



2023 WEST NILE VIRUS YEAR END REPORT

Grey Bruce Public Health

December 21, 2023

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1.0 OVERVIEW

The adult mosquito surveillance program was a key component of the overall mosquito surveillance program for Grey Bruce Public Health in the 2023 season. One (1) WNV-positive mosquito pool was reported in from the traps set by Grey Bruce Public Health in 2023.

In Ontario, a total of fifty-five (55) confirmed and/or probable human cases, sixty-one (61) WNV-positive birds, six (6) WNV-positive horses and three hundred and six (306) WNV-positive mosquito pools were reported (Public Health Ontario, 2023). Eighteen (18) Eastern Equine Encephalitis (EEEV) positive horses (CAHSS, 2023) and one (1) EEEV-positive mosquito pool reported in 2023 (PHO, 2023).

2.0 WEST NILE VIRUS TRANSMISSION DYNAMICS

West Nile Virus (WNV) is a member of the viral family Flaviviridae and is a classic arbovirus (arthropod-borne virus). Arboviruses are a large group of viruses transmitted by blood-feeding insects. WNV is transmitted by mosquitoes, primarily to birds, but it can sometimes spread to mammalian populations as well (Figure 1). There are two types of mosquito vectors involved in the WNV transmission cycle: 1) Enzootic vectors – which feed primarily on birds (and are referred to as bird-biting vectors) and 2) Bridge vectors – which feed on both birds and mammals, but primarily on mammals.

WNV was first isolated in the West Nile district of Uganda in 1937. WNV was initially endemic only in the eastern hemisphere, but spread to the western hemisphere in 1999, where it was first discovered in the greater New York City area. The first positive dead bird was reported in 2001 in Southern Ontario and the virus has since spread throughout Canada and become endemic. In 2023 Ontario reported fifty-five (55) confirmed and/or probably human cases, sixty-one (61) WNV-positive birds, six (6) WNV-positive horses and three hundred and six (306) WNV-positive mosquito pools were reported. (PHO, 2023).

Mammals are considered dead-end hosts of WNV because they do not produce significant viremia to be able to infect any mosquitoes that feed upon them. Mosquitoes from the genus *Culex* are the main enzootic vectors responsible for amplifying WNV in bird populations. Thus, most control programs emphasize the reduction of *Culex* species populations. Without a significant *Culex* population there is inadequate amplification of WNV and therefore limited risk of human infection.

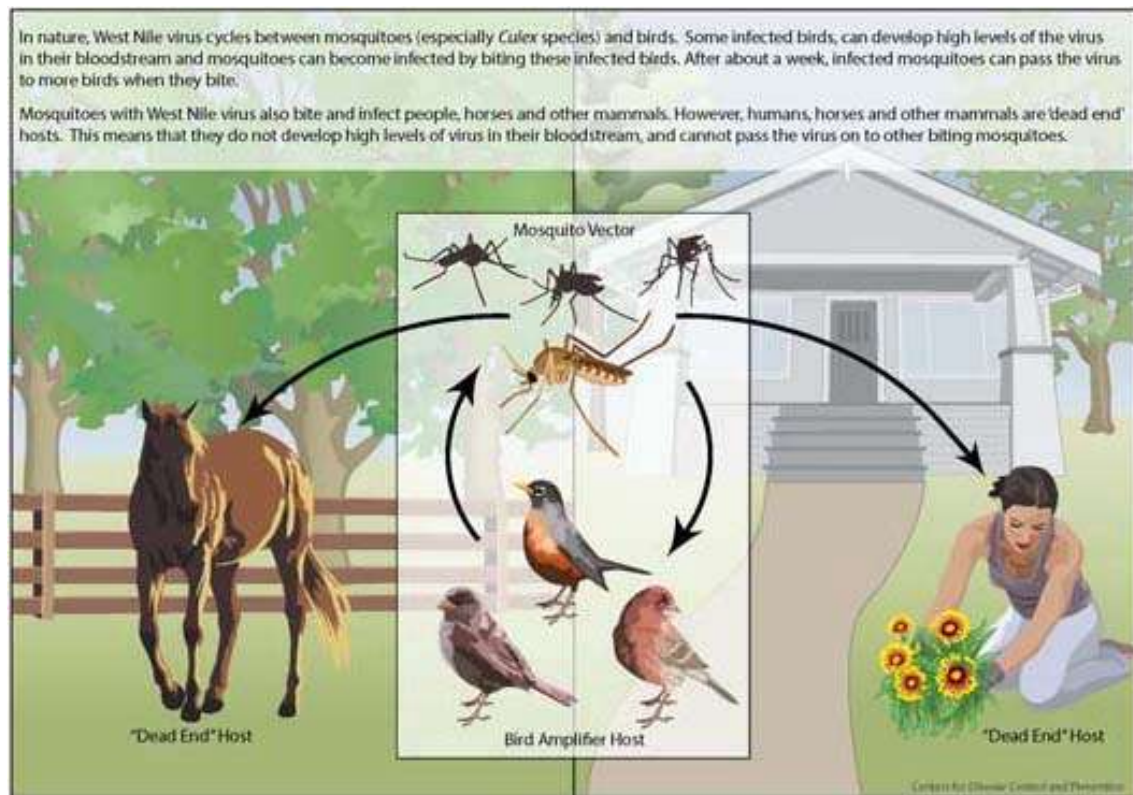


Figure 1. West Nile Virus Transmission Cycle (Centers for Disease Control and Prevention, 2023).

2.1 THE ROLE OF *CULEX* SPECIES IN WNV TRANSMISSION

According to most researchers, the major WNV enzootic vectors in Ontario are *Culex pipiens* and *Culex restuans*, which are both very competent vectors. *Cx. restuans* is an early season species and is replaced by *Cx. pipiens* as the season progresses. Research by Dr. Curtis Russell indicates that in certain instances, *Cx. pipiens* may be attracted to humans as well as to birds (Russell, 2008). Thus, *Cx. pipiens* may also serve as a bridge vector of WNV to humans. Other studies have shown that *Cx. pipiens* can transmit WNV to humans, potentially being responsible for up to 80% of human cases (Kilpatrick et al., 2005).

It has been shown that the risk of human disease increases in areas with large numbers of *Culex* mosquitoes throughout the season, whereas areas lacking high numbers of *Culex* mosquitoes have a much lower incidence of human cases. According to Dr. Henry Cuevas (pers. comm.) average daily temperatures must be at least 16.3°C for amplification of the virus to occur within the mosquito.

Mosquitoes have a complex life cycle, with four discrete stages: egg, larva, pupa and adult (Figure 2). The first three life stages are aquatic and *Culex* mosquitoes thrive in organically enriched standing water.

