	July 30, 2007	Test Negative

Specimens collected from Alberta Birds of Prey Centre

Five bird specimens were submitted to Fish and Wildlife Disease Section on September 7, 2007 (Date of collection August 15) for post mortem examination and WNv testing. The birds, which included two Snowy Owls, two Great Grey owls and one Peregrine falcon, were received from the Alberta Birds of Prey Centre, Coaldale AB. The centre reported that the specimens were found dead at various times over several days prior to the issue of the incident report to Fish and Wildlife (August 15). Also reported was that the centre was receiving calls regarding additional bird deaths in the local area. All specimens were sent to the Canadian Cooperative Wildlife Health Centre (CCWHC) in Saskatoon for WNv testing. Test results showed that all four of the owl specimens were positive for WNv. The Peregrine falcon was test negative for WNv and likely succumbed to other injuries.

Specimen collected from Lethbridge, Alberta

Lethbridge Fish and Wildlife received a call pertaining to multiple observations of dead/dying corvid species (crows/magpies) on July 30, 2007 in area: Township 15, Range 22. One fresh dead American crow and one partially decomposed American crow were collected from a local site by Fish and Wildlife staff members in the area. The fresh dead sample was submitted for testing. WNv testing (VEC test) was preformed at OS Longman post mortem lab in Edmonton with negative result.

Summary

In 2007, a total of six birds were tested for WNv as a response to public concern. These specimens included two Great Grey Owls (*Strix nebulosa*), two Snowy Owls (*Bubo scandiacus*), one Peregrine falcon (*Falco peregrinus*), and one American crow (*Corvus brachyrhynchos)*. All four of the owl specimens tested positive for WNV. Two other specimens tested negative for WNv.

VIII. Horse Surveillance

Submitted by Dr. Gerald Ollis and Lisa Morin, *Alberta Agriculture and Rural Development*

Introduction

Horses become infected with WNv when they are bitten by mosquitoes that carry the virus. Research suggests that most horses bitten by infected mosquitoes will not develop clinical disease, but instead will eliminate the virus uneventfully. 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 are required to 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 the virus. 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. In 2005, surveys were shortened to only include location, clinical signs and vaccination information. In 2006 and 2007, veterinarians were only asked to provide additional information on horses that tested positive for WNv, not suspects. This information included location, vaccination information and whether or not the horse had recently traveled.

WNv in all species of animals is immediately notifiable under Canada's *Health of Animals Act*, meaning that veterinary laboratories are required to contact the Canadian Food Inspection Agency (CFIA) regarding the suspicion or diagnosis of WNv.

Table 1 summarizes the occurrence of WNv in Alberta horses in from 2003 to 2007.

Table 1. Summary of WNv in horses in Alberta from 2003 - 2007

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

Objectives

The objectives of horse surveillance in 2007 were to:

- Determine the number of horses reported as positive for WNv in Alberta in 2007,
- Determine the location of positive horses in the province, and
- Determine vaccine usage of positive cases.

Methods

WNv in horses is a reportable disease in Alberta, therefore, all veterinary practitioners who examined a horse with suspicious clinical symptoms were required to report this fact to the OCPV. Veterinarians and/or private diagnostic laboratories notified the OCPV of positive cases and the results of laboratory tests (IgM Elisa serology), which confirmed the disease.

Results

The first case of WNv in horses was reported in early August, with reporting continuing until late October. Forty-six horses confirmed positive for WNv. Two had been vaccinated for the virus. Nineteen horses died, including fifteen that were euthanized due to complications from the virus.

