New York State Department of Health 2025 Mosquito-Borne Viral Disease Surveillance & Response Plan

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EXECUTIVE SUMMARY

New York State Department of Health's (DOH) Mosquito-Borne Disease Surveillance & Response Plan outlines the Department's actions, provides guidance for local health departments (LHDs) in New York State (NYS), and reflects a review of surveillance activities, control efforts, and education and risk communication initiatives. Specific information is provided to assist LHDs to reduce the risk of human disease from endemic viruses, such as West Nile virus (WNV) and eastern equine encephalitis virus (EEEV); exotic viruses, such as dengue virus (DENV), chikungunya virus (CHIKV), and Zika virus (ZIKV); and other emerging viral pathogens. Key DOH activities include:

<u>Surveillance, Testing, and Data Analysis</u>

- *Mosquito Surveillance and Testing*: DOH coordinates the weekly collection and identification of mosquitoes from traps located in key habitats across the State. Approximately 7,000 mosquito pools are tested for viruses at the NYSDOH Wadsworth Center each mosquito season. Positive findings in mosquitoes are immediately communicated to the LHD where the pool originated. DOH provides information on infection in subpopulations of mammal-biting species to LHDs, who are responsible for determining appropriate control measures. It is important to remember that the purpose of trapping is to identify if these viruses are present among mosquitoes (not to reduce the mosquito population) and to assess mosquito species and population dynamics.
- *Animal Surveillance, Testing and Prevention*: DOH conducts surveillance among veterinary medical practitioners for encephalitis in horses. Horses are very sensitive to EEEV and WNV infection; signs of EEEV and WNV encephalitis are indistinguishable from those of rabies. EEEV infection is often fatal. In all cases of suspected encephalitis in horses, rabies is the primary consideration. Encephalitic horses that are negative for rabies are subsequently tested for mosquito-borne viruses at Wadsworth Center and/or the NYS Animal Health Diagnostic Center at Cornell University (AHDC). Although most animal cases of EEEV infection are in horses, there have been cases in other species such as dog, donkey, goat, and deer. DOH also encourages veterinary surveillance for illness among non-passerine birds including chukar partridges, pheasants, turkeys, and ratites (emus, ostriches), which are also susceptible to the effects of EEEV infection. DOH assists the NYS Department of Agriculture and Markets (AGM) to promote vaccination of horses against WNV and EEEV.
- *Human Surveillance and Testing*: DOH oversees and assures the timely reporting of suspected cases of mosquito-borne virus infection by providers to LHDs, which is required by regulation. When indicated, DOH staff facilitate appropriate testing at the Wadsworth Center.
- DOH collects, compiles, and analyzes the above information to identify areas of disease risk and track trends in mosquito-borne viral infections by geographic area to guide public health educational messaging as well as local decision-making regarding mosquito control measures (including but not limited to larvicides, dunks, and "spraying").

- DOH actively participates in CDC's national surveillance system (ArboNet). Data collected by ArboNet are used to track arboviral activity across the U.S. and can be used by providers and LHDs to educate the public, including travelers.

Education and Outreach

- DOH issues a seasonal vector-borne disease health advisory to all LHDs and healthcare providers on symptoms and diagnostic procedures for mosquito-borne diseases. Additional information for healthcare providers is posted on the DOH website.
- DOH holds statewide webinars for LHDs and clinicians, as needed, to provide new scientific information and to convey a need for increased awareness.
- DOH, in cooperation with AGM, issues a separate notification to veterinarians to protect horses. The advisory provides veterinarians with the appropriate procedures for the diagnosis and testing of WNV and EEEV infection and reminds them of the availability and importance of equine WNV and EEEV vaccines.
- DOH conducts public education campaigns, which provide NYS residents with information on protecting themselves and reducing the presence of mosquitoes around homes and commercial properties. Campaigns use print and electronic materials as well as social media. Educational materials are available in several languages and are provided at no-cost to the public and to LHDs. Materials are also made available at The Great New York State Fair and other venues.
- DOH publishes a weekly mosquito-borne disease activity report for the public, providers, LHDs and the media. The report is available at: https://www.health.ny.gov/diseases/mosquitoes/reports/
- DOH issues press releases throughout the mosquito season and responds to media inquiries to highlight personal protective measures for the public, provide technical and diagnostic information for clinicians, and to raise awareness in specific communities as cases of arboviral infection or positive mosquito pools are identified.
- DOH provides 24/7/365 public health consultation to clinicians who require technical assistance regarding mosquito-borne diseases.

