2024—Arbovirus Final Report

Summary of Human West Nile Virus and Other Arboviral Infections, Georgia 2024

West Nile virus (WNV) is a mosquito-borne disease of birds. Humans are occasionally infected with WNV through mosquito bites. Approximately 1 in 5 people infected with WNV develop symptoms of "West Nile Fever", which is often characterized by fever, headache, fatigue, and muscle pain or weakness. Less than 1% of people infected with WNV develop neurologic disease such as meningitis, encephalitis, or flaccid paralysis.

West Nile virus was first recognized in Georgia in July 2001. That year, there were 6 human cases of WNV encephalitis reported in Georgia, including one death. Since then cases have been reported each year with varying numbers of human deaths.

To improve identification of Georgians infected with WNV, surveillance for WNV illness in humans was expanded for the 2003 transmission season to include all acute infections of WNV. In addition, routine screening of the nation's blood supply began in 2003, resulting in the identification of persons infected with WNV prior to the development of symptoms, if symptoms developed at all.

While the majority of human infections with arboviruses have resulted from bites by infected mosquitoes, other rare modes of transmission have been identified, including transplacental, blood transfusion, and organ transplantation.

Historical data on arboviral diseases in Georgia 2002-2023 are available upon request.

In 2024, Georgia reported 54 cases of WNV and 24 WNV presumptive viremic donors (PVD), with 5 deaths. Presumptive viremic donors (PVDs) are people who had no symptoms at the time of blood donation or other testing, but tested positive for the presence of select arboviruses. Although Georgia tracks and reports PVDs to the CDC for epidemiological purposes, PVDs are not counted as cases in our state. However, they are indicators of transmission occurring at a specific time and place, so are counted in this summary.

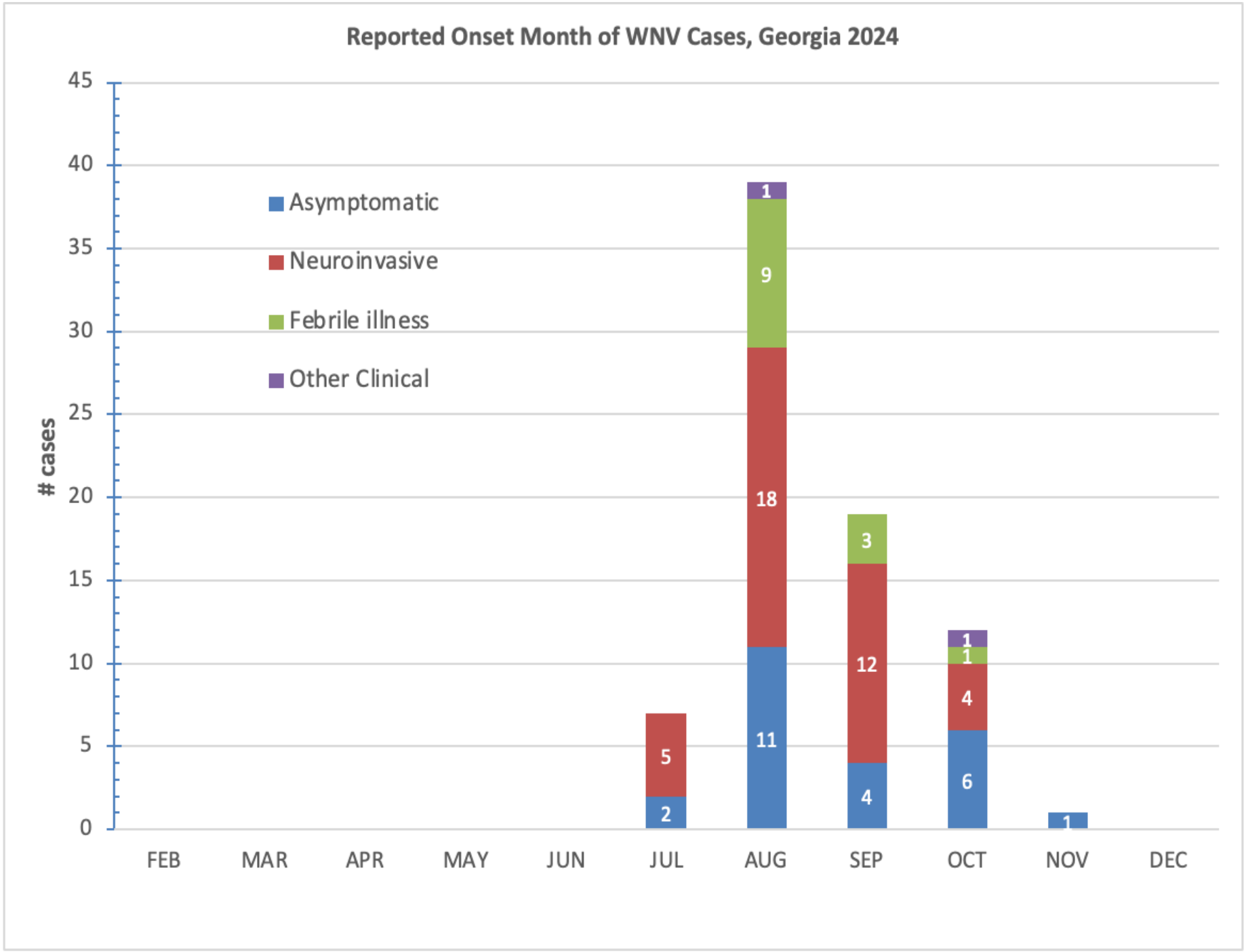
To date, 54 WNV disease cases were reported from 20 counties in 13 public health districts. Twenty-four asymptomatic cases of the 78 WNV-positives reported (30.8%) were reported from 16 counties in 11 Districts. Among the symptomatic cases, 39 (72.2%) of 54 experienced WNV neurologic illness (altered mental status, paralysis, encephalitis, GBS and/or meningitis), 2 (3.7%) had other clinical manifestations, and 13 (24.1%) were diagnosed with WNV fever. The average age of cases was 59 years (range 29-86). The average age of those with WNV neurologic illness was 46 years (range 41-86). The average age of asymptomatic WNV+ (out of 78) was 53.7 (range 17-81). Thirty-seven (68.5%) of the 54 cases were male. Most cases were reported in August.

California serogroup (CS) viruses, including California encephalitis, Keystone, La Crosse, Jamestown Canyon (JCV), snowshoe hare, and trivittatus, belong to the Bunyaviridae family of viruses. In the United States, La Crosse virus (LACV) is the most common of the California serogroup viruses. There were no cases of any California Serogroup virus were reported in Georgia in 2024.

Saint Louis encephalitis virus is related to WNV and is a member of the Flaviviridae subgroup. Until recently, SLE had not been reported in Georgia since the 1970s. In 2018, one case of SLE was reported in Georgia. There were no SLE cases reported in Georgia in 2024.

No cases of Eastern Equine Encephalitis (EEE) were reported in 2024.

The first travel-associated case of Zika was reported in Georgia in December 2015. In 2016, there were 113 travel-associated cases reported in Georgia. In 2017, there were a total of 11 travel-associated cases, 8 of which were asymptomatic. In 2018, a total of 2 asymptomatic travel-associated ZIKV cases were reported. In 2019, there were 5 travel-related ZIKV cases reported, 4 of which were asymptomatic. There was also 1 case of occupationally-acquired ZIKV. Between 2020 and 2024, no travel-related cases of ZIKV were reported. To date there have been no locally transmitted (mosquito to human) cases of Zika in Georgia. Fifty-eight travel-associated Dengue cases were reported in 2024, but no locally-acquired cases were reported. One travel-related case of CHIK was reported in 2024; no locally-acquired cases of CHIK have ever been reported in Georgia.


Reported Onset Month of WNV Cases, Georgia 2024
cases
45
40
35
30
25
20
15
10
5
0
Asymptomatic
Neuroinvasive
Febrile illness
Other Clinical
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
2
5
11
18
9
1
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12
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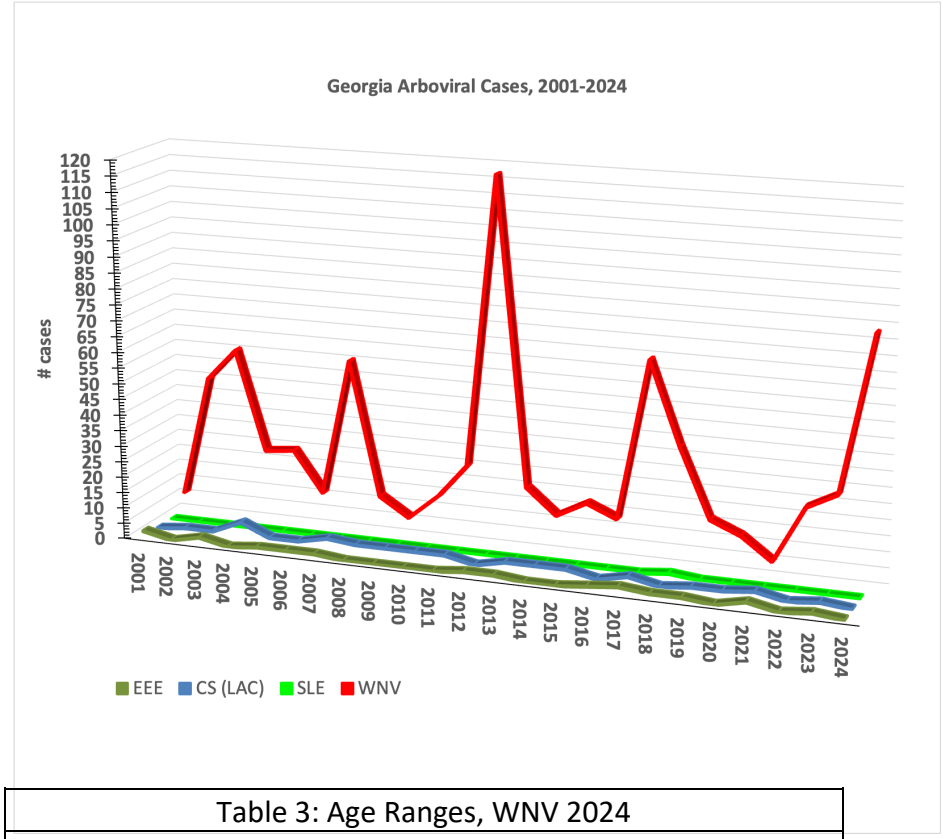
1



cases (including asymptomatic), 2024

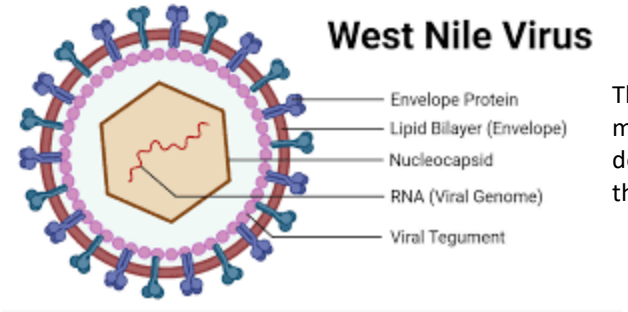
District	CS (LAC)	EEE	WNV	TOTAL
1-1				
1-2			3	**3**
2-0			2	**2**
3-(1,2,3,4,5)			48	**48**
4-0			3	**3**
5-1			1	**1**
5-2			3	**3**
6-0			3	**3**
7-0			3	**3**
8-1				
8-2				
9-1			3	**3**
9-2			9	**9**
10-0				
TOTAL	0	0	78	**78**

Table 3: Age Ranges, WNV 2024		
ALL		
count	**age range**	**%**
	0-10	0.0%
1	11-20	1.3%
1	21-30	1.3%
9	31-40	11.5%
12	41-50	15.4%
22	51-60	28.2%
16	61-70	20.5%
9	71-80	11.5%
8	>80	10.3%
78	total	

Clinical Syndromes, 2024			
Diagnosis	**EEE**	**CS (LAC)**	**WNV**
Asymptomatic			24
Encephalitis			12
Fever			13
Meningitis			8
other, neuroinvasive			19
other. clinical			2

Table 1: Clinical Syndromes, 2024

Virus	Month	Clinical Syndrome	Fatality	# cases
West Nile	July	Asymptomatic	No	2
		Meningitis	No	3
		Other Neuroinvasive Presentation	No	1
		Guillain-Barre Syndrome	No	1
	August	Acute Flaccid Paralysis	No	2
		Asymptomatic	No	11
		Febrile illness	No	1
		Febrile illness	No	1
		Febrile illness	No	2
		Febrile illness	No	5
		Meningitis	No	2
		Other Neuroinvasive Presentation	No	8
		Other Neuroinvasive Presentation	Yes	1
		Guillain-Barre Syndrome	No	1
		Encephalitis - Including Meningoencephalitis	No	2
		Encephalitis - Including Meningoencephalitis	Yes	2
		Other Clinical	No	1
	September	Acute Flaccid Paralysis	Yes	1
		Asymptomatic	No	4
		Febrile illness	No	3
		Meningitis	No	1
		Meningitis	Unknown	1
		Other Neuroinvasive Presentation	No	1
		Other Neuroinvasive Presentation	No	1
		Other Neuroinvasive Presentation	No	1
		Encephalitis - Including Meningoencephalitis	No	5
		Encephalitis - Including Meningoencephalitis	Yes	1
	October	Asymptomatic	No	6
		Febrile illness	No	1
		Meningitis	No	1
		Other Neuroinvasive Presentation	No	1
		Encephalitis - Including Meningoencephalitis	No	2
		Other Clinical	No	1
	November	Asymptomatic	No	1



The August case currently categorized as "**other clinical**" may be revised by the CDC. This case involves a blood donor who later developed symptoms but did not meet the clinical criteria for a WNV case definition.