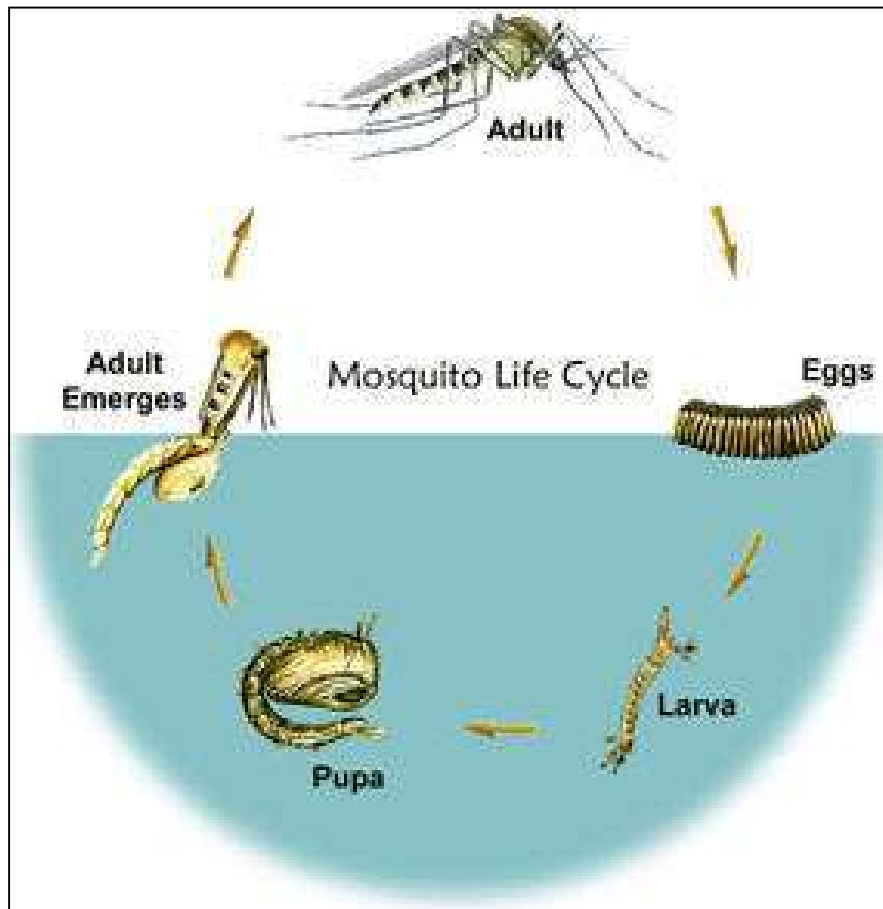


Figure 2. Mosquito Life Cycle (United States Environmental Protection Agency, 2023, recreated from a publication by D.M. Wood).

3.0 EASTERN EQUINE ENCEPHALITIS VIRUS TRANSMISSION DYNAMICS

Eastern Equine Encephalitis virus (EEEV) is a member of the viral family *Togaviridae* and is a classic arbovirus (arthropod-borne virus). EEEV is transmitted by mosquitoes, primarily to birds, but it can sometimes spread to mammalian populations as well (Figure 3). There are two types of mosquito vectors involved in the EEEV transmission cycle: 1) *Enzootic vectors* – which feed primarily on birds (and are referred to as bird-biting vectors) and 2) *Bridge vectors* – which feed on both birds and mammals, but primarily on mammals.

EEEV was first discovered in Massachusetts, USA in 1831. There are four lineages of EEEV of which Group I is endemic to North America and the Caribbean and is the main cause of human related cases. Groups IIA, IIB and III are primarily responsible for equine illness in Central and South America. The first positive horse was reported in 1938 in Southern Ontario.

Mammals are thought to be dead-end hosts of EEEV because they do not produce significant viremia to be able to infect any mosquitoes that feed upon them. The mosquito *Culiseta melanura* is the main enzootic vector responsible for amplifying EEEV in bird populations. Without a significant *Culiseta melanura* population there is inadequate amplification of EEEV and therefore limited risk of human infection.

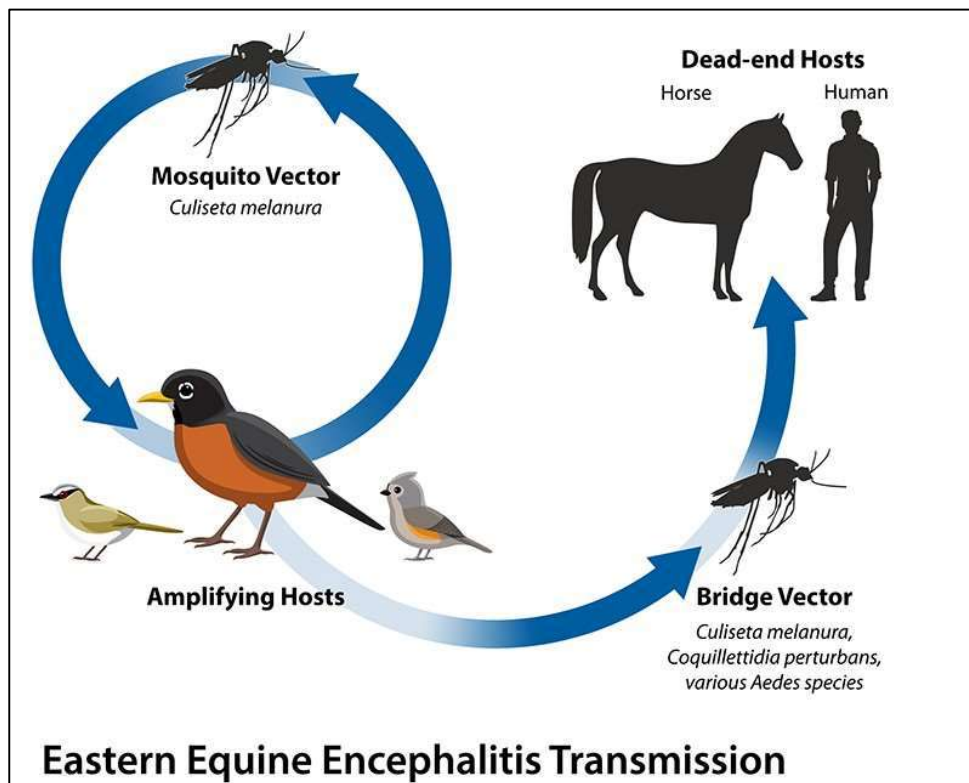


Figure 3. Eastern Equine Encephalitis Virus Transmission Cycle (CDC, 2022).

3.1 THE ROLE OF *CULISETA MELANURA* IN EEEV TRANSMISSION

Culiseta melanura is the main enzootic vector of EEEV in Ontario. The preferred habitat of this species is freshwater, hardwood swamps where they lay their eggs in the underground crypts in the root mats of trees. While this mosquito will occasionally bite humans, their preference is for an avian host. As a result, contracting EEEV from a bite of *Culiseta melanura* is not considered a significant risk to humans. Transmission to humans is more commonly associated with bridge vectors, such as *Aedes vexans*, *Coquillettidia perturbans*, and some species of the genus *Culex*.

Horses are susceptible to EEEV infection, and some cases can be fatal. However, infected horses are not considered to be of significant risk to humans because, like humans, they are thought to be dead-end hosts (CDC, 2023).

Reports of human infection are rare, with the United States reporting an average of 11 human cases per year. (CDC, 2022). One (1) EEEV-positive mosquito pool, and eighteen (18) EEEV-positive horses were reported in Ontario in 2023.

4.0 WEST NILE VIRUS ACTIVITY SUMMARY FOR CANADA, 2023

4.1 WEST NILE VIRUS HUMAN CASES IN CANADA, 2023

Reporting by PHAC is typically a few weeks behind that of PHO. The numbers presented are an amalgamation of data provided by PHAC and PHO as of November 1, 2023. A total of seventy-six (76) West Nile virus (WNV) confirmed or probable cases have been reported in Canada in 2023 (Figure 4). The human cases were reported from Ontario (55), Alberta (11), Manitoba (5), Quebec (4) and Saskatchewan (1). There have been two (2) deaths associated with WNV reported to PHAC in 2023. Of the reported human cases 25 were classified as neurological, 24 were classified as non neurological, 20 were unspecified and 7 were asymptomatic cases (PHAC, 2023).

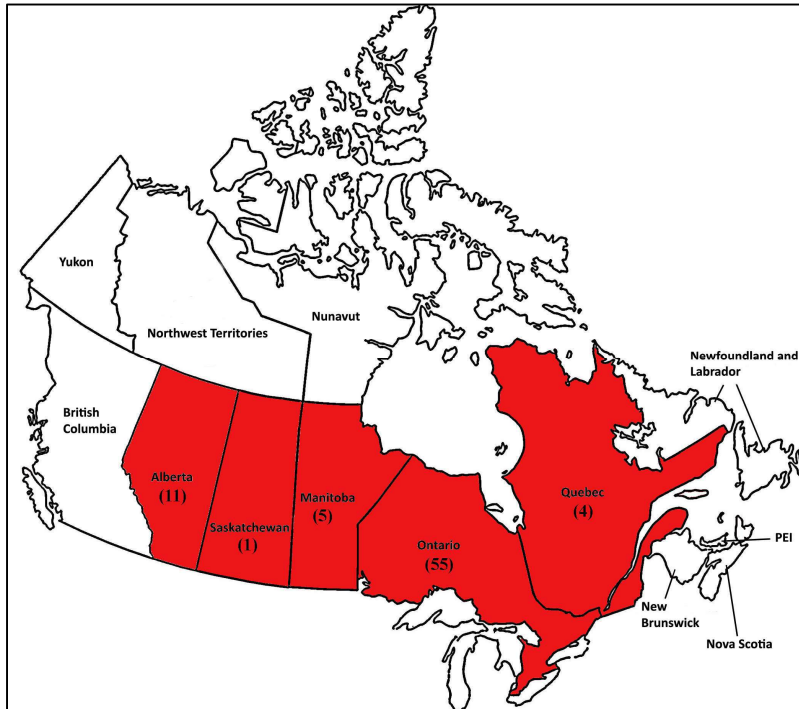


Figure 4. Total Human West Nile Virus cases in Canada, 2023. Red areas indicate WNV-positive cases. Number of reported cases marked within the province (Reported by PHAC and PHO as of November 2, 2023).