LHD Support and Funding

- DOH provides training for LHD staff in mosquito collection and identification and provides 24/7/365 public health consultation to LHDs who require technical assistance regarding mosquito-borne viruses and diseases.
- DOH holds a weekly statewide conference call with LHDs. The call provides a forum for their staff to ask questions about mosquito-borne and other infectious diseases and learn about best practices that could be adopted in their counties.
- DOH provides mosquito, animal, and human surveillance data to guide local decision making regarding public health prevention messaging and mosquito control measures (including but not limited to "spraying").
- DOH provides funding to LHDs for mosquito surveillance and control efforts. In general, LHDs are reimbursed at 36% for these activities through the Article 6 program.
- DOH responds to requests from LHDs for a designation of an Imminent Threat to Public Health (ITPH), which may result from local EEEV or other mosquito-borne viral activity.

The designation of an ITPH increases reimbursement of eligible costs through the Article 6 program to 50% and reduces some barriers to performing prompt control activities.

INTRODUCTION

DOH conducts surveillance for mosquito-borne viruses that pose a risk to human health. Activities are performed in cooperation with LHDs and include training personnel on mosquito trapping and identification; testing of mosquitoes, humans, and, when appropriate, animals; assisting with the identification of local areas at risk of disease; and providing surveillance information to guide local decision making on prevention and control measures. Efforts traditionally focus on WNV and EEEV, which are the most common mosquito-borne viruses in NYS; however, in recent years, DOH has expanded its focus to include exotic viruses, including CHIKV, DENV, ZIKV, and other emerging pathogens that could potentially be transmitted in NYS.

DISEASE HISTORY AND BACKGROUND

Endemic Mosquito-Borne Viruses

West Nile virus
West Nile virus (*Orthoflavivirus nilense)* is the leading cause of mosquito-borne disease in NYS and the continental U.S. The incubation period for WNV ranges from 5 to 15 days. Most people (80%) who are infected with WNV do not show symptoms. Up to 20% of those that become infected have less severe symptoms such as fever, headache, and body aches; however, about 1 in 150 people infected with WNV will develop severe illness including high fever, headache, neck stiffness, stupor, disorientation, coma, and other neurologic symptoms. These symptoms may last several weeks, and neurological effects may be permanent.

WNV is established in NYS, and activity will continue to occur annually. The virus is maintained by a cycle of continuous transmission between mosquito vectors and bird reservoir hosts. Although other mosquito species can be involved, the principal WNV mosquito vectors are species in the genus *Culex* and are abundant in urban areas, breeding easily in artificial containers such as birdbaths, discarded tires, buckets, clogged gutters, catch basins, and other standing water sources. *Culex pipiens* and *Cx. restuans* feed mainly on birds and occasionally mammals (including humans) and are most active from dusk into the late evening. *Culex salinarius*, which feeds on birds, amphibians, and mammals (including humans), prefers brackish and freshwater wetlands. Other species may also play a role in transmission.

Cumulative high temperatures and lower precipitation rates have been associated with higher mosquito infection and human disease rates. Additionally, warmer winter temperatures may result in larger numbers of *Culex* species successfully overwintering as adults, with resulting increases in early season *Culex* abundance the following year.

Eastern equine encephalitis virus

Eastern equine encephalitis virus (EEEV) (*Alphavirus eastern)* can cause an extremely rare but serious and often fatal infection involving encephalitis, or inflammation of the brain. It is possible that some people who are infected with EEEV will not develop any symptoms. Symptoms of EEEV infection typically appear 4-10 days after being bitten by an infected mosquito. The type of symptoms usually depends on the age of the person. People over age 50 and younger than age 15 are at greatest risk for developing severe disease. Severe cases of EEEV infection begin with the sudden onset of headache, high fever, chills, and vomiting that may progress into disorientation, seizures, encephalitis (inflammation of the brain), and coma. Approximately a third of patients who develop EEE die. Of those who recover, many are left with disabling and progressive mental and physical sequelae, which can range from minimal brain dysfunction to severe intellectual impairment, personality disorders, seizures, paralysis, and cranial nerve dysfunction. Many patients with severe sequelae die within a few years. No human vaccine is commercially available.

EEEV is found in some passerine bird species living in fresh-water swamp habitats. The transmission cycle of EEEV involves wild birds and the enzootic vector mosquitoes, *Culiseta melanura* and, to a lesser extent, *Cs. morsitans*. Both species feed predominantly on birds. Abundance of these species, especially *Cs. melanura*, impacts levels of virus transmission. When populations are high, a greater opportunity exists for the virus to perpetuate or amplify within the bird population, increasing the potential for spillover infection into bridge vectors that bite humans including *Coquillettidia perturbans, Anopheles punctipennis, An. quadrimaculatus, Aedes canadesnsis, Ae. vexans* and *Culex* species. Additionally, long-term weather patterns during the fall and winter that produce high ground water levels and snow cover may enhance survival of *Cs. melanura* larval populations. The abundance of these larval populations may serve as an early indicator of the potential for human disease later in the year.

