

**Appendices**

**Appendix A**

**Health Protection and Promotion Act  
Loi sur la protection et la promotion de la santé**

**ONTARIO REGULATION 199/03**

*Amended to O. Reg. 413/06*

**CONTROL OF WEST NILE VIRUS**

***This Regulation is made in English only.***

**Determination if action required**

1. A medical officer of health shall make a determination whether action is required by a municipality to decrease the risk of West Nile Virus to persons either inside or outside the health unit served by the medical officer of health, based upon a local risk assessment in accordance with the document entitled *West Nile Virus Preparedness and Prevention Plan 2006*, published by and available from the Ministry of Health and Long-Term Care, dated June 26, 2006. O. Reg. 231/03, s. 1; O. Reg. 322/04, s. 1; O. Reg. 413/06, s. 1.

**Notice to municipality**

2. (1) Where the medical officer of health has determined that action is required, he or she may give notice to the municipality of the required action. O. Reg. 199/03, s. 2 (1).

(2) In determining required actions under subsection (1), the medical officer of health shall have regard to,

- (a) the document mentioned in section 1; and
- (b) the generally accepted practices in the field of public health with regard to decreasing the risk of West Nile virus to persons. O. Reg. 199/03, s. 2 (2).

**Must comply**

3. A municipality shall comply with any requirements set out in the notice. O. Reg. 199/03, s. 3.

**What may be required**

4. Action required under this Regulation may include, without being limited to,
- (a) requirements respecting source reduction measures;
  - (b) requirements respecting surveillance;
  - (c) requirements respecting public awareness campaigns about personal protection;
  - (d) requirements respecting the control measures for larviciding and adulticiding set out in Table 1; and
  - (e) requirements respecting the time within which the action shall be taken. O. Reg. 199/03, s. 4.

## 2006 – West Nile Virus in the Region of Peel

TABLE 1

### LARVICIDING AND ADULTICIDING IN ONTARIO — WEST NILE VIRUS RESPONSE

“Triggers” based on surveillance of WNV positive humans, birds, mosquito pools or mammals (horses)

Current-Year WNV findings in Health Unit or municipality	Last Year's WNV findings in Health Unit or municipality	Preparatory Status (Larval surveys, mosquito trapping, mapping, training, etc.)	Larviciding ACTION	Adulticiding ACTION
No West Nile virus found yet	No West Nile virus found; virus found in adjacent Health Unit(s)	Not yet done	Do the preparatory work, then larvicide where indicated	Not indicated
No virus found yet	Virus found	Not yet done	Do the preparatory work, then larvicide where indicated	Not indicated
No virus found yet	Virus found	Done last year and under way this year	Larvicide where indicated	Not indicated
Virus found in <u>non</u> -human (dead bird, mosquito pool or mammal) — isolated or as a “hot spot”	Virus found or not found	Done or under way this year	If a “hot spot” and larvae are present, larvicide around this “hot spot” (if not too late in the season)	Adulticide a 3-km “Zone” ONLY IF there are high-risk indicators of transmission to humans*
<u>Human</u> case(s) — one or a few in a space-time “cluster”	Virus found or not found	Done or under way this year	Larvicide around the case or cluster if larvae are present (and if not too late in season)	Adulticide a 3-km radius Zone around the case or cluster
Human cases continue to occur; continued high-risk indicators*	Virus found or not found	Done or under way this year	Larvicide widely where larvae are found (if not too late in season)	Adulticide 3-km Zones — may be contiguous or overlapping

**Note:** Public education efforts and non-pesticide means of mosquito source reduction should be in place, and increased as increasing evidence of virus is found (especially human cases) in the current year.

\* **High-risk indicators of transmission to humans:** increasing dead bird sightings; high mosquito infection rates; abundant bridge vector populations; increasing mammal (horse) cases; proximity of mosquito breeding sites to human populations (especially large population centres) and weather conditions that favour mosquito breeding.

1. These are minimum activity standards. Medical Officers of Health may increase the Zone size to be treated or take additional mosquito control actions, if justified by scientific data or recommendations.
2. Medical Officer of Health will maintain a means to record, investigate, and report any confirmed or likely adverse or unintended human health effects attributed to mosquito control actions, and will report any non-human environmental adverse effects that he or she knows about to the Ministry of the Environment and/or other relevant local or provincial authorities.