4.2 WEST NILE VIRUS POSITIVE BIRD CASES IN CANADA, 2023

Dead birds were collected and submitted to Canadian Wildlife Health Cooperative (CWHC) as part of the 2023 surveillance season. In total, 183¹ birds tested positive for WNV. The birds that tested positive were submitted from Ontario (61), Manitoba (55), Quebec (34) and Saskatchewan (33) (PHAC, 2023).

¹ The total number of avian cases combines data from PHAC and CHWC in order to provide the most current numbers available for the province of Ontario.

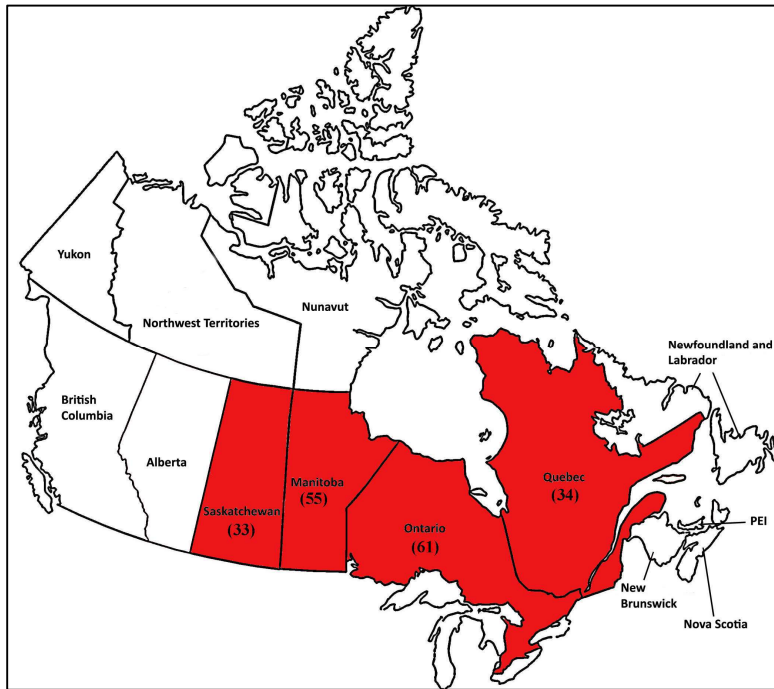


Figure 5. West Nile Virus positive bird cases in Canada, 2023. (Numbers confirmed from PHAC and CWHC as of November 2, 2023).

4.3 WEST NILE VIRUS POSITIVE EQUINE CASES IN CANADA, 2023

A total of forty-six (46) West Nile virus (WNV) confirmed or probable equine cases have been reported in Canada in 2022 (Figure 6). The cases were reported in Alberta (24) Saskatchewan (10), Ontario (6) Quebec (5) and Manitoba (1).



Figure 6. West Nile Virus positive equine cases in Canada, 2023. Red areas indicate WNV-positive cases with numbers indicating the total number of positive horses. (Reported by CAHSS as of November 1, 2023).

4.4 WEST NILE VIRUS POSITIVE MOSQUITO CASES IN CANADA, 2023

A total of 354 mosquito pools tested positive for West Nile virus in Canada in 2023 (Figure 7). Most positive mosquito pools were reported from Ontario (n=306) with the remaining cases being reported in Manitoba (n=48) (PHAC, 2023). Numbers for Alberta and Quebec were reported as N/A at the time of reporting.



Figure 7. West Nile Virus positive mosquito pools in Canada, 2023. Red areas indicate WNV-positive cases with numbers indicating the total number of positive pools. (Reported by PHAC as of October 23, 2023).

5.0 WEST NILE VIRUS ACTIVITY IN THE UNITED STATES, 2023

As of October 11, 2023, a total of 2,073 cases of West Nile virus disease in people have been reported in 46 states. Of these, 1,357 (65%) were classified as neuroinvasive disease. Exact numbers of mosquito, bird and equine cases was not readily available.

6.0 WEST NILE VIRUS ACTIVITY SUMMARY FOR ONTARIO, 2023

6.1 WEST NILE VIRUS HUMAN CASES IN ONTARIO, 2023

As of October 11, 2023, 55 human WNV cases have been reported from 14 different health units (Figure 8). The positive cases were from Toronto (22), Niagara (8), Hamilton (6), Peel (4), Chatham Kent (2), Halton (2), Middlesex-London (2), Durham (2), Lambton (1), Simcoe (1), Southwestern (1) Sudbury (1) and Windsor-Essex (1). The location data for two (2) positive human cases has not yet been reported.

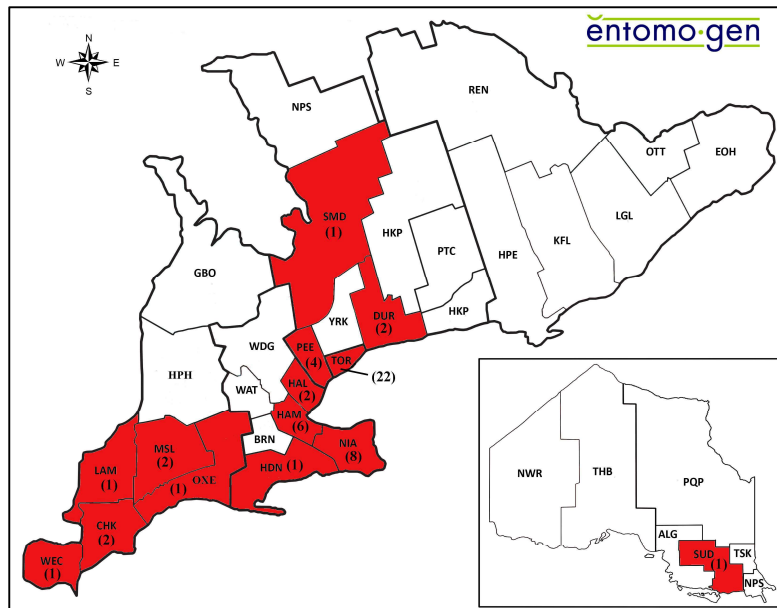


Figure 8. West Nile Virus human cases in Ontario, 2023. Red areas indicate WNV-positive cases. Number of reported cases recorded within health unit boundary. (Reported by Public Health Ontario as of November 1, 2023).

6.2 WEST NILE VIRUS POSITIVE BIRD CASES IN ONTARIO, 2023

Sixty-one (61) WNV-positive birds were reported from Health Units in Ontario in 2023. As of November 1, 2023 there is no geographical or species information currently available for the WNV-positive birds (PHAC, 2023).

6.3 WEST NILE VIRUS POSITIVE EQUINE CASES IN ONTARIO, 2023

According to the Canadian Animal Health Surveillance System (CAHSS), there were six (6) WNV-positive cases in the equine population in 2023. The positive cases were reported from Haliburton, Kawartha, Pine Ridge (2), Hastings Prince Edward County (1), Niagara (1), Simcoe (1) and Thunder Bay (1).