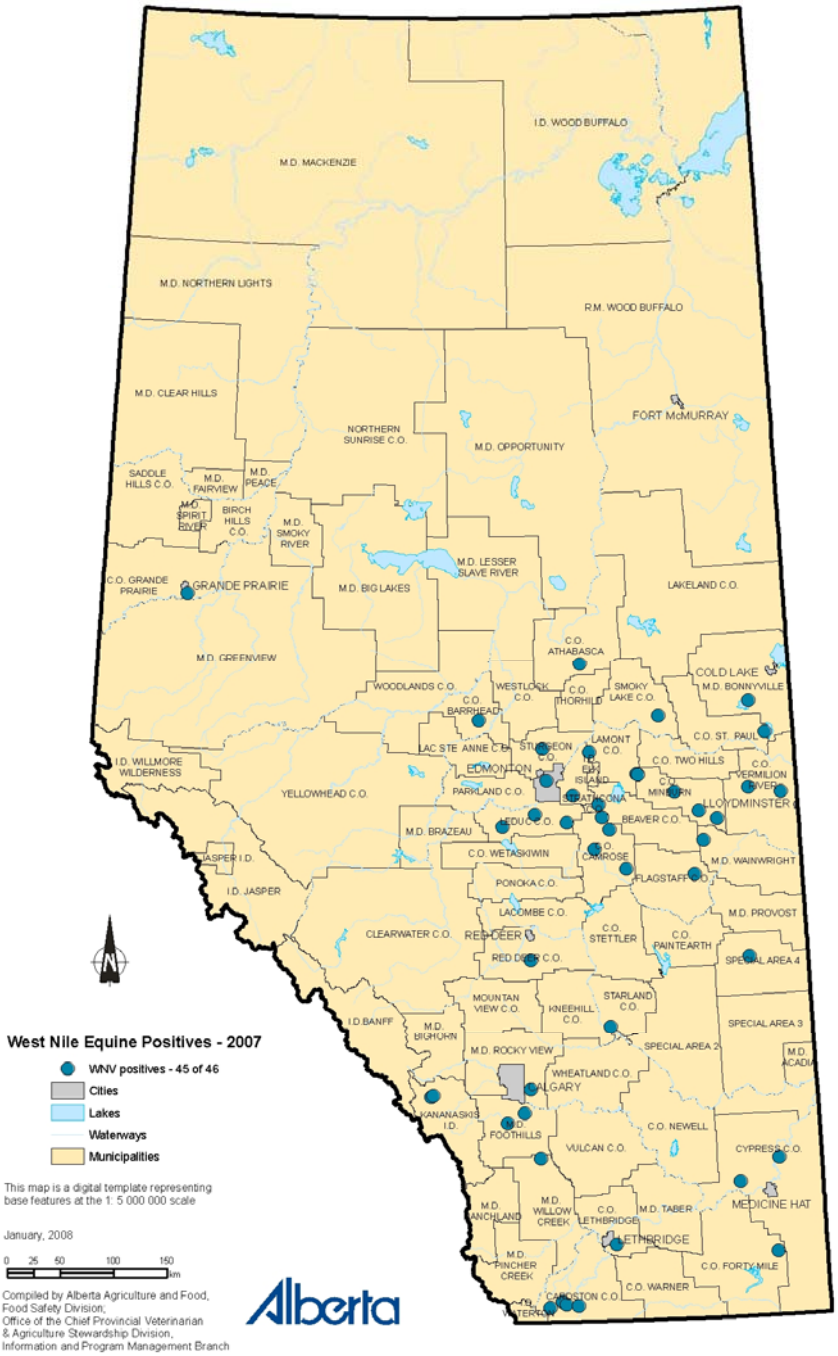
Geographic Distribution

The geographic distribution of confirmed WNv cases in horses is illustrated in Figure 1. Over half of the positive horse cases reported were located east or north of Edmonton.

Summary

In 2007, there were forty-six horses that were laboratory confirmed positive for WNv in Alberta.

Figure 1. Geographic distribution of equine laboratory confirmed positive cases of WNv in Alberta (2007)



IX. Acknowledgements

Thank you to the members of the Interdepartmental Working Committee who provided leadership in the response to WNv in 2007.

Thank you to staff from municipalities, regional health authorities, government agencies and departments who provided their support and expertise in monitoring and responding to West Nile virus in Alberta in 2007.

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- Regional Medical Officers of Health and communicable disease staff
- Dr. Judy Hannon, Dr. Dale Towns and staff from the Canadian Blood Services

Mosquito Surveillance

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- Noemie Jenni, Alberta Environment
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- Bill Kolkman, Special Areas 3
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- Jeff LePage, County of Warner

Bird Surveillance

Thank you to members of the public for providing information regarding dead birds found and to Fish and Wildlife staff who fielded public phone calls and took appropriate action.

Horse Surveillance

The Office of the Chief Provincial Veterinarian extends a thank you to the veterinary practitioners in Alberta and horse owners for their cooperation. Thanks are also extended to the Alberta Veterinary Medical Association (AVMA) for publicizing WNv information.