Arboviral Diseases

There are >500 recognized arboviruses worldwide, 150 of which are known to cause human disease. This figure may only represent <1% of all arboviruses, as most are zoonotic infections among hosts other than humans. Worldwide, the most prevalent arboviral diseases per year are dengue fever (DENV; 96 million cases), chikungunya virus (CHIKV; 693,000 cases), Zika virus (ZIKV; 500,000 cases), yellow fever (130,000 cases), Japanese encephalitis (42,500 cases), and West Nile virus (2,588 cases). Other emergent or reemergent arboviral diseases are Eastern equine encephalitis, St Louis encephalitis, La Crosse encephalitis, Rift Valley fever, Spondweni, Mayaro, Usutu, O'nyong-nyong, and Sindbis.

DENV, CHIKV, and ZIKV viruses are of current concern because of rising incidence, expanding geographic range, clinically important disease spectrum, and public health burden. These viruses share epidemiology, transmission pathways, and clinical expressions, although their complications vary. The clinical signs associated with infection from these arboviruses are often inapparent, mild, or nonspecific, but they may include serious complications. Definitive diagnoses of DENV, CHIKV, and ZIKV may be made with enzyme-linked immunosorbent assay or reverse transcriptase-polymerase chain reaction, but these tests may not be readily available in many under-resourced laboratory settings.

The primary vector of DEN, CHIKV, and ZIKV is *Aedes aegypti*. *Aedes aegypti* are small, dark mosquitoes with white markings on their thorax, abdomen, and legs. As with all mosquitoes, they have four life stages (egg, larva, pupa, adult), a process that takes 8 to 10 days, depending on temperature, food availability, and larval density. Males may mate frequently throughout their lifetimes, but only one sperm dose is needed by females to produce numerous batches of eggs. Females lay 100 eggs at a time and some species need as little as a bottle cap full of water to lay eggs, which may hatch and develop into adults in as little as 1 week. Some species have eggs that are durable, capable of remaining viable after freezing, and surviving in desiccated settings for >1 year. Males survive 2 to 3 weeks in the field, whereas females may survive a month or more.

Male mosquitoes do not bite humans, but female *Ae. aegypti* are voracious daytime feeders seeking blood for protein to make eggs. *Aedes aegypti* have a strong preference for human blood, whereas *Ae. albopictus* are less discriminate, feeding on both humans and animals. *Aedes aegypti* may ingest 3 to 4 µL of blood, twice its body weight, and may become infected with an arbovirus after feeding on a viremic human. Once infected, *Ae. aegypti* remain infected for life. Viruses in *Ae. aegypti* saliva may be transmitted to humans by bites from the infected females. *Aedes aegypti* are capable of transmitting more than one arbovirus during a single feeding episode. Females may take multiple blood meals to complete the 2 to 8-day gonotrophic cycle that begins with blood meals and ends with egg laying.

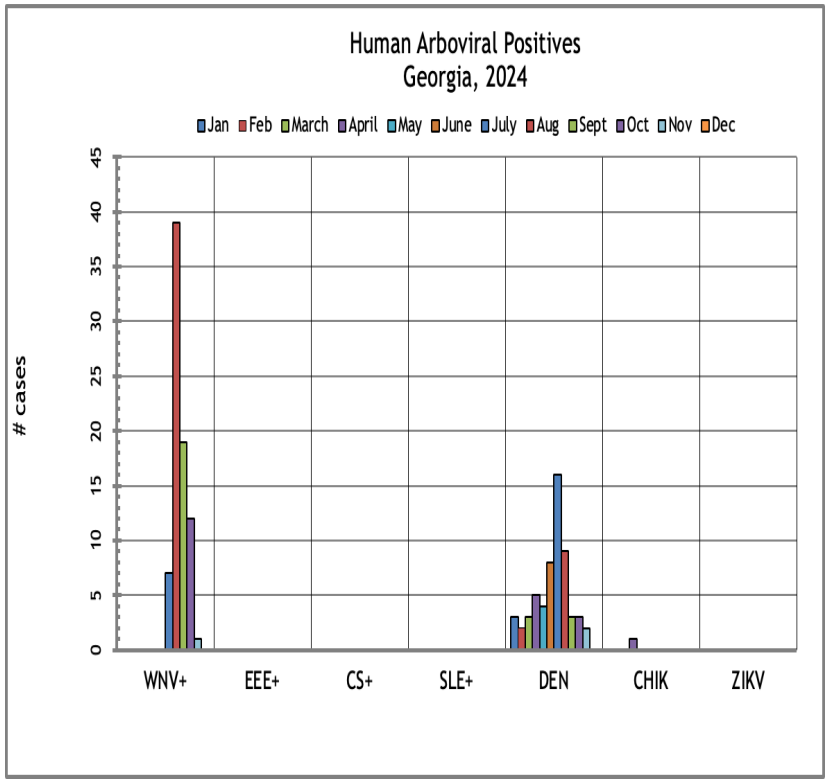
(https://pmc.ncbi.nlm.nih.gov/articles/PMC8055094/)

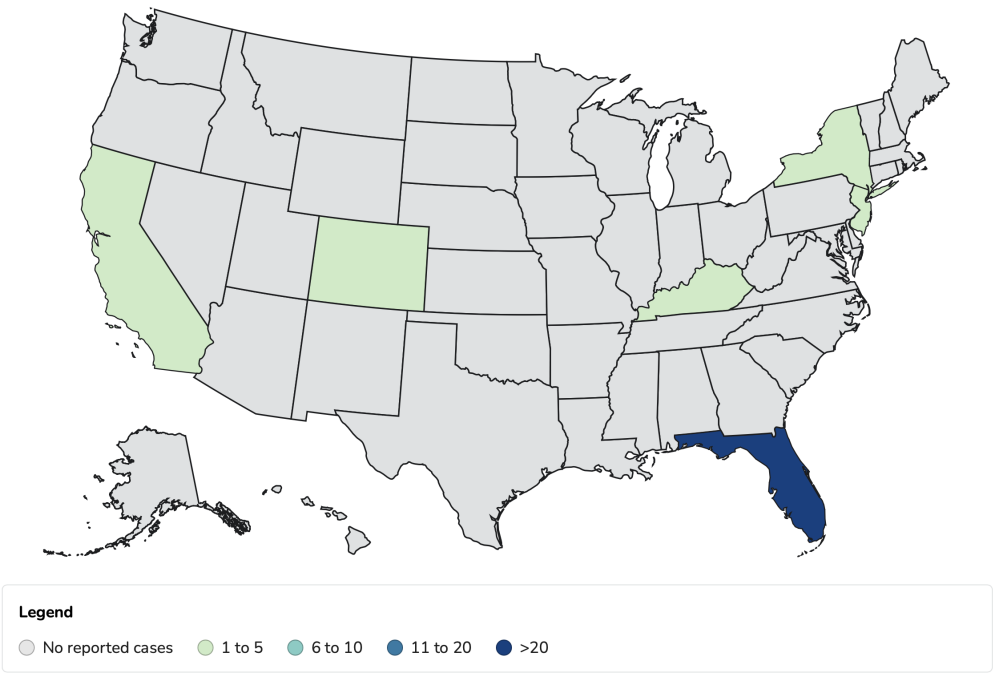
Cases by Year (includes asymptomatic cases*)				
Year	EEE	CS (LAC)	SLE	WNV
2001	2			6
2002		1		45
2003	2	1		55
2004		5		23
2005	1	1		24
2006	1	1		11
2007	1	3		55
2008		2		12
2009		2		6
2010		2		14
2011		2		25
2012	1			117
2013	1	2		20
2014		2		13
2015		2		15
2016	1			13
2017	2	2		63
2018	1		1	38
2019	1	1		16
2020		1		12
2021	2	2		5
2022				23
2023	1	1		28
2024				78

Exotic Mosquito-Borne Diseases

Oropouche virus (OROV) is a vector-borne virus that causes Oropouche fever. OROV is primarily transmitted through the bites of infected biting midges (*Culicoides paraensis*). It can also be transmitted through the bites of certain mosquitoes. Symptoms of OROV fever typically appear 3-10 days after infection and include: fever, headache, muscle and joint pain, chills, nausea, vomiting, and sensitivity to light. Most people with OROV fever recover within a few weeks. However, in rare cases, it can lead to complications such as: encephalitis, meningitis, and Guillain-Barrè syndrome. The Oropouche virus is present mostly in South America and the Caribbean, but since December 2023 more cases were reported, totaling over 10 000 cases in 2024, including from areas in the region where it was not previously detected. In 2024 concerns arose about possible complications of Oropouche virus infection including two deaths in previously healthy infected adults, and of possible negative outcomes of infection during pregnancy with associated fetal death, miscarriage, and microcephaly in newborns, that requires further investigation and research. There have been no reports of transmission of Oropouche virus through sexual activity to date. However, a recent publication describes a patient with Oropouche virus disease who had virus and viral RNA detected in bodily fluids, including semen.

Infections can be prevented mainly through vector control and personal protective measures against insect bites, including use of meshed bed nets, chemical insecticides, protective clothing, and insect repellents is recommended.





Travel-related Oropouche virus disease cases reported by location of residence, 2024

The Spread of Oropouche Virus

virus	Country of Origin	Count
Chikungunya	BARBADOS	1
Dengue	BONAIRE, SINT EUSTATIUS AND SABA	1
	BRAZIL	6
	CAMEROON	1
	COLOMBIA	2
	DOMINICAN REPUBLIC	2
	EL SALVADOR	1
	GUATEMALA	6
	GUYANA	1
	HONDURAS	4
	INDIA	7
	MALAYSIA	1
	MARTINIQUE	2
	MEXICO	8
	NEPAL	1
	NICARAGUA	1
	NIGERIA	1
	PARAGUAY	1
	PHILIPPINES	1
	PUERTO RICO	3
	TANZANIA, UNITED REPUBLIC OF	1
	THAILAND	1
	VENEZUELA, BOLIVARIAN REPUBLIC OF	1
	VIRGIN ISLANDS	4

Veterinary Data

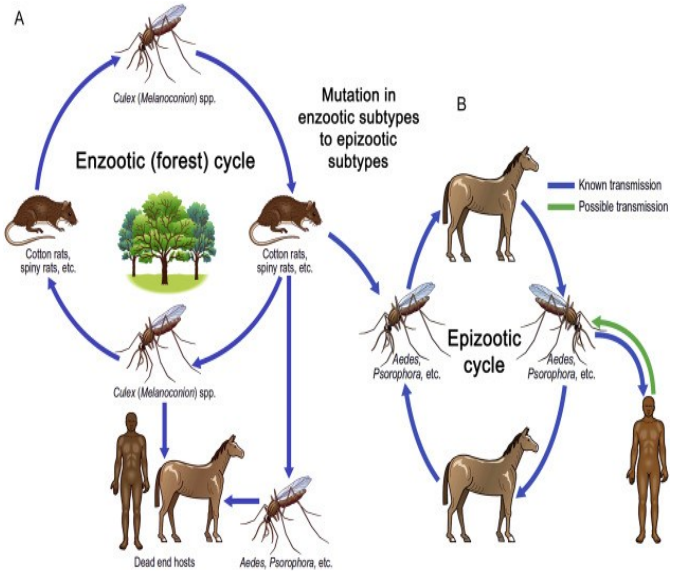
Two horses tested positive for WNV in 2024. The number of reported cases of WNV in horses decreased rapidly after 2002, likely due to increased immunity, increased vaccination, and/or decreased testing, but had lately begun to increase again, although somewhat sporadically.