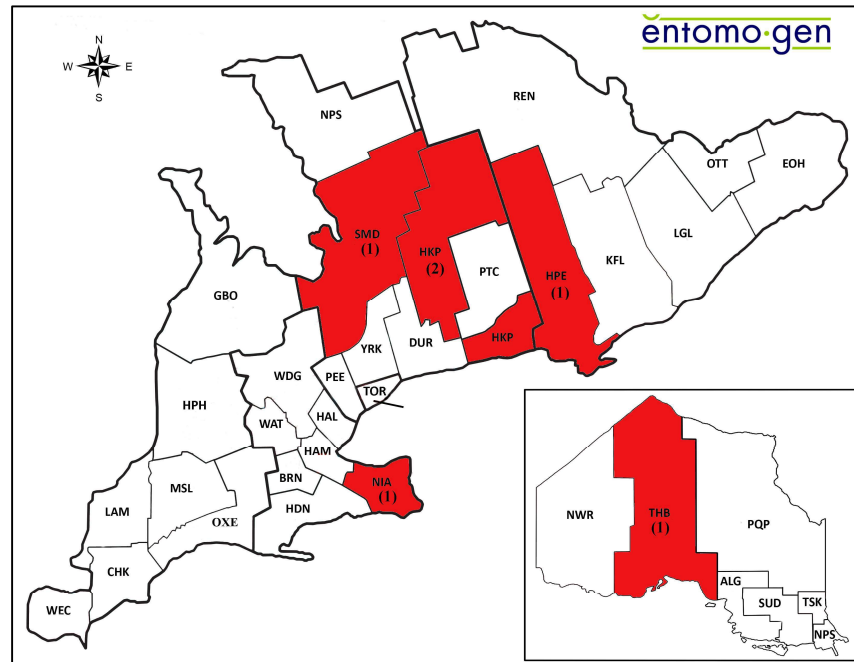


Figure 10. West Nile Virus positive mosquitoes in Ontario, 2023. Red areas indicate WNV-positive cases. Number of reported cases recorded within health unit boundary. (Reported by CAHSS as of November 1, 2023).

6.4 WEST NILE VIRUS POSITIVE MOSQUITO CASES IN ONTARIO, 2023

From mosquito surveillance conducted by provincial health units, 306 WNV-positive mosquito pools were confirmed from 21 separate Ontario Health Units in 2023 (Figure 10).

The positive pools were from Toronto (83), Peel (52), Halton (33), Hamilton (29), Niagara (25), Durham (16), York (13), Windsor-Essex (11), Middlesex-London (9), Chatham Kent (7), Southwestern (6), Ottawa (5), Hastings Prince Edward (4), Lambton (4), Wellington-Dufferin-Guelph (3), and one (1) WNV-positive pool reported from each of the following Brant, Grey Bruce, Haldimand-Norfolk², Huron Perth, Kingston-Frontenac and Lennox and Addington and Sudbury (PHO, 2023).

² Positive pool in Haldimand Norfolk (HDN) was reported by Indigenous Services Canada from Mississaugas of the New Credit First Nation

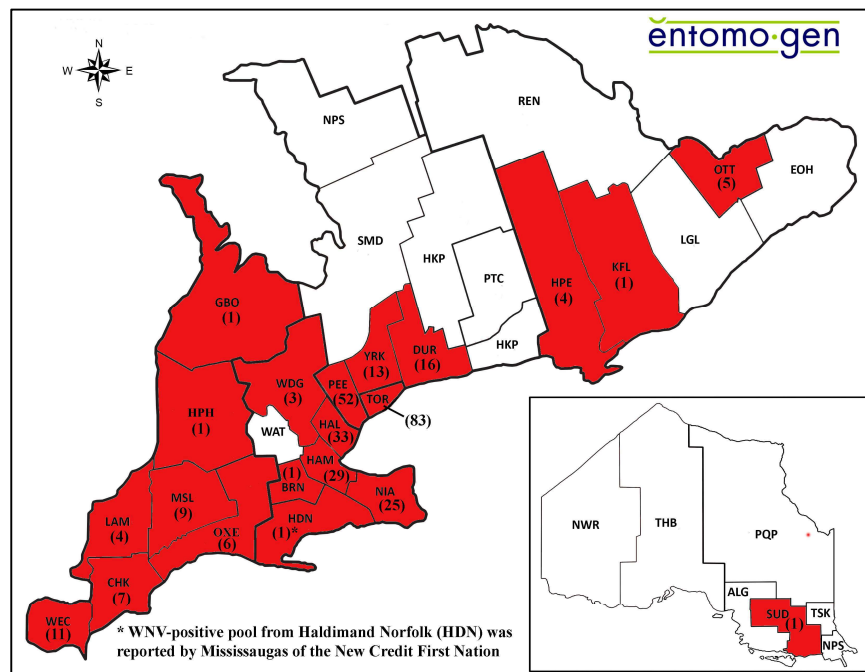


Figure 10. West Nile Virus positive mosquitoes in Ontario, 2023. Red areas indicate WNV-positive cases. Number of reported cases recorded within health unit boundary. (Reported by Public Health Ontario as of November 1, 2023).

7.0 EASTERN EQUINE ENCEPHALITIS VIRUS ACTIVITY SUMMARY FOR ONTARIO, 2023

There was no Eastern Equine Encephalitis Virus (EEEV) activity reported in the human population, however there were 15 equine cases and one EEEV-positive mosquito pool reported for Ontario in 2023. The equine cases were reported from Leeds, Grenville and Lanark (7), Ottawa (6), Peterborough (3), Haliburton, Kawartha, Pine Ridge (1) and Simcoe Muskoka (1).

The one (1) EEEV-positive mosquito pool was reported as part of Indigenous Services Canada surveillance program. The pool was collected from Moose Deer Point First Nation which is located within the Simcoe Muskoka District Health Unit boundaries.

8.0 TIMING OF WNV-POSITIVE *CULEX PIPIENS/RESTUANS* IN GREY BRUCE PUBLIC HEALTH ON 2023 TEMPERATURES

Based on an accumulated degree-day model used by Public Health Ontario, the rate at which WNV replicates within the adult females of *Culex pipiens/restuans* depends on ambient temperatures. Below 18.3°C (average daily field temperature) there is no extrinsic incubation of WNV but above this temperature threshold the virus will replicate in the mosquito. 380 accumulated degree-days are required for 50% of infected *Culex pipiens/restuans* mosquitoes to test positive for WNV. Figure 13a shows the total accumulated degree-days that occurred during the 2023 season in Ontario, highlighting Grey Bruce Public Health in red. According to this model, there appeared to be insufficient heat units in 2023 for amplification of the virus in *Culex* spp. mosquitoes.