O. Reg. 199/03, Table 1.

**Source:**

e-Laws, Ontario

[http://www.e-laws.gov.on.ca/DBLaws/Regs/English/030199\\_e.htm](http://www.e-laws.gov.on.ca/DBLaws/Regs/English/030199_e.htm)

Retrieved October 23, 2006

## Appendix B

### Health Protection and Promotion Act Loi sur la protection et la promotion de la santé

#### ONTARIO REGULATION 558/91

*Amended to O. Reg. 364/06*

#### SPECIFICATION OF COMMUNICABLE DISEASES

*This Regulation is made in English only.*

1. The following diseases are specified as communicable diseases for the purposes of the Act:

Acquired Immunodeficiency Syndrome (AIDS)

Amebiasis

Anthrax

Botulism

Brucellosis

Campylobacter enteritis

Chancroid

Chickenpox (Varicella)

Chlamydia trachomatis infections

Cholera

Cytomegalovirus infection, congenital

Diphtheria

Encephalitis, primary viral

Food poisoning, all causes

Gastroenteritis, institutional outbreaks

Giardiasis

Gonorrhoea

Group A Streptococcal disease, invasive

Haemophilus influenzae b disease, invasive

Hemorrhagic fevers, including,

i. Ebola virus disease

ii. Marburg virus disease

iii. Other viral causes

Hepatitis, viral,

i. Hepatitis A

ii. Hepatitis B

iii. Hepatitis D (Delta hepatitis)

iv. Hepatitis C

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Influenza  
Lassa Fever  
Legionellosis  
Leprosy  
Listeriosis  
Lyme Disease  
Malaria  
Measles  
Meningitis, acute,  
    i. bacterial  
    ii. viral  
    iii. other  
Meningococcal disease, invasive  
Mumps  
Ophthalmia neonatorum  
Paratyphoid Fever  
Pertussis (Whooping Cough)  
Plague  
Pneumococcal disease, invasive  
Poliomyelitis, acute  
Psittacosis/Ornithosis  
Q Fever  
Rabies  
Respiratory infection outbreaks in institutions  
Rubella  
Rubella, congenital syndrome  
Salmonellosis  
Severe Acute Respiratory Syndrome (SARS)  
Shigellosis  
Smallpox  
Syphilis  
Transmissible Spongiform Encephalopathy, including,  
    i. Creutzfeldt-Jakob Disease, all types  
    ii. Gerstmann-Sträussler-Scheinker Syndrome  
    iii. Fatal Familial Insomnia  
    iv. Kuru  
Trichinosis  
Tuberculosis  
Tularemia  
Typhoid Fever

## 2006 – West Nile Virus in the Region of Peel

Verotoxin-producing E. coli infections

West Nile Virus Illness

Yellow Fever

Yersiniosis

O. Reg. 558/91, s. 1; O. Reg. 204/95, s. 1; O. Reg. 380/01, s. 1; O. Reg. 431/01, s. 1; O. Reg. 80/03, s. 1; O. Reg. 97/03, s. 1; O. Reg. 364/06, s. 1.

2. OMITTED (REVOKES OTHER REGULATIONS). O. Reg. 558/91, s. 2.

### **Source:**

e-Laws, Ontario

[http://www.e-laws.gov.on.ca/DBLaws/Regs/English/910558\\_e.htm](http://www.e-laws.gov.on.ca/DBLaws/Regs/English/910558_e.htm)

Retrieved October 23, 2006

**Appendix C**  
**Health Protection and Promotion Act**  
**Loi sur la protection et la promotion de la santé**

**ONTARIO REGULATION 559/91**

*Amended to O. Reg. 365/06*

**SPECIFICATION OF REPORTABLE DISEASES**

***This Regulation is made in English only.***

1. The following diseases are specified as reportable diseases for the purposes of the Act:

Acquired Immunodeficiency Syndrome (AIDS)

Amebiasis

Anthrax

Botulism

Brucellosis

Campylobacter enteritis

Chancroid

Chickenpox (Varicella)