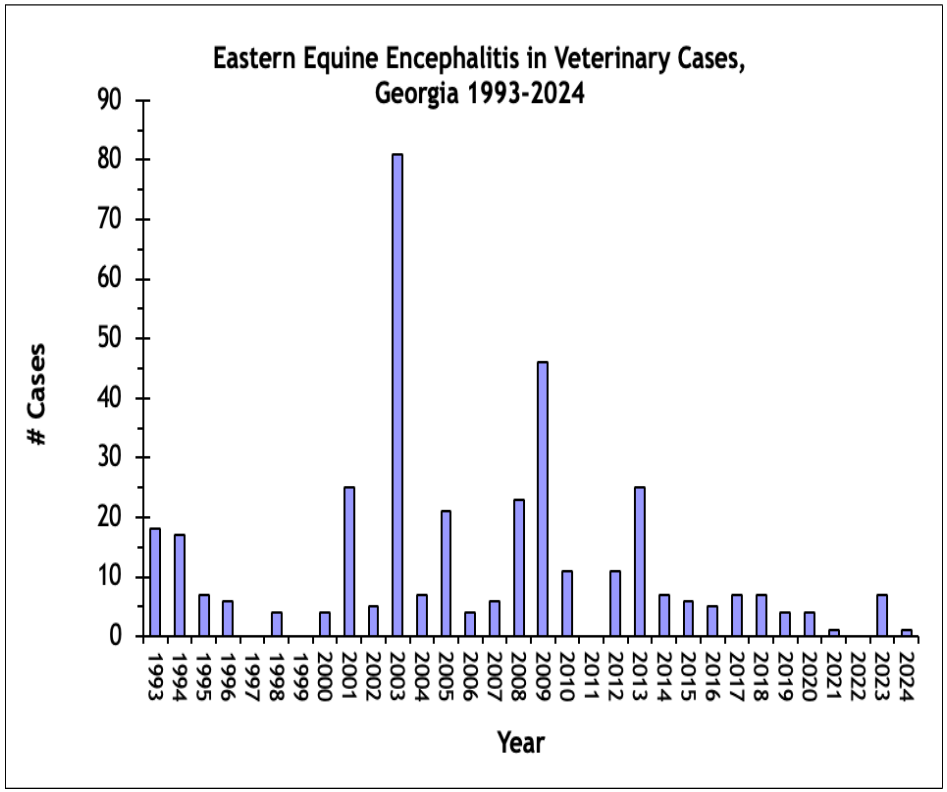
One horse tested positive for EEE in 2024. Eastern equine encephalitis is endemic in the Coastal and Coastal Plains areas of Georgia. During an average year, four or five EEE+ horses are reported from these areas. The true number of horse cases is probably higher, and lack of reporting is due primarily to under-testing, although subclinical infections can occur with EEE.

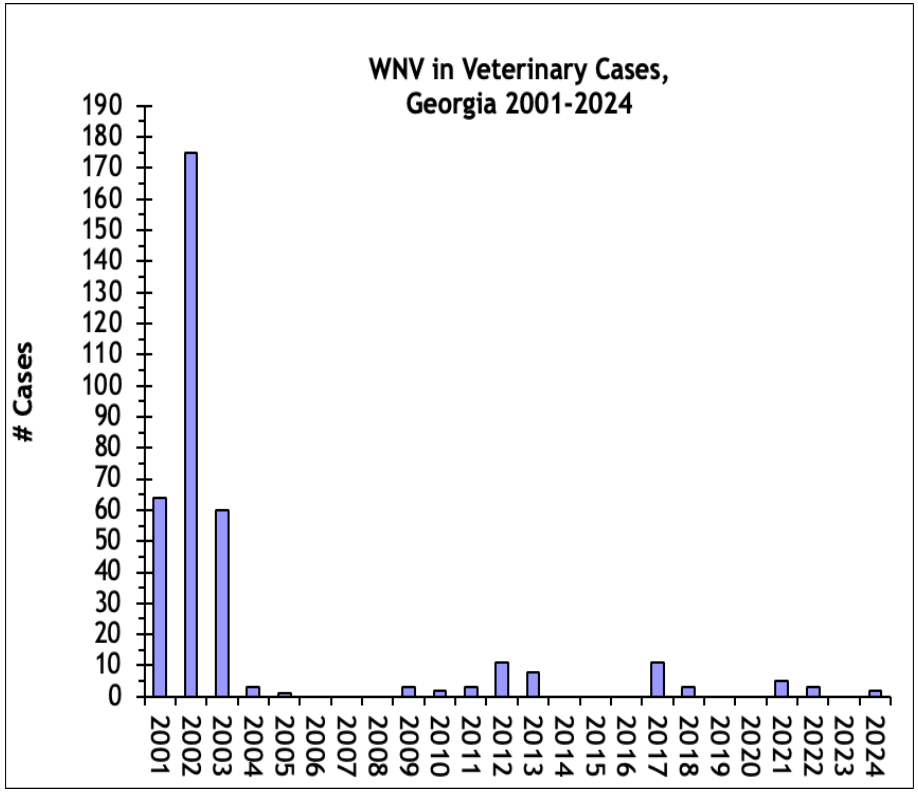
Vaccinating at the proper time of the year against EEE and WNV is critical to protecting horses from the potentially fatal mosquito-borne diseases.

year	WNV	EEE
2001	64	25
2002	175	5
2003	60	81
2004	3	7
2005	1	21
2006		4
2007		6
2008		23
2009	3	46
2010	2	11
2011	3	
2012	11	11

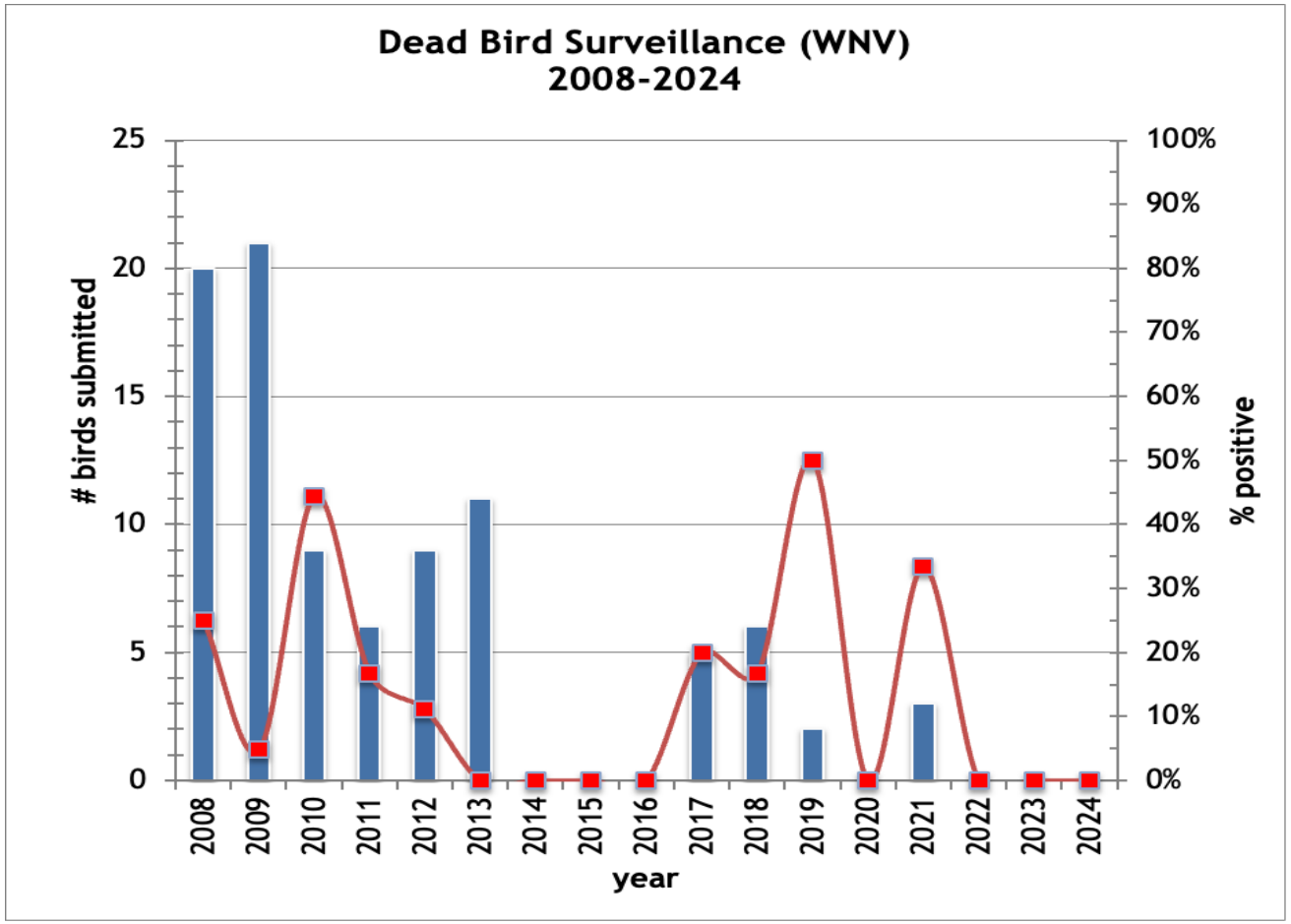
year	WNV	EEE
2013	8	25
2014		7
2015		6
2016		5
2017	11	7
2018	3	7
2019		4
2020		4
2021	5	1
2022	3	
2023		7
2024	2	1







Dead Bird Surveillance



year	WNV+	total	% positive
2001	322	1566	20.6%
2002	931	2421	38.5%
2003	478	2131	22.4%
2004	105	581	18.1%
2005	23	311	7.4%
2006	15	281	5.3%
2007	10	97	10.3%
2008	5	20	25.0%
2009	1	21	4.8%
2010	4	9	44.4%
2011	1	6	16.7%
2012	1	9	11.1%
2013		11	
2014			
2015			
2016			
2017	1	5	20.0%
2018	1	6	16.7%
2019	1	2	50.0%
2020			
2021	1	3	33.3%
2022			
2023			
2024			

As of 2012, federal funding was no longer available to test birds. Submission of dead birds had already decreased from a high of 2421 birds submitted to SCWDS for testing in 2002, to 2 birds submitted in 2019.

In 2024, no birds were reported as submitted for testing.

Dead bird surveillance continues to lose ground as a surveillance tool, and even more so now when no funding is available at the State level to support testing; most counties do not have the resources to pick up and ship birds for testing in any case. Bird testing does continue to have some utility however, esp where mosquito surveillance data are not available. In addition, positive dead bird reports can be used to trigger public education messages reminding people to wear repellent and to dump out standing water.