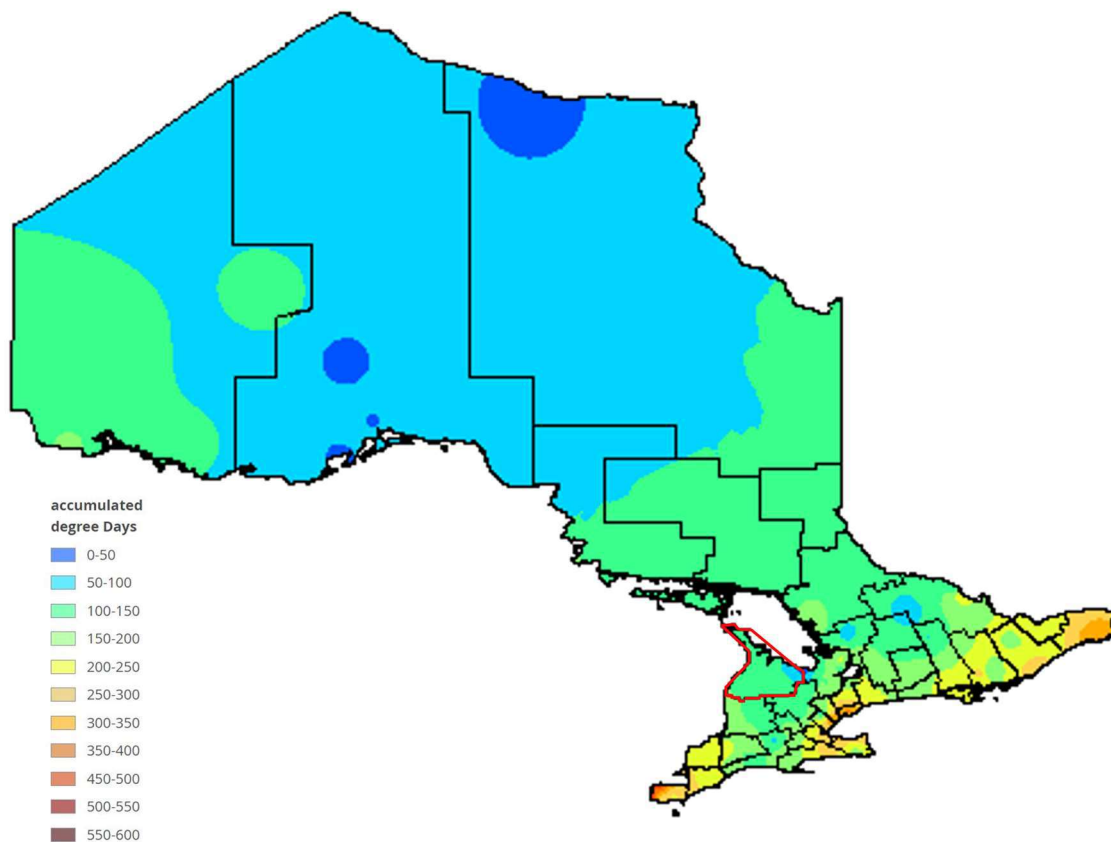


Figure 13a. Accumulated Degree-Day Graph for Ontario, highlighting Grey Bruce Public Health, 2023.

Figure 13b shows the gradual increase in Accumulated degree-days (grey shaded area) that occurred during the 2023 season in Grey Bruce Public Health. In total, there were 114.5 accumulated degree days, based on temperature readings taken from the Wiarton A Station.

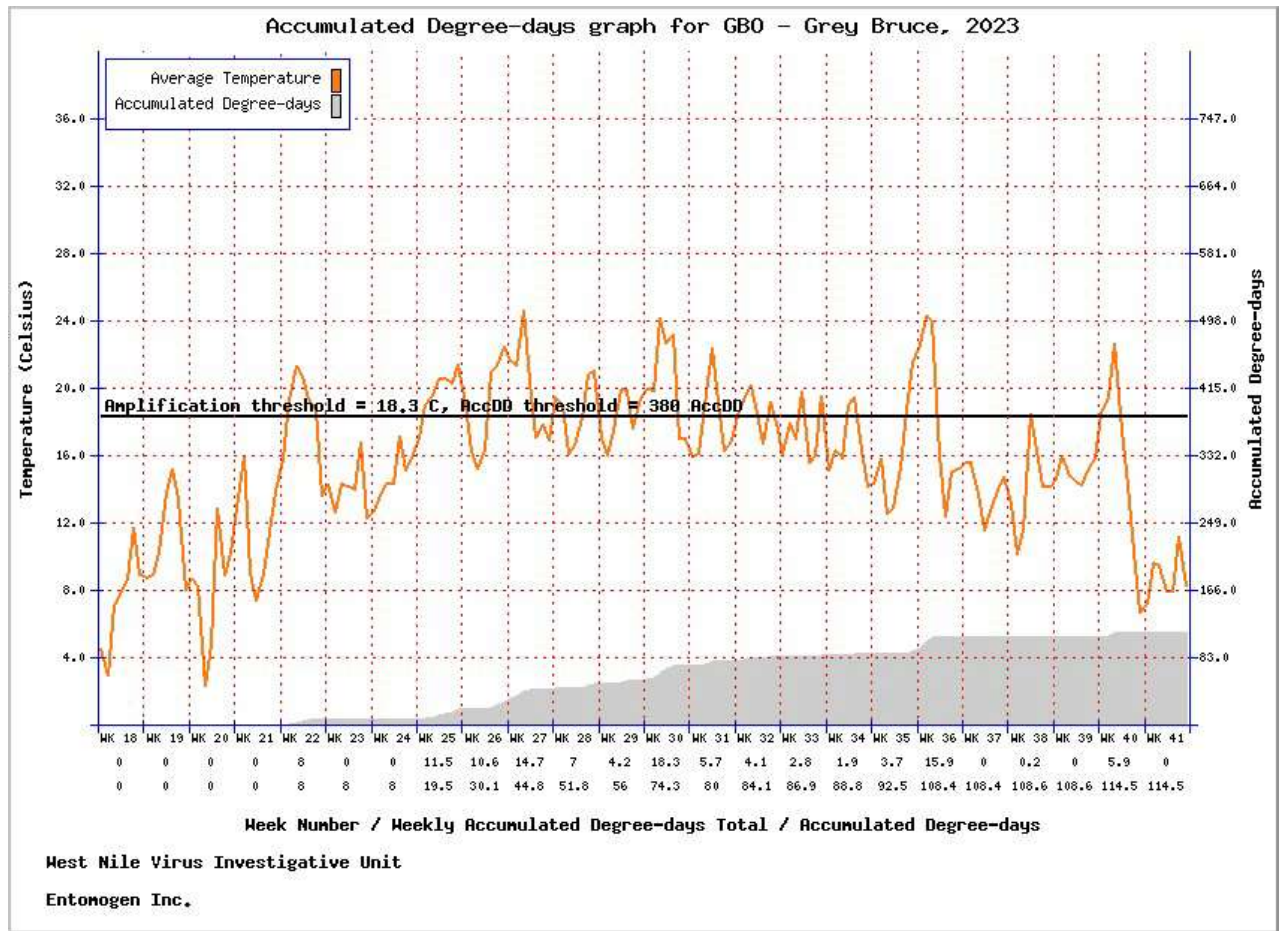


Figure 13b. Accumulated Degree-Day Graph for Grey Bruce Public Health, 2023.

9.0 GREY BRUCE PUBLIC HEALTH ADULT MOSQUITO SURVEILLANCE DATA, 2023

A total of eighty-six (86) traps were submitted from 17 different sites during the 2023 trapping season. Figure 14 shows the location of all 17 sites within Grey Bruce Public Health. Trapping began the week of May 15th, 2023 (epi week 20) and ended the week of September 25th, 2023 (epi week 36).

Traps were sorted to a maximum subsample of up to 150 mosquitoes. Any additional mosquitoes were labeled and stored as extras. Sorted mosquitoes were identified to the species level and individuals of the same species were pooled for subsequent viral testing. In total, there were 10,714 mosquitoes collected, of which 188 were unidentified males. A subsample of 4,426 mosquitoes was examined under a dissecting microscope.