Chlamydia trachomatis infections

Cholera

Cryptosporidiosis

Cyclosporiasis

Cytomegalovirus infection, congenital

Diphtheria

Encephalitis, including,

i. Primary, viral

ii. Post-infectious

iii. Vaccine-related

iv. Subacute sclerosing panencephalitis

v. Unspecified

Food poisoning, all causes

Gastroenteritis, institutional outbreaks

Giardiasis, except asymptomatic cases

Gonorrhoea

Group A Streptococcal disease, invasive

Group B Streptococcal disease, neonatal

Haemophilus influenzae b disease, invasive

Hantavirus pulmonary syndrome

Hemorrhagic fevers, including,

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- i. Ebola virus disease
  - ii. Marburg virus disease
  - iii. Other viral causes
- Hepatitis, viral,
- i. Hepatitis A
  - ii. Hepatitis B
  - iii. Hepatitis C
  - iv. Hepatitis D (Delta hepatitis)
- Herpes, neonatal
- Influenza
- Lassa Fever
- Legionellosis
- Leprosy
- Listeriosis
- Lyme Disease
- Malaria
- Measles
- Meningitis, acute,
- i. bacterial
  - ii. viral
  - iii. other
- Meningococcal disease, invasive
- Mumps
- Ophthalmia neonatorum
- Paratyphoid Fever
- Pertussis (Whooping Cough)
- Plague
- Pneumococcal disease, invasive
- Poliomyelitis, acute
- Psittacosis/Ornithosis
- Q Fever
- Rabies
- Respiratory infection outbreaks in institutions
- Rubella
- Rubella, congenital syndrome
- Salmonellosis
- Severe Acute Respiratory Syndrome (SARS)
- Shigellosis
- Smallpox
- Syphilis

## 2006 – West Nile Virus in the Region of Peel

Tetanus

Transmissible Spongiform Encephalopathy, including,

- i. Creutzfeldt-Jakob Disease, all types
- ii. Gerstmann-Sträussler-Scheinker Syndrome
- iii. Fatal Familial Insomnia
- iv. Kuru

Trichinosis

Tuberculosis

Tularemia

Typhoid Fever

Verotoxin-producing E. coli infection indicator conditions, including Haemolytic Uraemic Syndrome (HUS)

West Nile Virus Illness

Yellow Fever

Yersiniosis

O. Reg. 559/91, s. 1; O. Reg. 205/95, s. 1; O. Reg. 129/96, s. 1; O. Reg. 381/01, s. 1; O. Reg. 432/01, s. 1; O. Reg. 81/03, s. 1; O. Reg. 96/03, s. 1; O. Reg. 365/06, s. 1.

2. OMITTED (REVOKES OTHER REGULATIONS). O. Reg. 559/91, s. 2.

### Source:

e-Laws, Ontario

[http://www.e-laws.gov.on.ca/DBLaws/Regs/English/910559\\_e.htm](http://www.e-laws.gov.on.ca/DBLaws/Regs/English/910559_e.htm)

Retrieved: October 24, 2006

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**Appendix D**

**Week Codes - 2006 - West Nile Virus**

Number	2006
1	Jan 1 - Jan 7
2	Jan 8 - Jan 14
3	Jan 15 - Jan 21
4	Jan 22 - Jan 28
5	Jan 29 - Feb 4
6	Feb 5 - Feb 11
7	Feb 12 - Feb 18
8	Feb 19 - Feb 25
9	Feb 26 - Mar 4
10	Mar 5 - Mar 11
11	Mar 12 - Mar 18
12	Mar 19 - Mar 25
13	Mar 26 - Apr 1
14	Apr 2 - Apr 8
15	Apr 9 - Apr 15
16	Apr 16 - Apr 22
17	Apr 23 - Apr 29
18	Apr 30 - May 6
19	May 7 - May 13
20	May 14 - May 20
21	May 21 - May 27
22	May 28 - Jun 3
23	Jun 4 - Jun 10
24	Jun 11 - Jun 17
25	Jun 18 - Jun 24
26	Jun 25 - Jul 1
27	Jul 2 - Jul 8

Number	2006
28	Jul 9 - Jul 15
29	Jul 16 - Jul 22
30	Jul 23 - Jul 29
31	Jul 30 - Aug 5
32	Aug 6 - Aug 12
33	Aug 13 - Aug 19
34	Aug 20 - Aug 26
35	Aug 27 - Sep 2
36	Sep 3 - Sep 9
37	Sep 10 - Sep 16
38	Sep 17 - Sep 23
39	Sep 24 - Sep 30
40	Oct 1 - Oct 7
41	Oct 8 - Oct 14
42	Oct 15 - Oct 21
43	Oct 22 - Oct 28
44	Oct 29 - Nov 4
45	Nov 5 - Nov 11
46	Nov 12 - Nov 18
47	Nov 19 - Nov 25
48	Nov 26 - Dec 2
49	Dec 3 - Dec 9
50	Dec 10 - Dec 16
51	Dec 17 - Dec 23
52	Dec 24 - Dec 30
1	Dec 31 - Jan 6

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**Appendix E 2006 WNV Risk Assessment**

Assessment week:

Date completed:

Completed by:

Surveillance Factor	Assessment	Benchmark	Assigned Value
1. Seasonal temperature	1	Two week mean daily temperature below normal (>2°)	
	3	Two week mean daily temperature at or near normal (±2°)	
	5	Two week mean daily temperature above normal (>2°)	
2. Adult mosquito vector abundance  Determined by trapping adults, identifying them to species, and comparing numbers to those previously documented for an area	2	Vector abundance well below average (<50%) (or <25% of 2002 data)	
	4	Vector abundance below average (50%-90%) (or 25%-50% of 2002 data)	
	6	Vector abundance average (90%-150%) (or 50%-75% of 2002 data)	
	8	Vector abundance above average (150%-300%) (or 75%-150% of 2002 data)	
	10	Vector abundance well above average (>300%) (or >150% of 2002 data)	
3. Virus isolation rate in vector mosquito species  $MIR = \frac{\text{\# of Positive Cx. Pools}}{\text{\# of Cx. Mosquitoes Tested}} \times 1000$  Tested in pools of 50. Expressed as minimum infection rate (MIR) per 1000 female mosquitoes tested (or 10 pools). A single positive pool with < 500 total <i>Culex</i> cannot score higher than 6.	2	MIR*1000 = 0	
	6	MIR*1000 = > 0 - 5	
	8	MIR*1000 = > 5 - 10	
	10	MIR*1000 = > 10	
4. Human Cases of WNV  (Probable and Confirmed)	1	No human cases in province or neighbouring US states	
	2	≤ 10 human cases in neighbouring US states, and none in province	
	3	One human case acquired in province or 11-99 in neighbouring US states	
	4	Multiple human cases acquired in province, or ≥ 100 in neighbouring US states	
	5	One or more human cases acquired in region/area	
5. Local WNV activity  (do not score if bird testing has stopped, unless benchmark factor is met for a score of 5)	1	No WNV in birds, horses, or mosquitoes in province	
	2	One or more positive crows/blue jays or mosquitoes in province	
	3	One to three positive crows/blue jays locally	
	4	Multiple positive crows/blue jays (>3) or an equine case locally	
	5	A rapid increase in dead bird (crow and blue jay) sightings or 2 or more equine cases in the specific and local area.	
6. Time of Year  (score only if virus activity detected in region/area)	1	Before June 15 or after September 15	
	3	Between June 15 and July 15, or between September 1 and September 15	
	5	Between July 15 and September 1	
7 Proximity to urban or suburban regions  (score only if virus activity detected in region/area)	1	Virus activity in remote areas	
	2	Virus activity in rural areas	
	3	Virus activity in small towns	
	4	Virus activity in suburban/urban areas	
	5	Virus activity in suburban/urban areas with positive mosquito traps and previous infection rates >5 per 100,000 for a previous season	
Risk Assessment Level		Total	
		Divide total by 7 if summing surveillance factors 1-5 Divide total by 9 if summing surveillance factors 1-7 Divide total by 6 if summing surveillance factors 1-4 Divide total by 8 if summing surveillance factors 1-4 and 6,7  Average	

## Appendix F

### Provincial Surveillance for West Nile Virus – Case Definitions

#### Provincial Surveillance for West Nile Virus (WNV)

##### Section A: Case Definitions

The current Case Definitions were drafted with available information at the time of writing. Case Definitions and Diagnostic Test Criteria are subject to change as new information becomes available.

##### **1) West Nile Virus Neurological Syndrome (WNNS):**

###### **Clinical Criteria:**

History of exposure in an area where WN virus (WNV) activity is occurring<sup>1</sup>

**OR**

history of exposure to an alternative mode of transmission<sup>2</sup>

**AND**

onset of fever

**AND NEW ONSET OF AT LEAST ONE of the following:**

- encephalitis (acute signs of central or peripheral neurologic dysfunction), or
- viral meningitis (pleocytosis and signs of infection e.g. headache, nuchal rigidity), or
- acute flaccid paralysis (e.g. poliomyelitis-like syndrome or Guillain-Barré-like syndrome)<sup>3</sup> or
- movement disorders (e.g., tremor, myoclonus) or
- Parkinsonism or Parkinsonia like conditions (e.g., cogwheel rigidity, bradykinesia, postural instability) or
- other neurological syndromes as defined in the note below

<sup>1</sup> History of exposure when and where West Nile virus transmission is present, or could be present, or history of travel to an area with confirmed WNV activity in birds, horses, other mammals, sentinel chickens, mosquitoes, or humans.