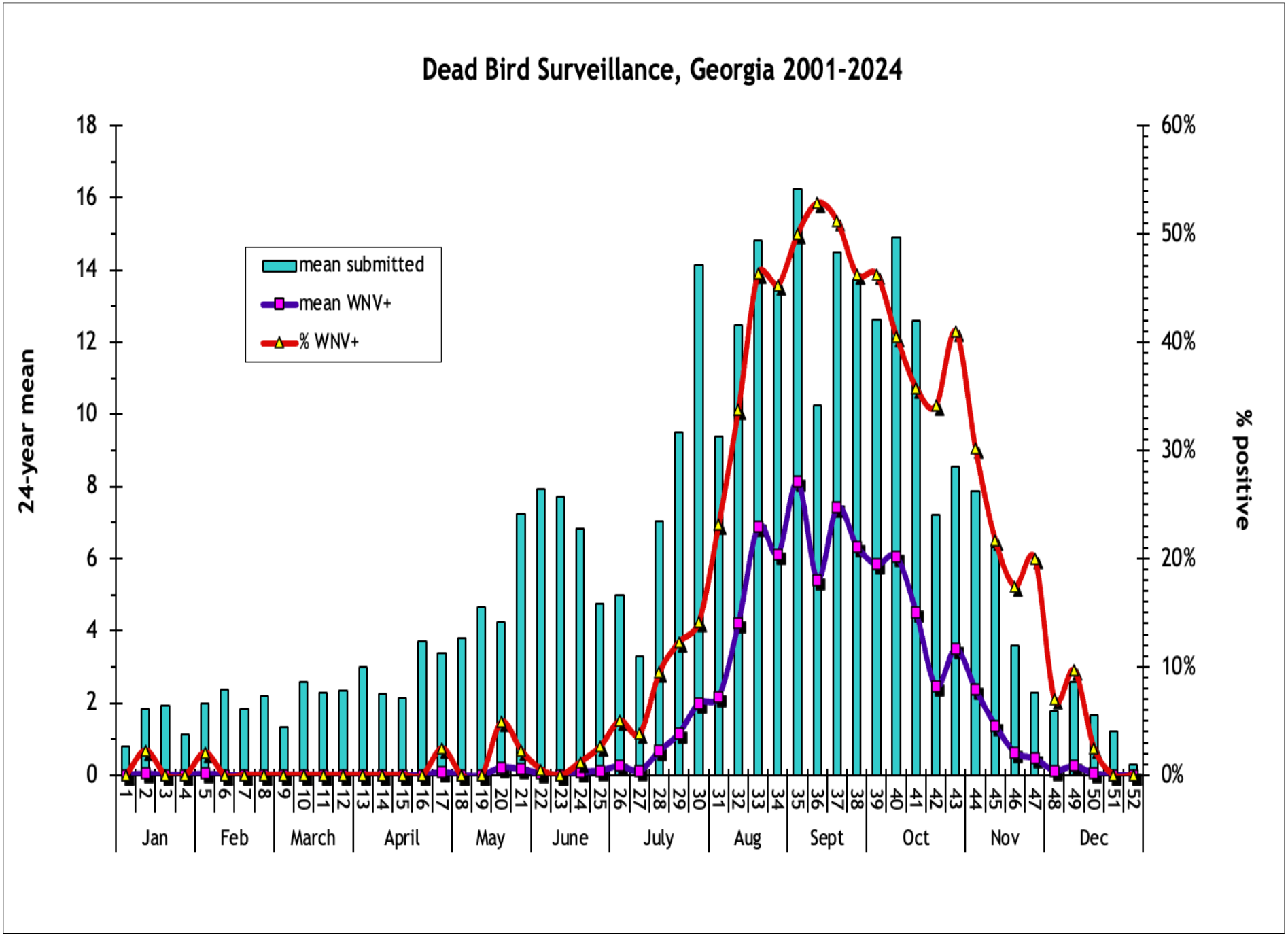
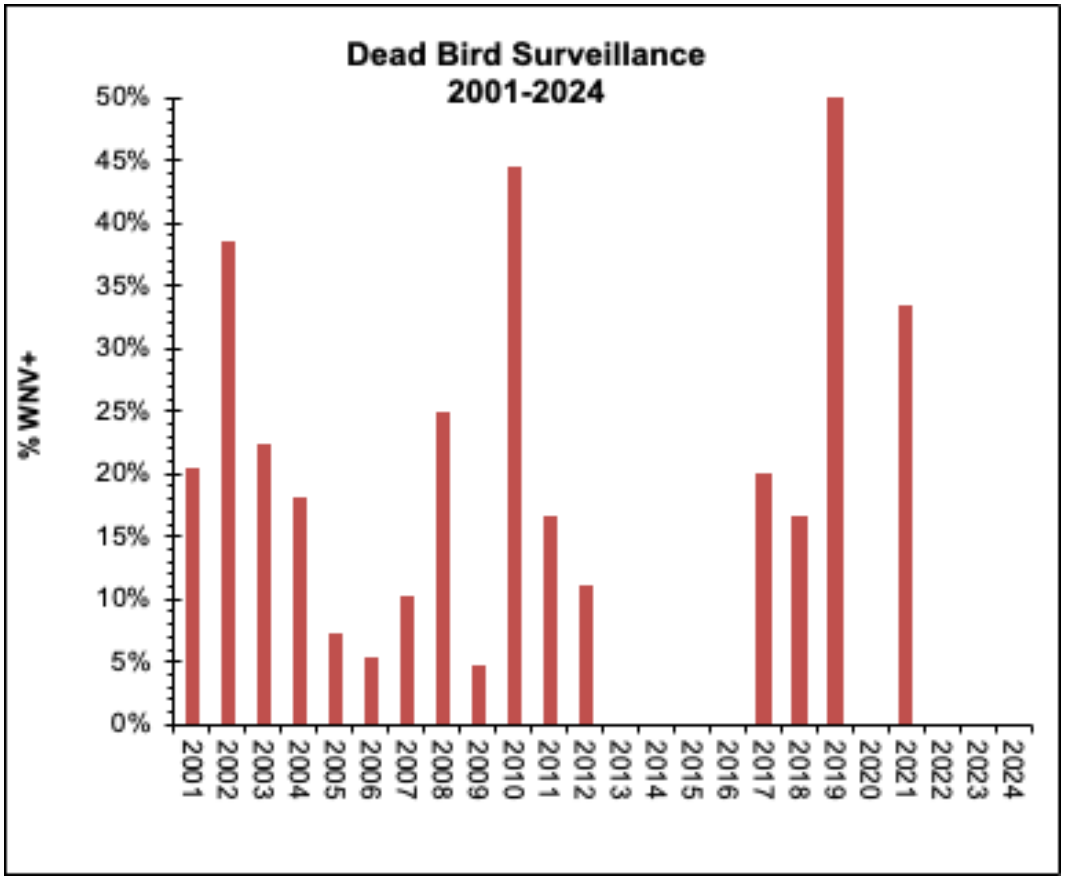
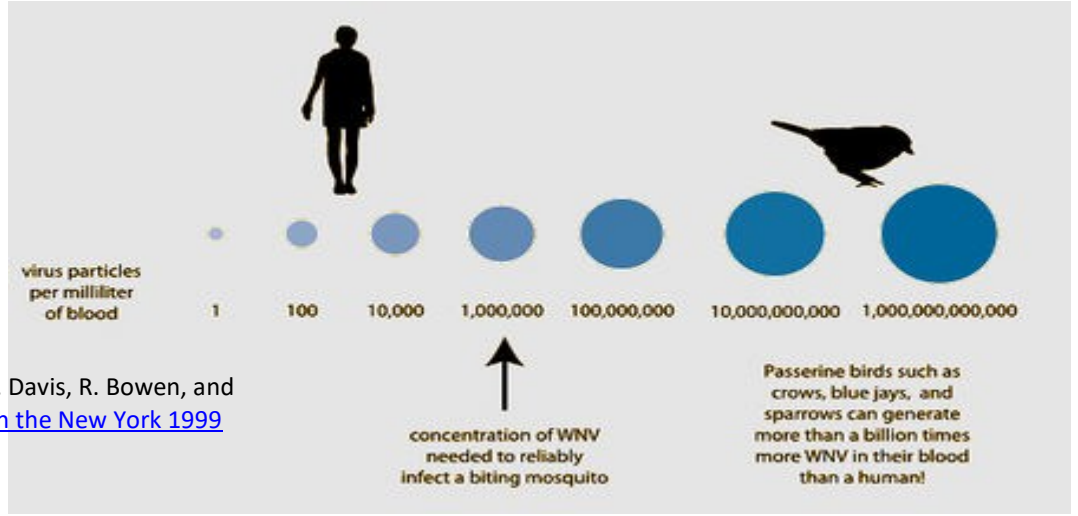

Dead Bird Surveillance, Georgia 2001-2024
24-year mean
% positive
mean submitted
mean WNV+
% WNV+
0
2
4
6
8
10
12
14
16
18
0%
10%
20%
30%
40%
50%
60%
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52

Table of West Nile Virus host competency of 23 species of birds. A larger index number correlates to higher amounts of viral load in concurrence with long durations of viremia. Data adapted from Komar et al. 2003.

Species	Reservoir Competence Index
Blue Jay	2.55
Common Grackle	2.04
House Finch	1.76
American Crow	1.62
House Sparrow	1.59
Ring-billed Gull	1.26
Black-billed Magpie	1.08
American Robin	1.08
Red-winged Blackbird	0.99
American Kestrel	0.93
Great Horned Owl	0.88
Killdeer	0.87
Fish Crow	0.73
Mallard	0.48
European Starling	0.22
Mourning Dove	0.19
Northern Flicker	0.06
Canada Goose	0.03
Rock Dove	0
American Coot	0
Ring-necked Pheasant	0
Monk Parakeet	0





Komar, N., S. Langevin, S. Hinten, N. Nemeth, E. Edwards, D. Hettler, B. Davis, R. Bowen, and M. Bunning. 2003. Experimental Infection of North American Birds with the New York 1999 Strain of West Nile Virus. Emerging Infectious Diseases 9(3): 311-322.

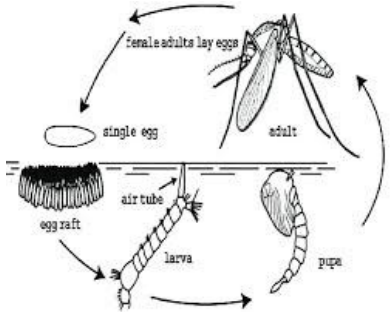
Mosquito Surveillance

In 2012, due to funding cuts, mosquito testing was no longer supported by the State Department of Public Health. Counties testing mosquito pools in-house or holding contracts for testing continued doing mosquito surveillance and shared some of the test results with the GDPH. Unfortunately, data submitted to the GDPH are likely to be incomplete, making data analysis difficult and results suspect.

Sixteen counties sent mosquitoes for testing in 2024. A total of 9281 pools of mosquitoes (178195 individuals) were sent for testing in 2024, with results reported to the GDPH. Three species, *Culex quinquefasciatus* (233 pools), *Cx nigripalpus* (6 pools), and *Cx restuans* (3 pools) were found to be WNV+. Fourteen pools of unidentified *Culex* spp also tested positive for WNV; these were likely to have been *Cx quinquefasciatus* as well. Additionally, four pools tested positive for EEE.

County	vector species	# WNV+ pools
Chatham	*Culex spp.*	14
	Cx. nigripalpus	6
	Cx. quinquefasciatus	198
DeKalb	*Cx. quinquefasciatus*	32
	Cx. restuans	3
Glynn	*Cx. quinquefasciatus*	3

Species	County	EEE+ pools
Cs. melanura	Lowndes	**1**
	Chatham	1
Cx. quinquefasciatus	Lowndes	**1**
	Irwin	**1**



2024 WNV+ Mosquitoes

county	# mosquitoes submitted	WNV+ pools	MIR
Ben Hill	31		
Berrien	23		
Brooks	64		
Bryan	33		
Camden	14600		
Chatham	114317	218	1.91
Cook	15		
DeKalb	12111	35	2.89
Echols	100		
Fulton	7477		
Glynn	20142	3	0.15
Irwin	50		
Lanier	100		
Lowndes	9029		
Tift	97		
Turner	6		

trap type	NEG	EEE	FLAV	WNV	TOTAL
BGS	3				3
CDC	1246	2		4	1252
DynaTrap	130				130
Exit	47				47
Gravid	5050	2	3	252	5307
NJLT	2624				2624

CDC Light Trap

GA Arboviruses 2001-2024 (# pools)

	trap type					
Virus	**unknown**	**other**	**BGS**	**Gravid**	**CDC**	**Total**
Bunyavirus					1	1
Cache Valley	6					6
EEE	1	1		8	24	34
Flanders	16			1078	16	1110
Flanders (variant)				80	2	82
HJV				4	6	10
HP				1		1
Keystone	2				1	3
LAC	1					1
NEG	10244	4353	734	105402	25517	146250
Orbivirus		1				1
Potosi	2				1	3
South River virus	2					2
TENV					1	1
UNK				1		1
WNV	193		3	2672	44	2912
TOTAL	10467	4355	737	109246	25613	150418

BGS Trap

Gravid Trap

In 2024, the first WNV+ mosquitoes were detected in Chatham County in mid June. The last WNV+ pool was collected in Chatham in early November. Peaks in numbers of WNV+ pools occurred in July and August. Four WNV+ pools were collected in CDC light traps; 252 WNV+ pools were collected in gravid traps.