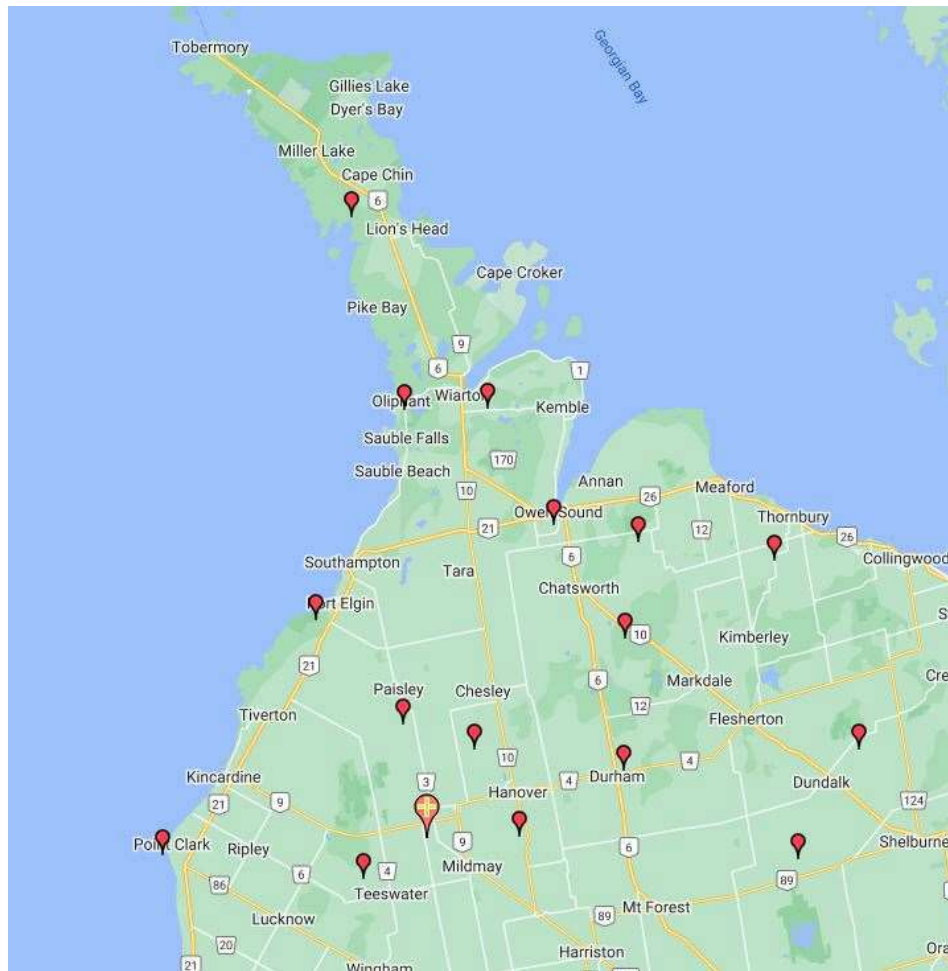


Figure 14. Adult mosquito trap sites for Grey Bruce Public Health, 2023. Balloon with cross indicates site where the WNV positive pool was confirmed

9.1 MOSQUITO SPECIES COLLECTED IN GREY BRUCE PUBLIC HEALTH, 2023

Figure 15 shows the species found in Grey Bruce Public Health throughout the season. Enzootic vectors, or bird-biting mosquitoes, composed entirely of *Culex pipiens/restuans*, made up approximately 3% of the species collected. Research indicates that *Cx. pipiens* may be attracted to humans as well as to birds (Russell, 2008). Therefore, humans may have come in contact with blood feeding *Culex*.

Potential bridge vector species (highlighted in pink) are capable of biting an infected bird and transmitting the virus from the infected bird to a human, horse, or other mammal. This species complex made up 42% of the species identified from traps collected in 2023; thus, humans living within Grey Bruce Public Health may have come in contact with blood feeding *Aedes/Ochlerotatus* mosquitoes. Non vector species which are of no significant concern with regards to WNV accounted for the majority of the mosquitoes collected in 2023 at 53% of the identified specimens.

Table 1 lists the mosquito species identified from sites in Grey Bruce Public Health. The primary WNV enzootic vector was *Culex pipiens/restuans* (2.62% of the population) and the primary WNV bridge vector was *Ochlerotatus canadensis* (18.66% of the population). A total of 106 *Culiseta melanura* - the main EEEV enzootic vector – were collected in Grey Bruce Public Health in 2023, accounting for approximately 2% of the total population.

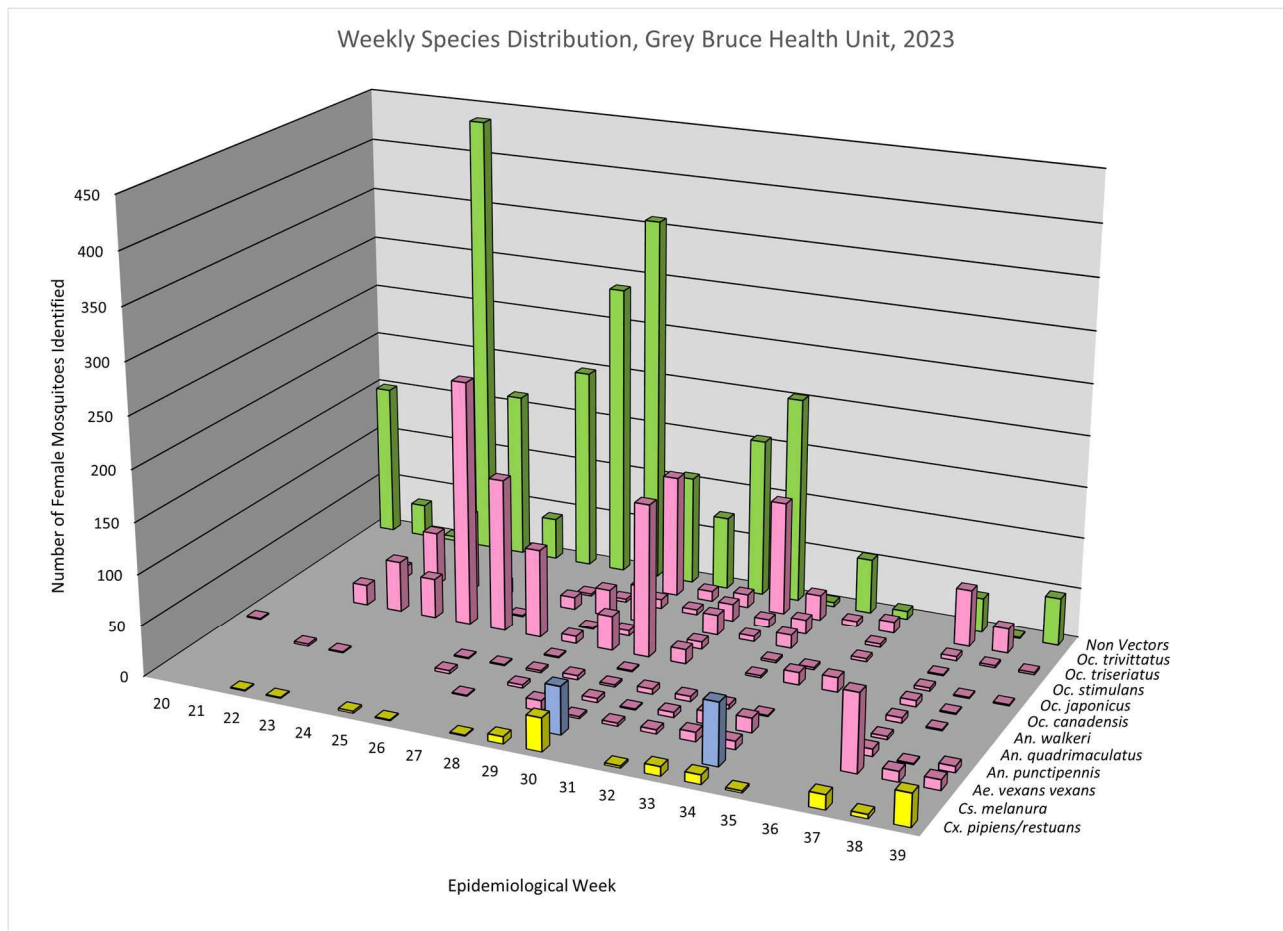


Figure 15. Species Distribution for Grey Bruce Public Health, 2023. Yellow bars represent bird-biting (WNV enzootic vector) species, pink bars represent WNV bridge vectors, and green bars represent non-vector species.

Table 1. Mosquitoes identified from Sites in Grey Bruce Public Health in 2023

116	WNV Enzootic Vectors <i>Culex pipiens/restuans</i>	2.62%	106	EEEV Vectors <i>Culiseta melanura</i>	2.39%
826	WNV Bridge Vectors <i>Ochlerotatus canadensis</i>	18.66%	689	Non Vectors <i>Ochlerotatus black-legged</i>	15.57%
376	<i>Ochlerotatus trivittatus</i>	8.50%	688	<i>Coquillettidia perturbans</i>	15.54%
324	<i>Ochlerotatus stimulans</i>	7.32%	674	<i>Ochlerotatus broad-banded</i>	15.23%
132	<i>Aedes vexans vexans</i>	2.98%	120	<i>Aedes/Ochlerotatus species</i>	2.71%
69	<i>Ochlerotatus triseriatus</i>	1.56%	91	<i>Aedes cinereus</i>	2.06%
61	<i>Anopheles punctipennis</i>	1.38%	68	<i>Ochlerotatus excrucians</i>	1.54%
29	<i>Anopheles quadrimaculatus</i>	0.66%	19	<i>Psorophora ferox</i>	0.43%
23	<i>Ochlerotatus japonicus</i>	0.52%	4	<i>Ochlerotatus cantator</i>	0.09%
8	<i>Anopheles walkeri</i>	0.18%	2	<i>Anopheles earlei</i>	0.05%
			1	<i>Uranotaenia sapphirina</i>	0.02%