<sup>2</sup> Alternative modes of transmission, identified to date, include: laboratory-acquired; in utero; receipt of blood components; organ/tissue transplant; and, possibly via breast milk.

<sup>3</sup> A person with WNV-associated acute flaccid paralysis may present with or without fever or mental status changes. Altered mental status could range from confusion to coma with or without additional signs of brain dysfunction (e.g. paralysis, cranial nerve palsies, sensory deficits, abnormal reflexes, generalized convulsions and abnormal movements). Acute flaccid paralysis with respiratory failure is also a problem.

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**Note:** A significant feature of West Nile viral neurologic illness may be marked muscle weakness that is more frequently unilateral, but could be bilateral. WNV should be considered in the differential diagnosis of all suspected cases of acute flaccid paralysis with or without sensory deficit. WNV- associated weakness typically affects one or more limbs (sometimes affecting one limb only). Muscle weakness may be the sole presenting feature of WNV illness (in the absence of other neurologic features) or may develop in the setting of fever, altered reflexes, meningitis or encephalitis. Weakness typically develops early in the course of clinical infection. Patients should be carefully monitored for evolving weakness and in particular for acute neuromuscular respiratory failure, which is a severe manifestation associated with high morbidity and mortality. **For the purpose of WNV Neurological Syndrome Classification, muscle weakness is characterized by severe (Polio-like), non-transient and prolonged symptoms.** Electromyography (EMG) and lumbar puncture should be performed to differentiate WNV paralysis from the acute demyelinating polyneuropathy (Guillain-Barré syndrome). Lymphocytic pleocytosis (an increase in WBC with a predominance of lymphocytes in the cerebrospinal fluid [CSF] ) is commonly seen in acute flaccid paralysis due to WNV.

Other emerging clinical syndromes, identified during 2002 included, but were not limited to the following: myelopathy, rhabdomyolysis (acute destruction of skeletal muscle cells), peripheral neuropathy; polyradiculoneuropathy; optic neuritis; and acute demyelinating encephalomyelitis (ADEM). Ophthalmologic conditions including chorioretinitis and vitritis were also reported. Facial weakness was also reported. Myocarditis, pancreatitis and fulminant hepatitis have not been identified in North America, but were reported in outbreaks of WNV in South Africa. “Aseptic” meningitis without encephalitis or flaccid paralysis occurring in August and September when WNV is circulating may be due to non-polio enteroviruses circulating at the same time. This should be considered in the differential diagnosis.

[Sejvar J et al. JAMA (2003) Vol.290 (4) p. 511-515, Sejvar, J. et al. Emerg Infect Dis (2003) Vol 9 (7) p.788-93 and Burton, JM et al Can. J. Neurol. Sci. (2004) Vol.31 (2) p.185-193]

### **Suspect WN Neurological Syndrome Case:**

Clinical criteria IN THE ABSENCE OF OR PENDING diagnostic test criteria (see below) AND IN THE ABSENCE of any other obvious cause.

### **Probable WN Neurological Syndrome Case:**

Clinical criteria AND AT LEAST ONE of the probable case diagnostic test criteria (see below).

### **Confirmed WN Neurological Syndrome Case:**

Clinical criteria AND AT LEAST ONE of the confirmed case diagnostic test criteria (see below).

## 2) West Nile Virus Non-Neurological Syndrome (WN Non-NS):

### Clinical Criteria:

History of exposure in an area where WN virus (WNV) activity is occurring<sup>1</sup>  
**OR**

history of exposure to an alternative mode of transmission<sup>2</sup>

**AND AT LEAST TWO** of the following<sup>5</sup> :

- fever,<sup>6</sup>
- myalgia ,
- arthralgia,
- headache,
- fatigue,
- lymphadenopathy,
- maculopapular rash

<sup>1</sup> History of exposure when and where West Nile virus transmission is present, or could be present, or history of travel to an area with confirmed WNV activity in birds, horses, other mammals, sentinel chickens, mosquitoes, or humans.

<sup>2</sup> Alternative modes of transmission, identified to date, include: laboratory-acquired; in utero; receipt of blood components; organ/tissue transplant; and, possibly via breast milk.

<sup>5</sup> It is possible that other clinical signs and symptoms could be identified that have not been listed and may accompany probable case or confirmed case diagnostic test criteria. For example, gastrointestinal (GI) symptoms were seen in many WNV patients in Canada and the USA in 2003 and 2004.