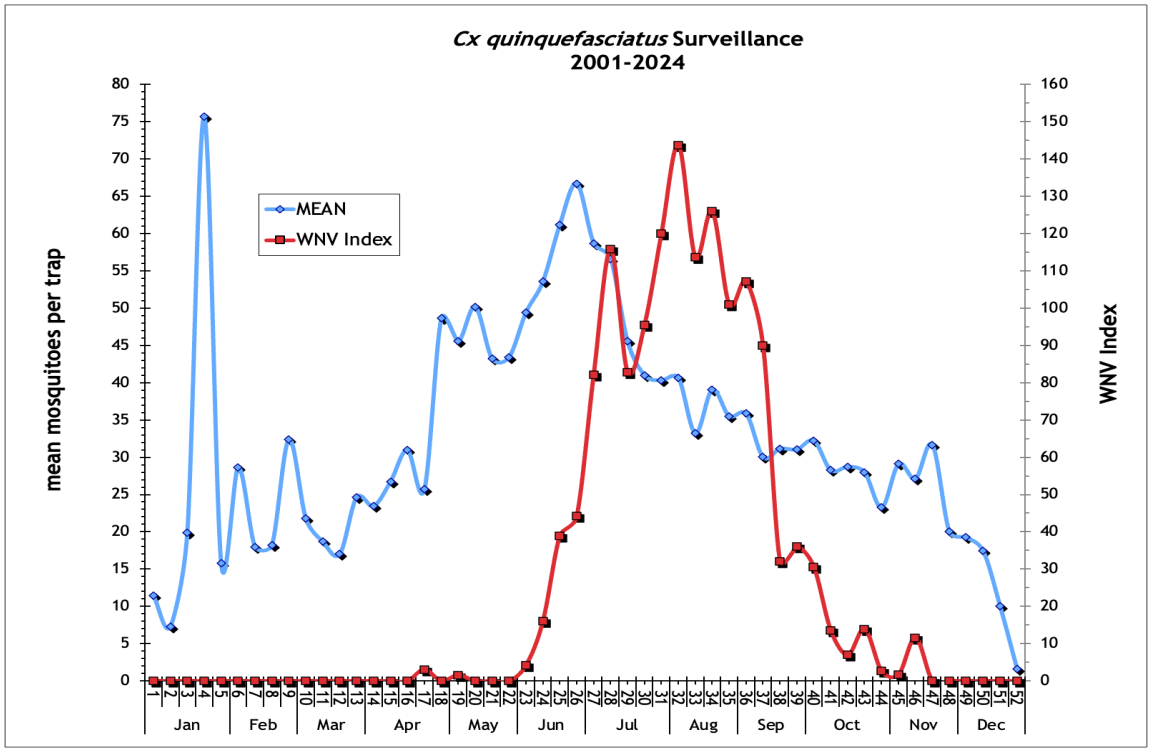
The Vector Index (VI) equals the MIR times the number of vectors per trap night . It is a Measure of infectivity that takes into account the following information:

- **Vector species composition** – Key species carrying West Nile virus in our region.
- **Vector species population density** – Vector abundance relative to trapping effort (vectors per trap night).
- **Vector species infection rate** – Proportion of vector population infected with WNV (MIR).

The VI is an objective method of following trends in mosquito infection rates, adjusted for mosquito abundance in the area.

The Minimum Infection Rate or MIR = (# WNV+ Pools/Total # Mosquitoes Tested) X 1000. The WNV Index is the MIR multiplied by the number of mosquitoes per trap night. An MIR of 0 suggests that there is no viral activity in the area. An MIR of 0.1 to 3.9 indicates that some viral activity is present, and increased vigilance and testing are needed. An MIR of 4.0 or above means that a high level of viral activity is present, human infections are imminent (if not already present), and prompt action is required.

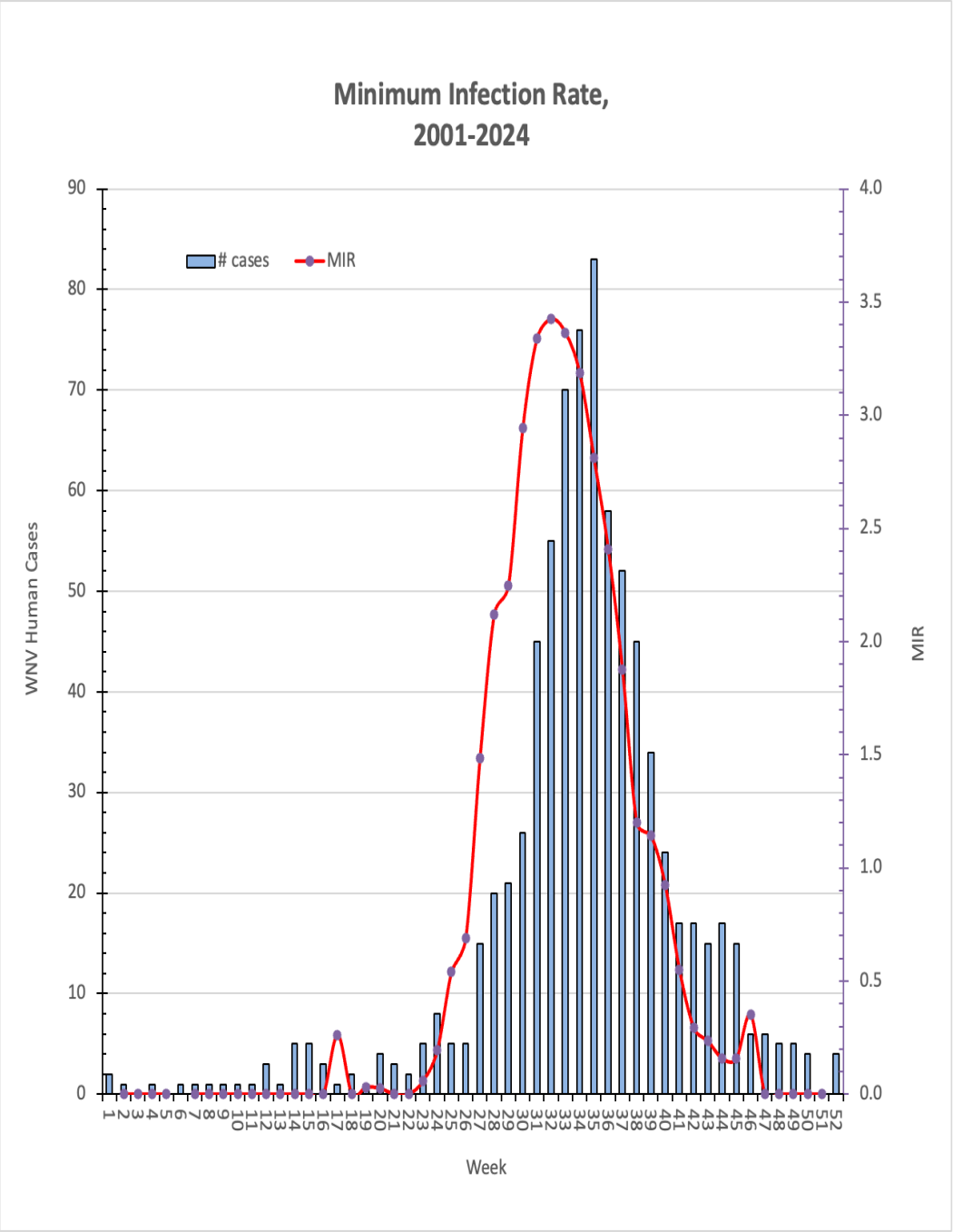
The monthly MIR for Georgia in 2024 ranged from 0.13 to 5.11, with an average of 2.06.



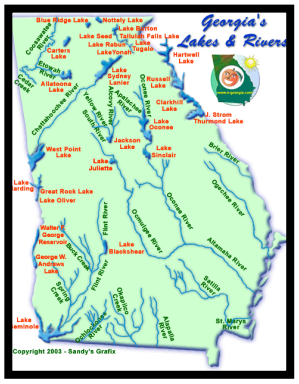
year	WNV Index	WNV+ Pools	human cases
2001	146.3	31	6
2002	106.6	57	37
2003	50.7	105	60
2004	40.7	126	24
2005	17.7	67	24
2006	31.5	81	10
2007	29.9	75	60
2008	25.3	50	12
2009	13.7	24	6
2010	47.7	99	14
2011	179.6	397	26
2012	64.3	125	117
2013	72.0	150	20
2014	43.6	56	13
2015	37.00	40	17
2016	22.80	36	13
2017	148.00	276	64
2018	202.30	310	38
2019	113.40	243	16
2020	24.60	59	12
2021	11.50	31	5
2022	59.60	100	23
2023	48.40	118	28
2024	51.6	256	78

2001-2024	human cases	WNV+ mosquito pools	veterinary case	positive bird
total	723	2912	480	1902
mean/year	30.1	121.3	32	79.3

year	total pools	WNV+	% WNV+	human cases
2001	597	31	5.2%	6
2002	4032	57	1.4%	37
2003	6177	105	1.7%	60
2004	10161	126	1.2%	24
2005	15248	67	0.4%	24
2006	4785	81	1.7%	10
2007	6513	75	1.2%	60
2008	6383	50	0.8%	12
2009	4446	24	0.5%	6
2010	5990	99	1.7%	14
2011	7622	397	5.2%	26
2012	6042	125	2.1%	117
2013	7453	150	2.0%	20
2014	5038	56	1.1%	13
2015	3366	40	1.2%	17
2016	5620	36	0.6%	13
2017	6419	276	4.3%	64
2018	6599	310	4.7%	38
2019	5532	243	4.4%	16
2020	6015	59	1.0%	12
2021	7375	31	0.4%	5
2022	3611	100	2.8%	23
2023	7110	118	1.7%	28
2024	9363	256	2.7%	78
MEAN	6312	121.3	2.1%	30.1
TOTAL	151489	2912	50.0%	723