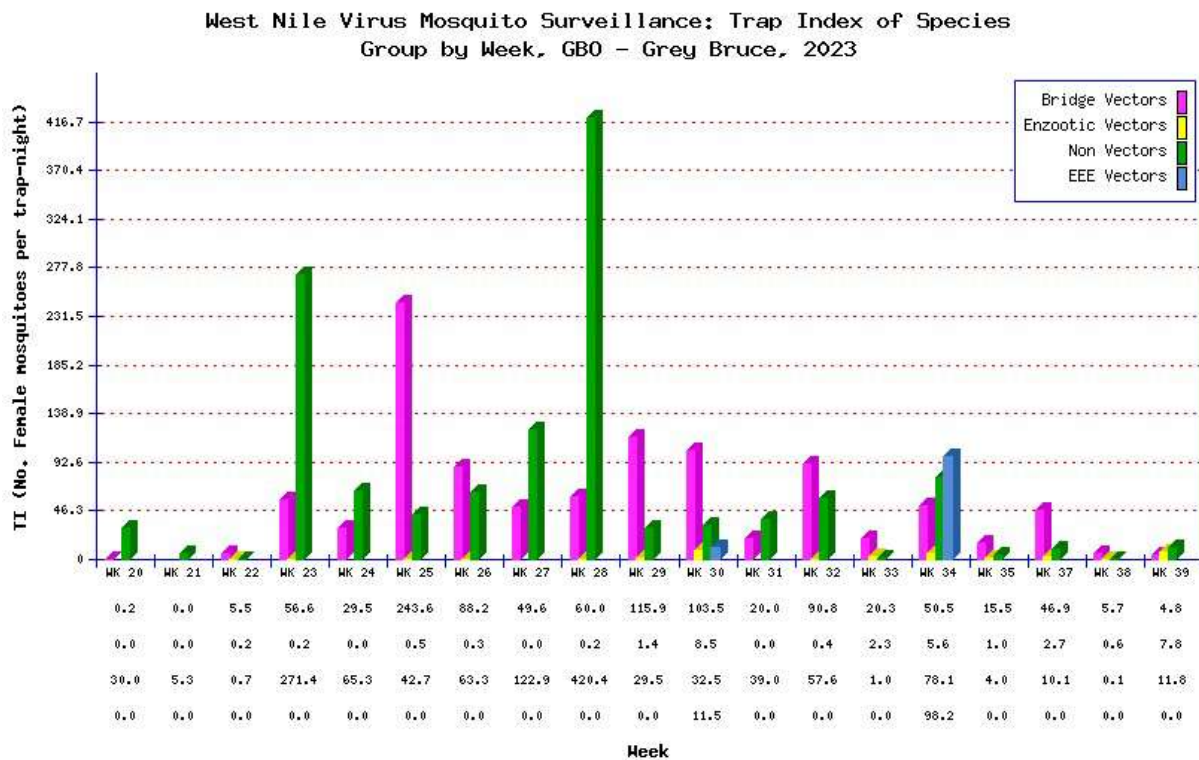
9.2 TRAP INDEX OF GROUPS BY WEEK IN GREY BRUCE PUBLIC HEALTH, 2023

The **trap index (TI)** is a useful tool for summarizing trap data and for comparing different time periods and locations (Figure 16). We use TI to show population fluctuations of a particular group of mosquitoes (enzootic vectors vs. bridge vectors). TI is the average number of females per taxon per trap night.

There was a high bridge vector population throughout most of the season, which peaked early in the season with a TI value of 243.6 in week 25. A low enzootic population, consisting mostly of *Cx. pipiens/restuans*, peaked a little later in the year with a TI value of 8.5 during week 30.

9.3 MOSQUITO SPECIES DISTRIBUTION AMONG SITES IN GREY BRUCE PUBLIC HEALTH, 2023

Total numbers and percentages broken down by groups are provided in Table 2. Site APHK produced the highest percentage of WNV enzootic vectors (38.5%), while site MPSS and the highest percentage of WNV bridge vectors (85.4%). All 106 *Culiseta melanura* were collected from site SVCAB making up 23.1% of the mosquitoes collected at that site. Overall, site PKMM had the highest number of identified mosquitoes while site DCWG had the lowest number.



West Nile Virus Investigative Unit
Entomogen Inc.

Figure 16. Trap Indices of WNV Enzootic Vectors (yellow), WNV Bridge Vectors (pink) and non-Vectors (green), Grey Bruce Public Health, 2023

Table 2. Grey Bruce Public Health Key Species Distribution Report, 2023

Site Code	WNV Enzootic Vectors	WNV Bridge Vectors	EEEV Vectors	Non Vectors	Total Mosquitoes Identified	Number of Extras	Number of Traps
APHK	42 (38.5%)	49 (45.0%)	0 (0.0%)	18 (16.5%)	109	0	5
BKSG	1 (0.5%)	43 (20.0%)	0 (0.0%)	171 (79.5%)	215	0	5
CNBP	0 (0.0%)	8 (6.5%)	0 (0.0%)	116 (93.5%)	124	0	5
CTAE	9 (3.5%)	152 (59.6%)	0 (0.0%)	94 (36.9%)	255	0	5
DCWG	1 (3.2%)	22 (71.0%)	0 (0.0%)	8 (25.8%)	31	0	5
GTGB	0 (0.0%)	216 (50.6%)	0 (0.0%)	211 (49.4%)	427	200	5
HPTBM	1 (0.2%)	133 (32.3%)	0 (0.0%)	278 (67.5%)	412	900	5
IMK	6 (18.8%)	18 (56.3%)	0 (0.0%)	8 (25.0%)	32	0	5
KRSBP	2 (0.4%)	194 (38.8%)	0 (0.0%)	304 (60.8%)	500	350	5
LMGH	1 (0.4%)	38 (17.0%)	0 (0.0%)	185 (82.6%)	224	0	5
MCHTC	10 (6.5%)	21 (13.7%)	0 (0.0%)	122 (79.7%)	153	0	5
MKOS	2 (1.3%)	51 (34.2%)	0 (0.0%)	96 (64.4%)	149	0	5
MPSS	1 (0.3%)	310 (85.4%)	0 (0.0%)	52 (14.3%)	363	450	5
PKMM	3 (0.5%)	74 (13.4%)	0 (0.0%)	475 (86.1%)	552	2600	6
SVCAB	26 (5.7%)	189 (41.3%)	106 (23.1%)	137 (29.9%)	458	1000	5
SVCASB	6 (1.6%)	305 (80.5%)	0 (0.0%)	68 (17.9%)	379	600	5
VNTH	5 (11.6%)	25 (58.1%)	0 (0.0%)	13 (30.2%)	43	0	5

10.0 WEST NILE VIRUS AND EASTERN EQUINE ENCEPHALITIS VIRUS ANALYSIS, 2023

Identified mosquitoes are pooled according to species, location, collection date and number of specimens. Any species of concern (see Appendix A) are sent to our diagnostics laboratory, emDx, for viral analysis using Real Time RT-PCR.

10.1 WEST NILE VIRUS AND EASTERN EQUINE ENCEPHALITIS VIRUS ANALYSIS, 2023

Entomogen staff tested a maximum of three pools per trap submitted, based on recommendations provided by Public Health Ontario (PHO, 2023). From the 86 traps submitted a total of 170 pools were sent for WNV-testing. Personnel from the Microbiology Laboratory of Entomogen’s West Nile virus Investigative Unit confirmed one (1) WNV-positive mosquito pool from Grey Bruce Public Health (Table 3). Two (2) pools of *Culiseta melanura* – the main EEEV enzootic vector – were collected in traps submitted by Grey Bruce Public Health. The pools tested negative for EEEV.

Table 4 presents the species breakdown and number of pools of each species tested separated into their respective categories. Eleven (11) different species or species complexes were tested for the presence of WNV. Enzootic vector *Culex pipiens/restuans* made up approximately 36% (N=122) of the pools tested in Grey Bruce Public Health. Bridge vector species *Aedes vexans vexans* accounted for an additional 26% (N=89) pools tested for WNV.