<sup>6</sup> Muscle weakness may be a presenting feature of WNV illness. **For the purpose of WNV Non-Neurological Syndrome classification, muscle weakness or myalgia (muscle aches and pains) is characterized by mild, transient, unlikely prolonged symptoms that are not caused by motor neuropathy.**

### Suspect WN Non-Neurological Syndrome Case:

Clinical criteria IN THE ABSENCE OF OR PENDING diagnostic test criteria (see below) AND IN THE ABSENCE of any other obvious cause.

### Probable WN Non-Neurological Syndrome Case:

Clinical criteria AND AT LEAST ONE of the probable case diagnostic test criteria (see below)

### Confirmed WN Non-Neurological Syndrome Case:

Clinical criteria AND AT LEAST ONE of the confirmed case diagnostic test criteria (see below)

**3) West Nile Virus Asymptomatic Infection (WNAI) :**<sup>7</sup>

**Probable WN Asymptomatic Infection Case:**

Probable case diagnostic test criteria (see below) IN THE ABSENCE of clinical criteria

**Confirmed WN Asymptomatic Infection Case:**

Confirmed case diagnostic test criteria (see below) IN THE ABSENCE of clinical criteria

<sup>7</sup>  
This category could include asymptomatic blood donors whose blood is screened using a Nucleic Acid Amplification Test (NAT), by Blood Operators (i.e. Canadian Blood Services or Hema-Quebec) and is subsequently brought to the attention of public health officials. The NAT that will be used by Blood Operators in Canada is designed to detect all viruses in the Japanese encephalitis (JE) serocomplex. The JE serocomplex includes WN virus and 9 other viruses, although from this group only WN virus and St Louis encephalitis virus are currently endemic to parts of North America. Blood Operators in Canada perform a supplementary WN virus-specific NAT following any positive donor screen test result.

**Section B: West Nile Virus Diagnostic Test Criteria:**

**Probable Case Diagnostic Test Criteria:**

**AT LEAST ONE of the following:**

Detection of flavivirus antibodies in a single serum or CSF sample using a WN virus IgM ELISA <sup>8</sup> without confirmatory neutralization serology (e.g. Plaque Reduction Neutralization Test [PRNT]) <b>OR</b>
A 4-fold or greater change in flavivirus HI titres in paired acute and convalescent sera or demonstration of a seroconversion using a WN virus IgG ELISA <sup>8</sup> <b>OR</b>
A titre of $\geq 1:320$ in a single WN virus HI test, or an elevated titre in a WN virus IgG ELISA, with a confirmatory PRNT result <b>OR</b> [Note: A confirmatory PRNT or other kind of neutralization assay is not required in a health jurisdiction/authority where cases have already been confirmed in the current year]
Demonstration of Japanese encephalitis (JE) serocomplex-specific genomic sequences in blood by NAT screening on donor blood, by Blood Operators in Canada.

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<sup>8</sup> Both CDC and commercial IgM / IgG ELISAs are now available for front line serological testing. Refer to appropriate assay procedures and kit inserts for the interpretation of test results.

**Note:** WNV IgM antibody may persist for more than a year and the demonstration of IgM antibodies in a patient's serum, particularly in residents of endemic areas, may not be diagnostic of an acute WN viral infection. Seroconversion (by HI, IgG ELISA or PRNT assays) demonstrates a current WNV infection. Therefore, the collection of acute and convalescent sera for serologic analysis is particularly important to rule out diagnostic misinterpretation early in the WNV season (e.g. May, June) and to identify initial cases in a specific jurisdiction. However, it should be noted that seroconversions may not always be documented due to timing of acute sample collection (i.e. titres in acute sera may have already peaked). If static titres are observed in acute and convalescent paired sera, it is still possible the case may represent a recent infection. To help resolve this, the use of IgG avidity testing<sup>9</sup> may be considered to distinguish between current and past infection. The presence of both IgM antibody and low avidity IgG in a patient's convalescent serum sample are consistent with current cases of viral associated illness. However test results that show the presence of IgM and high avidity IgG are indicative of exposures that have occurred in the previous season. Immunocompromised individuals may not be able to mount an immune response necessary for a serological diagnosis. West Nile virus diagnostic test criteria for these individuals should be discussed with a medical microbiologist.