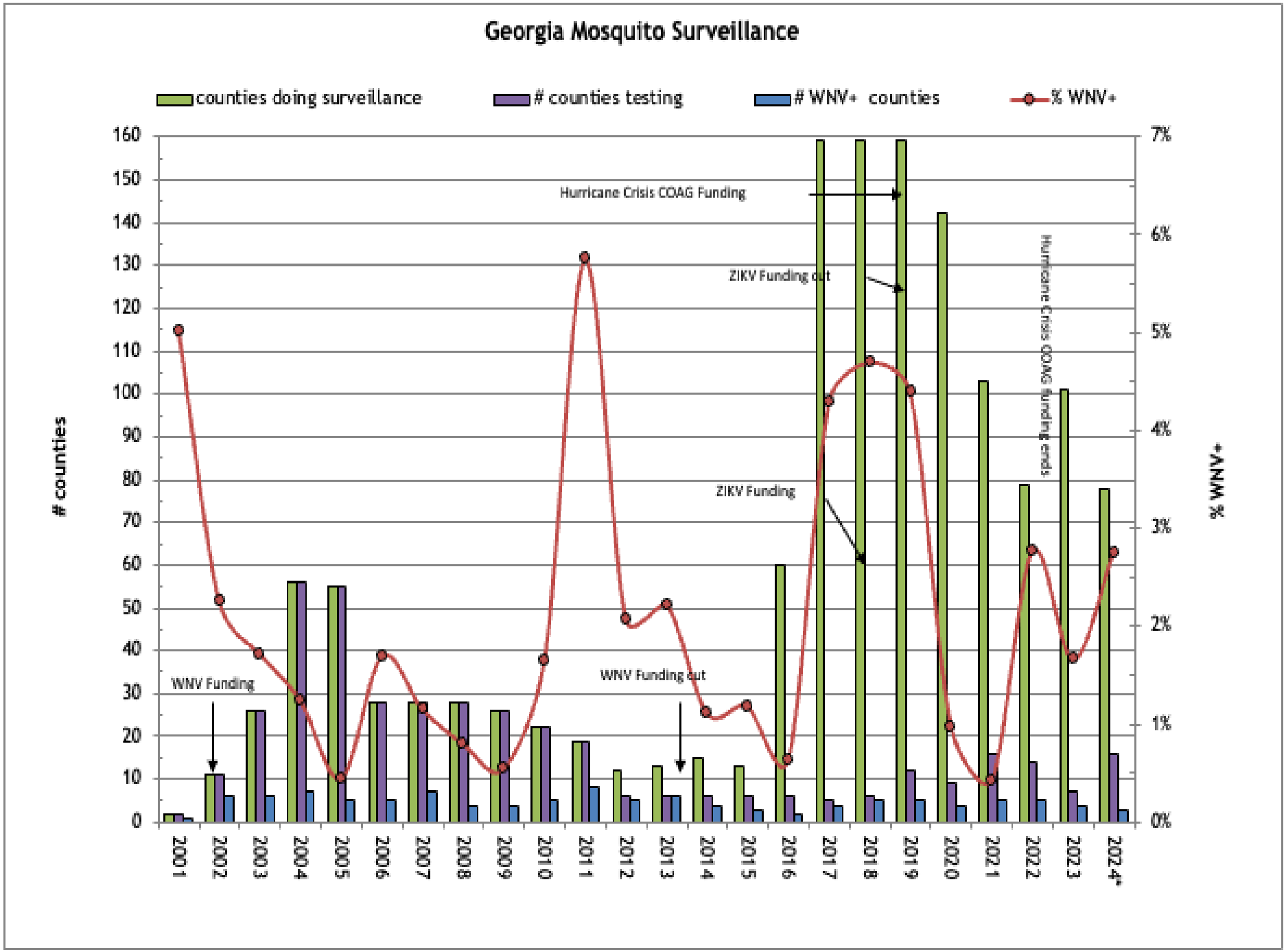


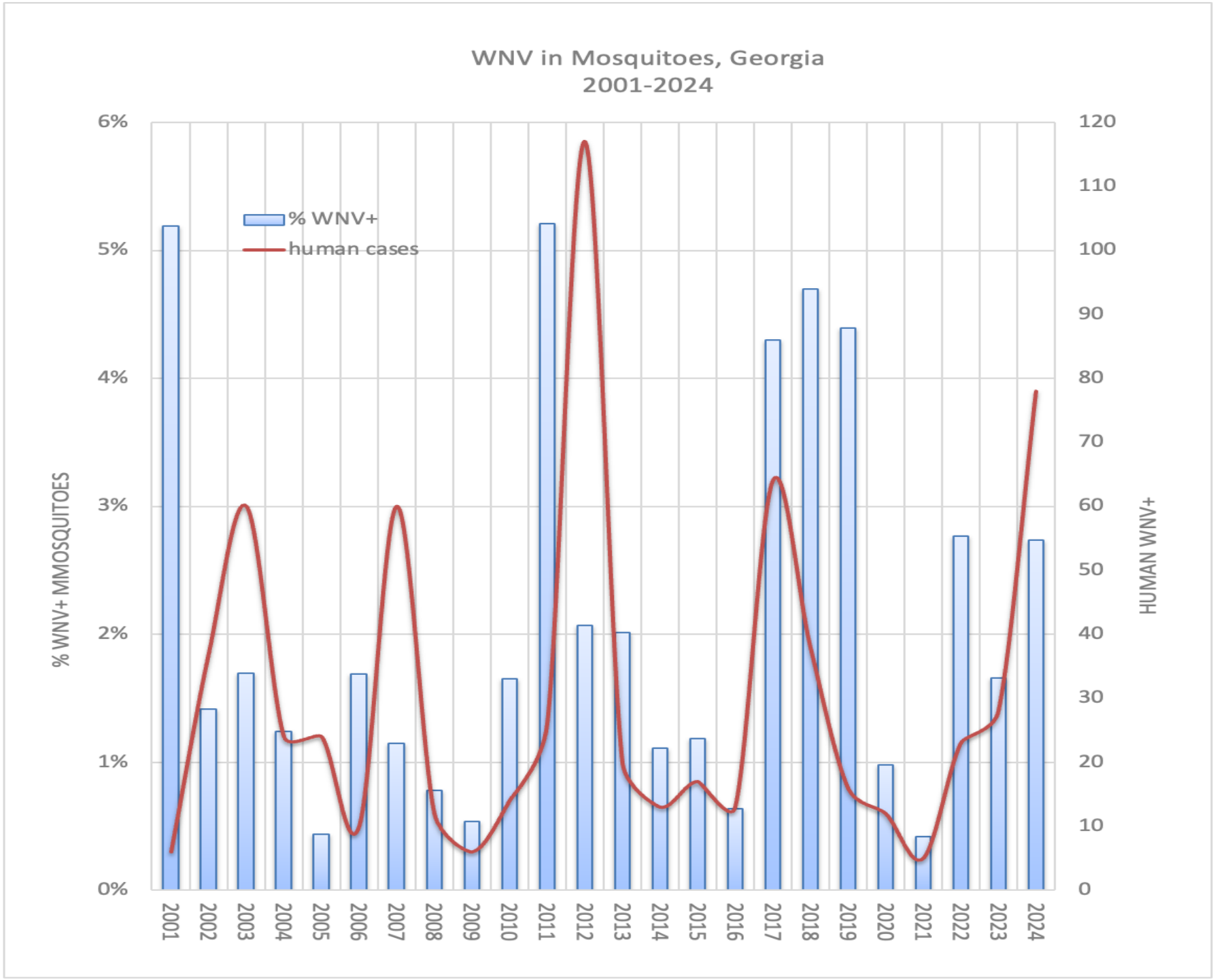
year	WNV+ pools	EEE+ pools	counties doing surveillance	# counties testing	# WNV+ counties	total mosquito pools tested	% WNV+	Human WNV+
2001	30		2	2	1	597	5.0%	6
2002	91		11	11	6	4032	2.3%	36
2003	106	1	26	26	6	6177	1.7%	55
2004	126	2	56	56	7	10161	1.2%	23
2005	67	8	55	55	5	15248	0.4%	24
2006	81		28	28	5	4785	1.7%	11
2007	75		28	28	7	6513	1.2%	55
2008	51	1	28	28	4	6383	0.8%	12
2009	24		26	26	4	4446	0.5%	6
2010	99	3	22	22	5	5990	1.7%	14
2011	438		19	19	8	7622	5.7%	25
2012	125	3	12	6	5	6042	2.1%	117
2013	166	1	13	6	6	7453	2.2%	20
2014	56	2	15	6	4	5038	1.1%	13
2015	40		13	6	3	3366	1.2%	15
2016	36		60	6	2	5620	0.6%	13
2017	276	2	159	5	4	6419	4.3%	63
2018	310	3	159	6	5	6598	4.7%	38
2019	243		159	12	5	5532	4.4%	16
2020	59		142	9	4	6025	1.0%	12
2021	31	1	103	16	5	7357	0.4%	5
2022	100	2	79	14	5	3611	2.8%	23
2023	118	1	101	7	4	7110	1.7%	28
2024	256	4	78	16	3	9281	2.8%	78



There are two general categories within which mosquito breeding habitats exist: natural mosquito breeding habitats and man-made mosquito breeding habitats. Female mosquitoes lay their eggs either on water or on soils that are periodically flooded. These breeding areas can be found in habitats that exist naturally, such as within a pond or flood plain, or in habitats that have been created by humans, such as bird baths, water-filled tires, or catch basins.

Container-breeding species tend to be asynchronous in their emergence, making their control difficult. Floodwater species tend to emerge all at once. These species are more easily control with typical mosquito control practices. There are, of course, a spectrum of emergence strategies between the two extremes.


Georgia Mosquito Surveillance
counties doing surveillance
counties testing
WNV+ counties
% WNV+
# counties
% WNV+
Hurricane Crisis COAG Funding
ZIKV Funding out
ZIKV Funding
WNV Funding
WNV Funding out
Hurricane Crisis COAG funding ends
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024*


WNV in Mosquitoes, Georgia
2001-2024
% WNV+
human cases
% WNV+ MMOSQUITOES
HUMAN WNV+
6%
5%
4%
3%
2%
1%
0%
120
110
100
90
80
70
60
50
40
30
20
10
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

Mosquito Surveillance: Untested Mosquitoes

After the loss of WNV funding, mosquitoes collected during surveillance by the GDPH were no longer sent for testing. These mosquitoes are identified and the data are shared with the county mosquito control agency to assist with control efforts. ZIKV funding, followed by Hurricane Crisis CoAg funding allowed GDPH to create 5 Vector Surveillance Coordinator positions and hire a second entomologist in order to increase our ability to do surveillance and to respond to mosquito complaints and arboviral disease issues. Between 2017-2019, some level of surveillance was done in every county in Georgia. Due to loss of funding resulting in the loss of the Vector Surveillance Coordinators in August 2020, the number of counties where surveillance is being done dropped. We have been able to maintain some surveillance due to assistance from EH Districts that have sufficient EHS to be able to do some surveillance and identification, and from collaborations with mosquito control programs throughout Georgia. Surveillance was done only in 78 counties in 2024.

Month	# mosquitoes
January	460
February	1002
March	2578
April	18361
May	29152
June	30698
July	28501
August	27834
September	34789
October	32157
November	9049
December	3332
Grand Total	**217913**

Month	# trap nights
January	80
February	98
March	165
April	860
May	1576
June	1630
July	1765
August	1803
September	1859
October	1530
November	849
December	561
Grand Total	**12776**

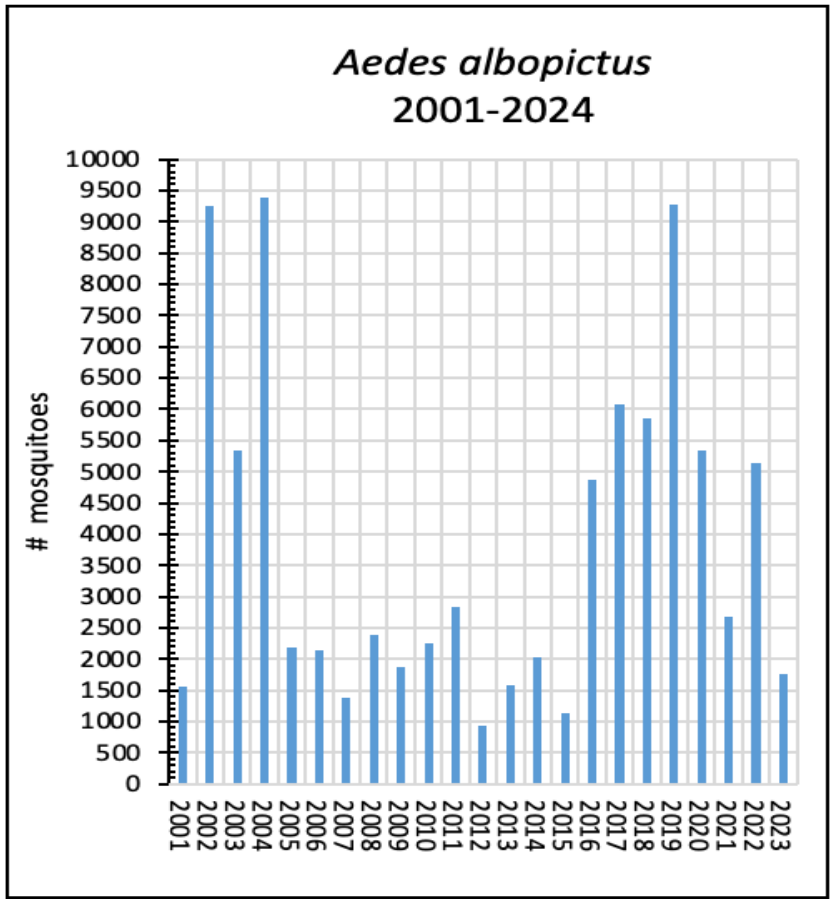
Month	# mosquitoes/trap night
January	5.75
February	10.22
March	15.62
April	21.35
May	18.50
June	18.83
July	16.15
August	15.44
September	18.71
October	21.02
November	10.66
December	5.94
Mean	**14.85**

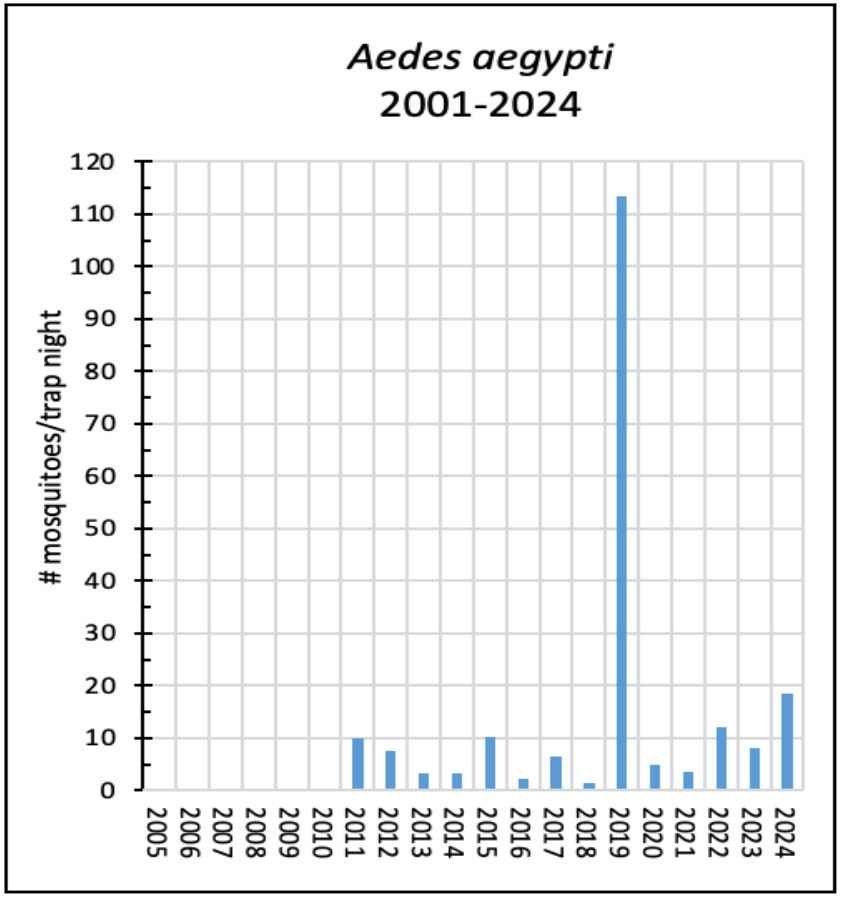
Untested Mosquitoes

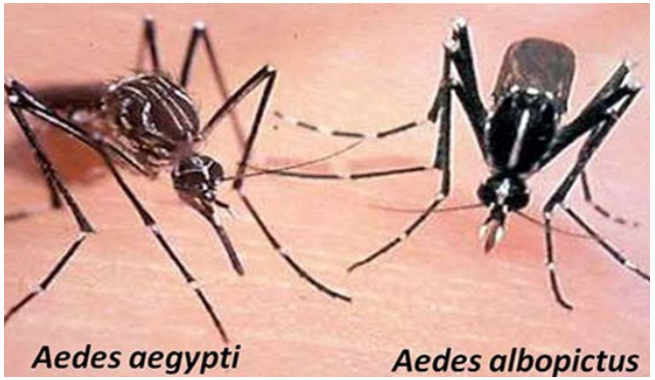
Species	# mosquitoes
Ae. aegypti	166
Ae. albopictus	4615
Ae. cinereus	7
Ae. vexans	9033
An. crucians	501
An. punctipennis	119
An. quadrimaculatus	157
Cq. perturbans	377
Cs. melanura	24
Cx. coronator	505
Cx. erraticus	431
Cx. nigripalpus	880
Cx. quinquefasciatus	13146
Cx. restuans	447
Cx. salinarius	1227
Cx. territans	14
Oc. atlanticus	10
Oc. canadensis	105
Oc. fulvus pallens	8
Oc. infirmatus	7
Oc. japonicus	238
Oc. mitchellae	4
Oc. sollicitans	11
Oc. sticticus	20
Oc. thibaulti	1
Oc. tormentor	2
Oc. triseriatus	92
Oc. trivittatus	25
Or. signifera	12
Ps. ciliata	63
Ps. columbiae	98
Ps. cyanescens	63
Ps. ferox	1919
Ps. horrida	2
Ps. howardii	27
Tx. rutilus	1
Ur. lowii	1
Ur. sapphirina	35