10.2 MINIMUM INFECTION RATE OF POSITIVE POOLS IN GREY BRUCE PUBLIC HEALTH, 2023

The Minimum Infection Rate (MIR) is a useful tool to estimate the proportion of mosquitoes infected with West Nile virus based on the results of viral testing of pooled samples. For any given species, MIR represents an estimate of the number of positive mosquitoes for every 1,000 collected. The MIR values for *Culex pipiens/restuans* is represented in Figure 19. Based on this model the MIR value when the positive pool was confirmed in week 39 was 32.3 out of 1,000 *Culex pipiens/restuans* mosquitoes potentially being positive for WNV.

Table 3. Grey Bruce Public Health, WNV Positive Pool in 2023

Health Unit	Week Code	Date Collected	Site Code	Species	Number of Mosquitoes	Result
GBO	39	26-Sep-23	SVCAB	<i>Culex pipiens/restuans</i>	25	Positive

Table 4. Grey Bruce Public Health, Number of Pools Tested for WNV or EEEV by Species in 2023

Species	Total Number of Mosquitoes	Number of Pools	Positive Pools
<i>Ae. vexans vexans</i>	132	21	0
<i>An. punctipennis</i>	37	17	0
<i>An. quadrimaculatus</i>	9	7	0
<i>An. walkeri</i>	3	3	0
<i>Cs. melanura</i>	106	2	0
<i>Cx. pipiens/restuans</i>	116	27	1
<i>Oc. canadensis</i>	622	25	0
<i>Oc. japonicus</i>	23	12	0
<i>Oc. stimulans</i>	273	28	0
<i>Oc. triseriatus</i>	67	16	0
<i>Oc. trivittatus</i>	159	14	0
Total	1547	172	0

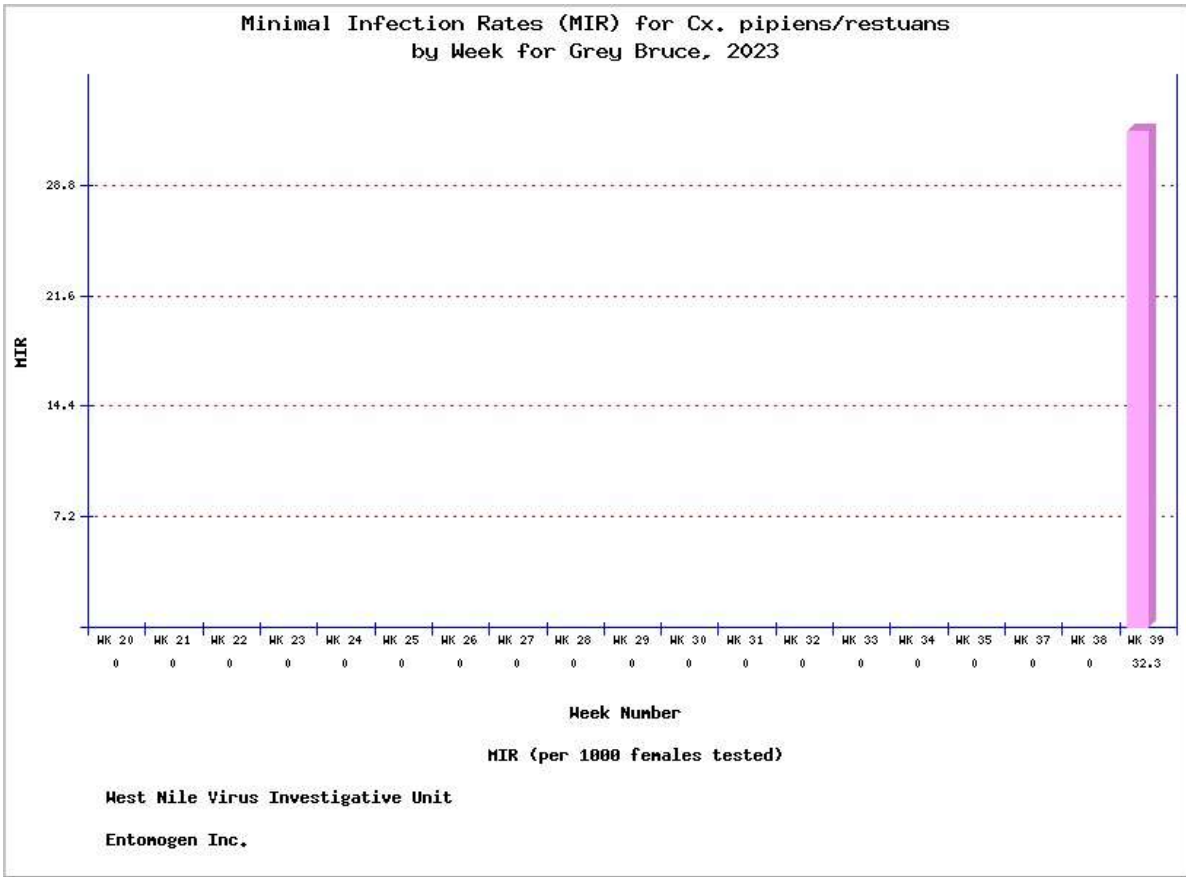


Figure 19. Grey Bruce Public Health, Minimum Infection Rate Graph for *Culex pipiens/restuans*, 2023

11.0 SUMMARY

Of the 4,426 mosquitoes identified in 2023, 116 of those were *Culex pipiens/restuans*, the main enzootic mosquito complex which is similar to the 2022 numbers (N=122). This number made up 2.62% of the total identified mosquito population in the 2023 season, compared to 3.58% in 2022.

The threshold value of 380 accumulated degree-days was not crossed indicating there were insufficient heat units for significant amplification of the virus in the enzootic mosquito population. No WNV human cases, or positive birds were reported in Grey Bruce Public Health, however Entomogen's lab did confirm one (1) WNV-positive mosquito pool in 2023. Province wide WNV numbers were up considerably in 2023 from the previous year, the majority of which occurred between weeks 31-35.

There were two (2) *Culiseta melanura* pools from traps submitted by Grey Bruce Public Health. Both of those pools tested negative for EEEV.

12.0 RECOMMENDATIONS

There were eighteen (18) EEEV equine cases and one (1) WNV-positive pool reported in 2023 (PHO, 2023). There were one hundred and six (106) *Culiseta melanura* – the main EEEV enzootic vector - collected in traps submitted by Grey Bruce Public Health. In addition, EEEV bridge vector species - *Ochlerotatus canadensis*, *Aedes vexans vexans* and *Coquillettidia perturbans* – made up approximately 37% (N=1,646) of all mosquito species collected in Grey Bruce Public Health in 2023. All of the *Culiseta melanura* specimens were collected from the same site, SVCAB on Concession 6 in Brockton, on two separate trap nights. Grey Bruce Public Health may want to consider increasing the trapping at that site.

In 2016, *Ae. albopictus* and *Ae. aegypti* – two exotic species that are vectors of many diseases including dengue, Zika and chikungunya - were discovered during routine surveillance in Windsor-Essex County. These findings demonstrate the importance for continued mosquito surveillance activities, not only for virus detection, but also to monitor range expansion and potential introduction of invasive species.

13.0 ACKNOWLEDGMENTS

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14.0 APPENDICES

APPENDIX A – MOSQUITO SPECIES: WNV TESTING ORDER OF PREFERENCE

1	<i>Culex pipiens/restuans</i>
2	<i>Culex salinarius</i>
3	<i>Ochlerotatus japonicus</i>
4	<i>Culex tarsalis</i>
5	<i>Aedes vexans vexans</i>
6	<i>Ochlerotatus triseriatus</i>
7	<i>Anopheles punctipennis</i>
8	<i>Ochlerotatus trivittatus</i>
9	<i>Anopheles walkeri</i>
10	<i>Ochlerotatus stimulans</i>
11	<i>Anopheles quadrimaculatus</i>
12	<i>Ochlerotatus canadensis</i>
*	<i>Aedes albopictus</i>
*	<i>Aedes aegypti</i>

* Since this species may sporadically occur in very low numbers and is a highly competent vector, it is suggested that it be tested for WNV as part of the three-pool limit

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