<sup>9</sup> Early in infection the immune system generates antibodies that bind relatively weakly to viral antigen (low avidity). As the infection proceeds, an increasing percentage of newly generated IgG antibody displays higher binding affinity to virus antigen and thus avidity also rises (Note: avidity is usually measured based upon the ability of IgG to dissociate from antigen preparations after incubation with a solution of urea). As long as high avidity IgG is not yet detected in the serum it can be assumed that the individual was exposed to the viral agent during a recent exposure. With respect to WNV infection it has not been precisely determined when (i.e. post-exposure) high avidity antibodies reach levels in serum that can be accurately detected by serological assays (there may be significant variation depending on the individual). However, it has been shown that greater than 95% of sera collected from individuals exposed to WNV 6-8 months previously will have IgG antibodies that bind strongly to viral antigen and will give high avidity scores using both IFA and ELISA testing formats. **Note: Avidity testing will not replace confirmatory neutralization testing, non-WNV flavivirus IgG antibody (Eg. dengue, SLE, etc.) may bind to the antigen preparations used in avidity assays.**

### Confirmed Case Diagnostic Test Criteria:

It is currently recommended that health jurisdictions/authorities use the Confirmed Case Diagnostic Test Criteria to confirm index cases (locally acquired) in their area each year; for subsequent cases, health jurisdictions/authorities could use the Probable Case Diagnostic Test Criteria to classify cases in their area as "confirmed", **for the purposes of surveillance**. Throughout the remainder of the transmission season health jurisdictions/authorities may wish to document PRNT antibody titres to West Nile virus in a proportion of cases, to be determined by that health jurisdiction/authority, in order to rule-out the possibility of concurrent activity by other flaviviruses. [For further information on diagnostic

testing algorithms for West Nile virus, see the section entitled Laboratory Specimen Diagnostic Testing Algorithm in Appendix 4 of the National Guidelines for Response to West Nile virus.]

**AT LEAST ONE of the following:**

A 4-fold or greater change in WN virus neutralizing antibody titres (using a PRNT or other kind of neutralization assay) in paired acute and convalescent sera, or CSF. <b>OR</b>
Isolation of WN virus from, or demonstration of WN virus antigen or WN virus-specific genomic sequences in tissue, blood, CSF or other body fluids <b>OR</b>
Demonstration of flavivirus antibodies in a single serum or CSF sample using a WN virus IgM ELISA <sup>8,9</sup> , confirmed by the detection of WN virus specific antibodies using a PRNT (acute or convalescent specimen). <b>OR</b>
A 4-fold or greater change in flavivirus HI titres in paired acute and convalescent sera or demonstration of a seroconversion using a WN virus IgG ELISA <sup>8,9</sup> <b>AND</b> the detection of WN specific antibodies using a PRNT (acute or convalescent serum sample).

<sup>8</sup> Both CDC and commercial IgM / IgG ELISAs are now available for front line serological testing. Refer to appropriate assay procedures and kit inserts for the interpretation of test results.

**Note:** WNV IgM antibody may persist for more than a year and the demonstration of IgM antibodies in a patient’s serum, particularly in residents of endemic areas, may not be diagnostic of an acute WN viral infection. Seroconversion (by HI, IgG ELISA or PRNT assays) demonstrates a current WNV infection. Therefore, the collection of acute and convalescent sera for serologic analysis is particularly important to rule out diagnostic misinterpretation early in the WNV season (e.g. May, June) and to identify initial cases in a specific jurisdiction. However, it should be noted that seroconversions may not always be documented due to timing of acute sample collection (i.e. titres in acute sera may have already peaked). If static titres are observed in acute and convalescent paired sera, it is still possible the case may represent a recent infection. To help resolve this, the use of IgG avidity testing<sup>9</sup> may be considered to distinguish between current and past infection. The presence of both IgM antibody and low avidity IgG in a patient’s convalescent serum sample are consistent with current cases of viral associated illness. However test results that show the presence of IgM and high avidity IgG are indicative of exposures that have occurred in the previous season. Immunocompromised individuals may not be able to mount an immune response necessary for a serological diagnosis. West Nile virus diagnostic test criteria for these individuals should be discussed with a medical microbiologist.

<sup>9</sup> Early in infection the immune system generates antibodies that bind relatively weakly to viral antigen (low avidity). As the infection proceeds, an increasing percentage of newly

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generated IgG antibody displays higher binding affinity to virus antigen and thus avidity also rises (Note: avidity is usually measured based upon the ability of IgG to dissociate from antigen preparations after incubation with a solution of urea). As long as high avidity IgG is not yet detected in the serum it can be assumed that the individual was exposed to the viral agent during a recent exposure. With respect to WNV infection it has not been precisely determined when (i.e. post-exposure) high avidity antibodies reach levels in serum that can be accurately detected by serological assays (there may be significant variation depending on the individual). However, it has been shown that greater than 95% of sera collected from individuals exposed to WNV 6-8 months previously will have IgG antibodies that bind strongly to viral antigen and will give high avidity scores using both IFA and ELISA testing formats. **Note: Avidity testing will not replace confirmatory neutralization testing, non-WNV flavivirus IgG antibody (Eg. dengue, SLE, etc.) may bind to the antigen preparations used in avidity assays.**