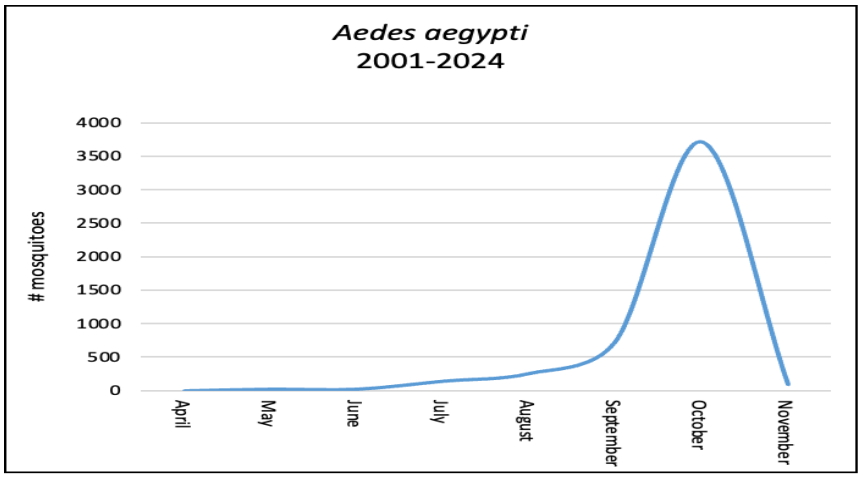
tested species

species	# mosquitoes
Ae. albopictus	416
Ae. vexans	1448
An. crucians	1475
An. punctipennis	1
An. quadrimaculatus	14
Cq. perturbans	1544
Cs. inornata	23
Cs. melanura	1026
Cx. coronator	923
Cx. erraticus	4638
Cx. nigripalpus	16690
Cx. quinquefasciatus	137255
Cx. restuans	2335
Cx. salinarius	2002
Ma. tittilans	37
Oc. atlanticus	2239
Oc. canadensis	7
Oc. infirmatus	297
Oc. sollicitans	93
Oc. taeniorhynchus	678
Oc. triseriatus	33
Ps. ciliata	12
Ps. columbiae	1225
Ps. ferox	25
Ur. sapphirina	4


Aedes albopictus
2001-2024
mosquitoes
10000
9500
9000
8500
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


Aedes aegypti
2001-2024
mosquitoes/trap night
120
110
100
90
80
70
60
50
40
30
20
10
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024

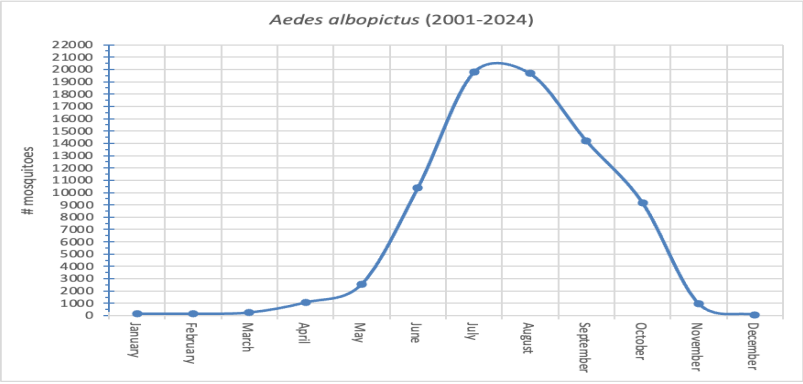

Aedes aegypti
Aedes albopictus


Aedes aegypti
2001-2024
mosquitoes
4000
3500
3000
2500
2000
1500
1000
500
0
April
May
June
July
August
September
October
November

Aedes albopictus

Year	earliest report	earliest surveillance
2001	late Aug	late Aug
2002	late April	late Jan
2003	early April	early Jan
2004	early April	late Feb
2005	mid March	early Jan
2006	late April	early March
2007	mid May	late March
2008	mid June	late March
2009	mid July	mid Feb
2010	mid June	late Feb
2011	mid June	late Feb
2012	mid April	early Jan
2013	early May	early Jan
2014	mid May	mid Feb
2015	late May	early March
2016	late March	early Jan
2017	mid April	early Jan
2018	early Jan	early Jan
2019	early Feb	early Feb
2020	early May	early May
2021	mid January	early Jan
2022	late March	early Jan
2023	late March	early Jan
2024	late March	early Dec

Trap Nights	Year	# *Aedes albopictus*	#/trap night
205	2001	1550	7.6
788	2002	9251	11.7
1538	2003	5333	3.5
2778	2004	9380	3.4
3738	2005	2182	0.6
2537	2006	2147	0.8
2509	2007	1375	0.5
2012	2008	2389	1.2
1751	2009	1869	1.1
1992	2010	2257	1.1
2444	2011	2843	1.2
1944	2012	943	0.5
2083	2013	1584	0.8
1283	2014	2037	1.6
1081	2015	1141	1.1
1582	2016	4872	3.1
1865	2017	6075	3.3
1532	2018	5851	3.8
2142	2019	9266	4.3
2402	2020	5336	2.2
715	2021	2685	3.8
231	2022	5146	22.3
342	2023	1765	5.2
5733	2024	5140	0.9



Aedes aegypti

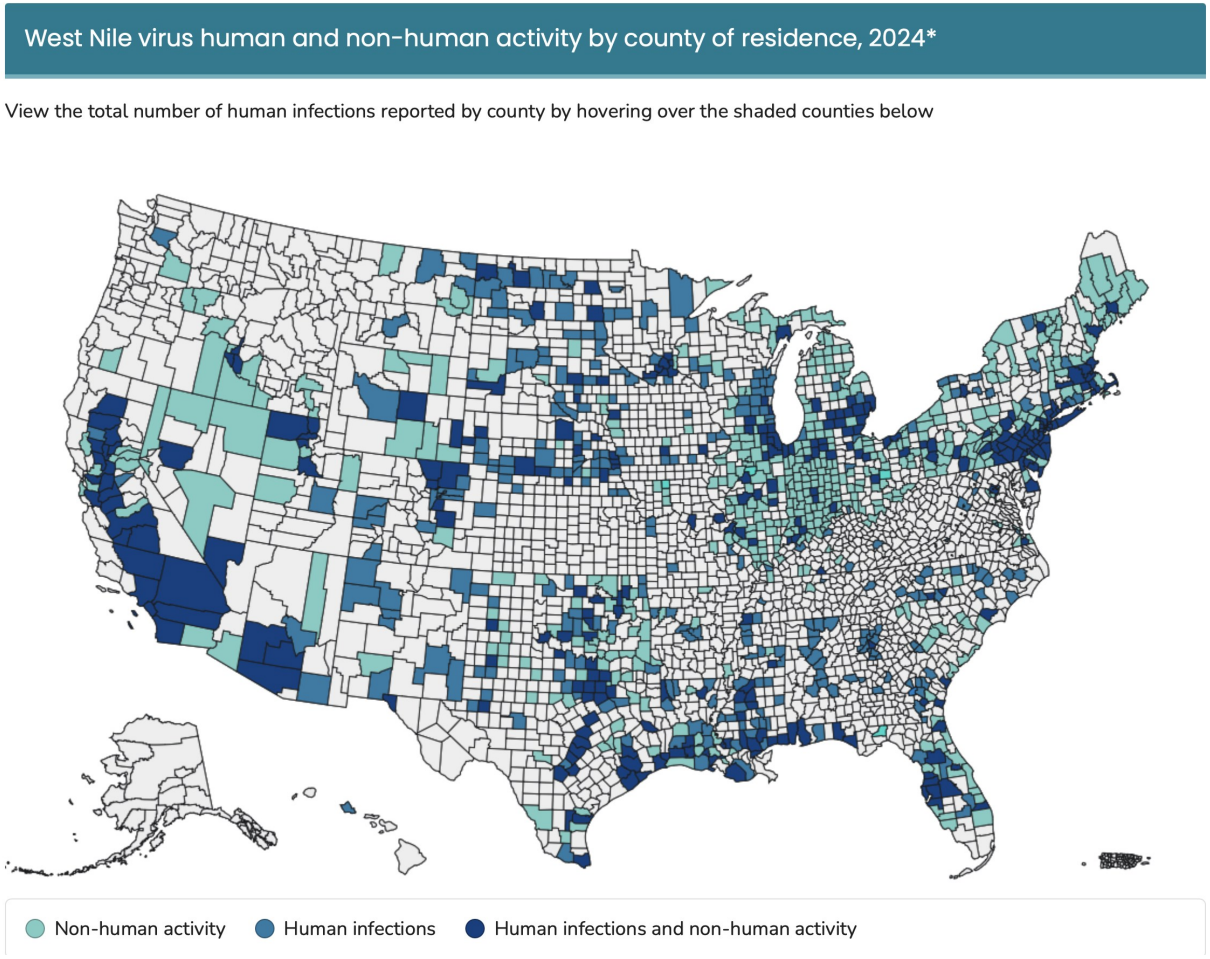
Year	earliest report	earliest surveillance
2005	late Oct	mid July
2006	early Sept	late July
2011	early Sept	early Sept
2012	mid July	mid July
2013	mid Aug	early July
2014	early July	early July
2015	early July	early July
2016	late July	late July
2017	early June	early June
2018	early May	mid Feb
2019	Late July	Late July
2020	early May	early May
2021	early Sept	early Sept
2022	mid Sept	mid May
2023	late Aug	late Aug
2024	mid April	early November

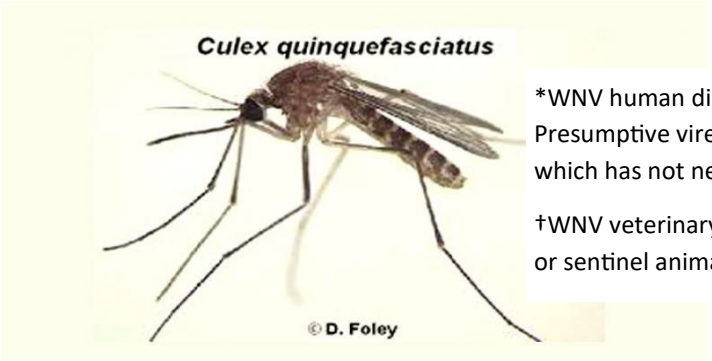
Trap Nights	Year	# *Aedes aegypti*	#/trap night
8	2005	2	0.3
13	2006	3	0.2
8	2011	79	9.9
18	2012	136	7.6
12	2013	39	3.3
11	2014	37	3.4
8	2015	82	10.3
12	2016	26	2.2
5	2017	32	6.4
11	2018	17	1.5
38	2019	4309	113.4
7	2020	35	5.0
5	2021	18	3.6
1	2022	12	12.0
1	2023	8	8.0
9	2024	166	18.4

WNV Activity Map

WNV human and non-human activity by county of residence, 2023 as of January 14, 2025.

- Total Human Cases, 2024—1466
- Neuroinvasive Human Cases, 2024—1063
- States Reporting Cases, 2024—49



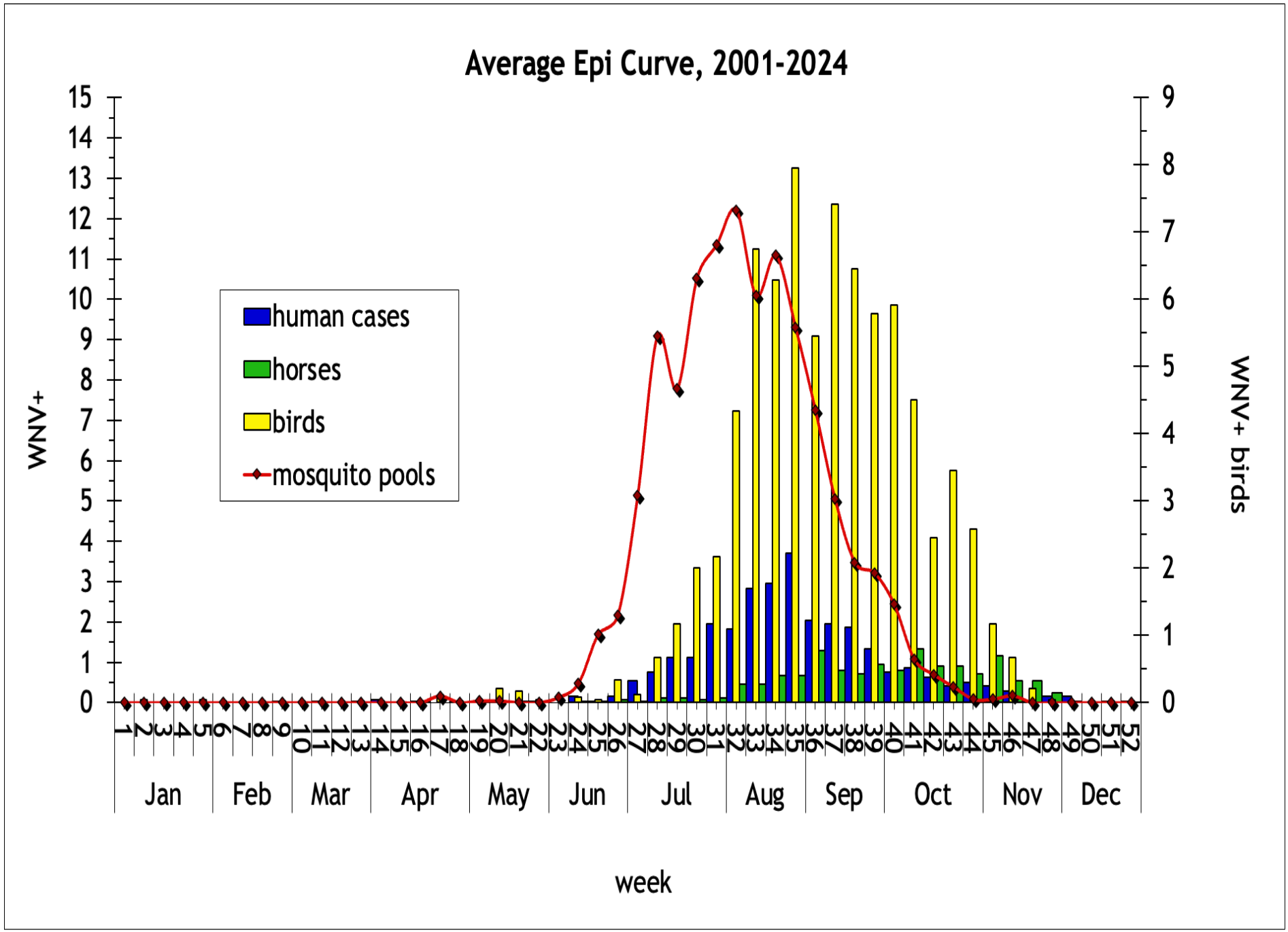


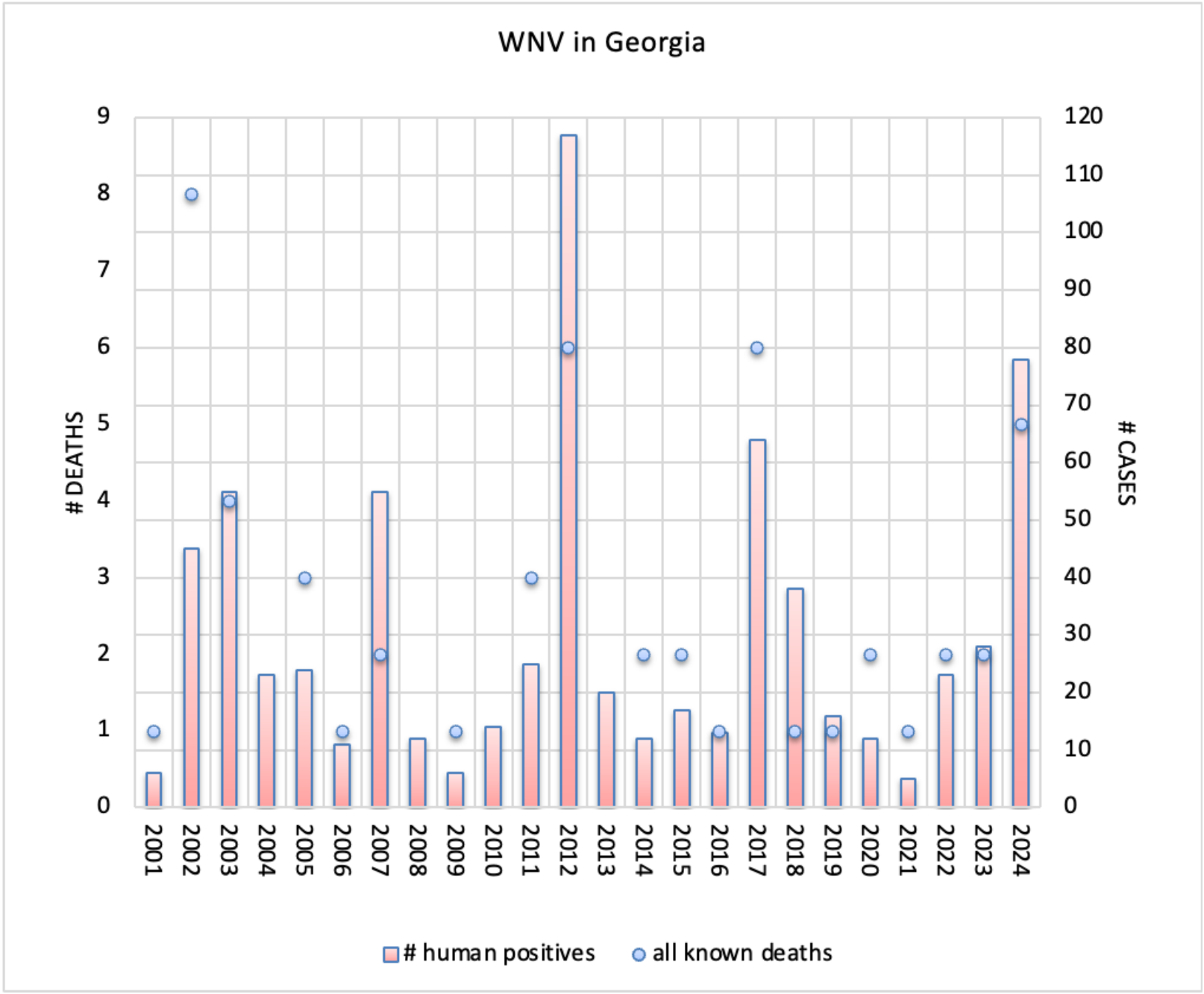
*WNV human disease cases or presumptive viremic blood donors. Presumptive viremic blood donors have a positive screening test which has not necessarily been confirmed.

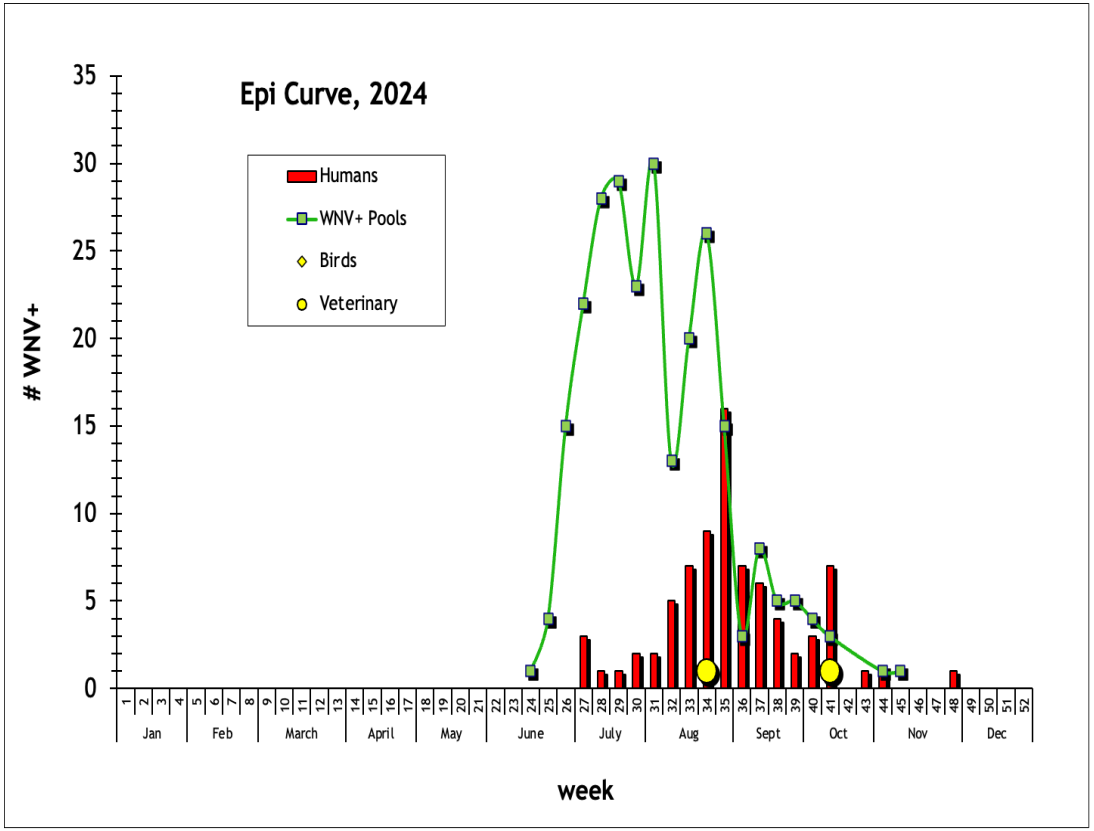
†WNV veterinary disease cases, or infections in mosquitoes, birds, or sentinel animals.

Surveillance data have several limitations that should be considered when using and interpreting the data.

1. Under-reporting is a limitation common to all surveillance systems that rely on healthcare providers to consider the disease as a possible diagnosis in a patient, obtain the appropriate laboratory test, and report confirmed to public health authorities.
2. Cases of mild illness (non-neuroinvasive disease) are more likely to be underreported compared to more severe disease (neuroinvasive) cases. The degree of underreporting varies by disease awareness and healthcare-seeking behavior in any area. Surveillance data for non-neuroinvasive disease should not be used to make comparisons of disease activity between different locations or over time.
3. Surveillance data are reported by county of residence, not the location (county or state) of exposure.
4. Non-human surveillance is conducted variably across the country. Absence of non-human activity reported to CDC should not be interpreted as no risk.
5. There is a lag in case reporting to CDC and states and territories may publish surveillance data on different schedules than CDC.


Average Epi Curve, 2001-2024
WNV+
WNV+ birds
human cases
horses
birds
mosquito pools
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
week


WNV in Georgia
DEATHS
CASES
0
1
2
3
4
5
6
7
8
9
0
10
20
30
40
50
60
70
80
90
100
110
120
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
human positives
all known deaths



The epidemic curve (epi curve) shows the progression of an outbreak over time.

THANK YOU to the district and county public and environmental health employees, mosquito control workers, interns, university students/staff, veterinarians, and healthcare providers who collected much of the data summarized in this document.

GDPH Vector-Borne & Zoonotic Diseases Team

- Rosmarie Kelly, PhD (Entomologist)
- "Tiffany" Thuy-vi Thi Nguyen, PhD (Entomologist)
- Shawna Stuck (Epidemiologist)
- Julie Gabel, DVM

Constructing epidemic curves is a common and very important practice in epidemiology. An epidemic curve, also known as an epi curve or epidemiological curve, is a statistical chart used in epidemiology to visualize the onset of a disease outbreak. It can help with the identification of the mode of transmission of the disease. It can also show the disease's magnitude, whether cases are clustered or if there are individual case outliers, its trend over time, and its incubation period.

For more information on vector-borne diseases and epi curves, go to https://www.ncbi.nlm.nih.gov/books/NBK52945/.