## **Appendix G**

# **RAPID RISK FACTOR SURVEILLANCE SYSTEM 2006 OVERVIEW**

## **INTRODUCTION**

The Rapid Risk Factor Surveillance System (RRFSS) is intended to provide Peel Public Health with timely data to monitor the community's awareness, knowledge, attitudes and risk behaviours in relation to a variety of key public health issues. Data are collected through an on-going monthly telephone survey of respondents aged 18 years and older. The information can be used to support program planning and evaluation, to advocate for public policy development and to improve community awareness regarding the risks for chronic diseases, infectious diseases and injuries.

RRFSS is based on the American Behavioural Risk Factor Surveillance System (BRFSS) and was piloted in Ontario by the Durham Regional Health Department in June of 1999. The pilot was very successful and in 2006, there were 21 Ontario health units participating.

During the pilot, RRFSS was funded by the Ontario Ministry of Health and Long-Term Care, Cancer Care Ontario, and Health Canada. Currently, each of the RRFSS-participating health units provides their own funding.

## **METHODS**

### **Sampling**

Each month, the Institute for Social Research (ISR) at York University randomly selects and surveys 100 residents of the Region of Peel by telephone. RRFSS uses a two-staged sampling frame. First, a household is randomly selected using a form of random-digit dialing methodology. Then one person aged 18 years or older is randomly selected from within the household. In households with more than one adult, the adult with the next birthday is interviewed. A minimum of 14 call attempts are made at different times of day to each household before the household is considered unreachable.

### **Data Collection**

In 2006, data collection occurred beginning January 13 and will continue through early January 2007. The RRFSS survey is composed of two main types of questions: core and optional. Core question modules are asked by all health units participating in RRFSS for the prescribed survey period, and cannot be changed during the year unless all the health units agree. Optional question modules are those selected by one or more participating health units, and may be modified or revised during the year by notifying ISR directly. Some core and optional questions are asked all year, while others are asked seasonally.

Examples of seasonal questions include those referring to protection from the sun and influenza immunization. In 2006, RRFSS participants were asked more than 50 core questions and over 130 optional questions.

Responses are captured using a Computer Assisted Telephone Interview (CATI) system. ISR generates datasets using the Statistical Package for the Social Sciences (SPSS) and forwards them to each health unit for analysis within six to eight weeks of data collection for each month.

### **Analysis**

Data for this report were analyzed using SPSS version 14.0.

“Don’t know” and “Refused” responses were excluded from most analyses, except where the proportion of respondents giving such answers was greater than five per cent or “don’t know” was a valid response option.

A general household weight was applied to estimates for questions asked specifically of the respondent. The weight accounts for the individuals’ different probabilities of being selected for the survey depending on the number of respondents in the household. Weights were not applied to estimates where the unit of measurement was households.

To ensure confidentiality, results were suppressed if numerators were less than five or denominators were less than 30 (noted as “NR - not releasable due to small numbers”).

The Coefficient of Variation (CV) was defined as the ratio of the standard deviation to the mean and was calculated for each estimate. The reliability of each estimate was determined based on the value of the CV. Estimates with a CV of 16.5% or less were considered reliable. If the CV was between 16.6% and 33.3%, then the estimate is presented but it is advised to “use estimate with caution”. These estimates may not accurately represent the population. If the CV was greater than 33.3%, the estimate was considered unreliable and is not presented (noted as “NR - not releasable due to small numbers”).

Where appropriate, significant differences ( $p < 0.05$  or  $p < 0.01$ ) in proportions between years, sexes, age groups, education or income level were identified using the Chi-square test for differences in proportions. The Chi-square test for trend was used to identify significant trends in the data (e.g., increasing proportions from 2001 to 2004, decreasing proportions over increasing age groups). Statistically significant differences and trends are noted below tables and figures.

Tables and figures indicate the ‘**number**’ and/or ‘**per cent**’ of respondents who provided a given response to a survey question. When the total number of respondents to a question is presented in tables and figures it is denoted as ‘**n**’.

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(i.e. '**number**' / '**n**' x **100** = '**per cent**')

Note that the weighted numbers of respondents and the percentages provided in the tables may not precisely add to the column/row totals due to rounding.