Eastern equine encephalitis virus: special considerations in Central New York
Historically, the majority of EEEV detections in mosquitoes, horses, and humans have occurred in a four-county region of Central New York: Madison, Oneida, Onondaga, and Oswego counties. DOH data suggest that there are two large swamp complexes, Cicero Swamp (Onondaga County) and Toad Harbor Swamp (Oswego County) where EEEV initiates and amplifies, most likely through a *Cs. melanura* – wild bird cycle. The first statewide detections of EEEV in a year are most often from *Cs. melanura* collected from one of these swamps. LHDs in this region attempt to control the virus during its amplification in the Cicero and Toad Harbor Swamps before infected mosquitoes spread geographically outward from these areas.

Eastern equine encephalitis virus: special considerations throughout New York
From 1952 through 2002, EEEV and EEE disease in NYS occurred only in Madison, Oneida, Onondaga, Oswego, Suffolk, and Orange counties. During 2003 through 2024, there was a geographic expansion of EEE to include 18 additional counties: Cattaraugus, Cayuga, Chautauqua, Chemung, Clinton, Dutchess, Franklin, Jefferson, Lewis, Nassau, Ontario, Putnam, St. Lawrence, Saratoga, Sullivan, Ulster, Washington, and Wayne. NYSDOH staff work closely with the LHDs in each impacted county to address sporadic EEEV activity using the phased response plans described below and continue to monitor EEEV activity for geographic expansion.

Other endemic mosquito-borne viruses
Current Wadsworth Center laboratory testing methods can detect the presence of other mosquito-borne viruses that can impact human health and may be found in NYS. If atypical results are noted and the specimen is negative for WNV and EEEV, it is tested for other viruses including but not limited to: St. Louis encephalitis virus, Jamestown Canyon virus, Cache Valley virus, and La Crosse encephalitis virus. These techniques are also capable of detecting newly introduced or emerging viruses in vector mosquitoes. Wadsworth Center laboratory testing also includes viruses considered to be non-pathogenic to humans, such as Highlands J virus. Additional details on arboviral testing at the Wadsworth Center can be found at:
https://www.wadsworth.org/programs/id/arbovirology/services

Exotic Mosquito-Borne Viruses

Zika virus
Zika virus (ZIKV) (*Orthoflavivirus zikaense)* is a single-stranded RNA virus that is transmitted to humans primarily through the bite of an infected mosquito in the genus *Aedes (Ae. aegypti* (not currently found in NYS) and *Ae. albopictus*).[1] These mosquito vectors typically breed in domestic water-holding containers; they are aggressive daytime biters and feed both indoors and outdoors near dwellings. Human and nonhuman primates are likely the main reservoirs of the virus, and anthroponotic (human-to-vector-to-human) transmission occurs during outbreaks. The extrinsic incubation period, or the time period during which the mosquito vector acquires ZIKV and is able to transmit it to a human, is approximately 10 days. Perinatal, in utero, sexual, and transfusion transmission events have also been reported. ZIKV RNA has been identified in asymptomatic blood donors during an ongoing outbreak.

About 1 in 5 people infected with ZIKV become symptomatic. The incubation period of ZIKV in humans is 3-14 days. Characteristic clinical findings are acute onset of fever with maculopapular rash, arthralgia, or conjunctivitis. Other commonly reported symptoms include myalgia and headache. Clinical illness is usually mild with symptoms lasting for several days to a week. Severe disease requiring hospitalization is uncommon, and case fatality is low. However, cases of Guillain-Barré syndrome (GBS) have been reported in patients following suspected ZIKV infection. Zika infection during pregnancy can cause serious birth defects including microcephaly and can be associated with other pregnancy problems such as miscarriage and stillbirth.

No specific antiviral treatment is available for ZIKV disease, and no vaccine is available. Treatment is generally supportive and can include rest, fluids, and use of analgesics and antipyretics. Because of similar geographic distribution and symptoms, patients with suspected ZIKV infections should also be evaluated and managed for possible dengue virus (DENV) or Chikungunya virus (CHIKV) infections as well as other infections common in the region where the patient traveled. People infected with ZIKV, CHIKV, or DENV should be protected from further mosquito exposure during the first few days of illness to prevent other mosquitoes from becoming infected and reducing the risk of local transmission.

[1] *Aedes albopictus* is also known as the Asian Tiger Mosquito. *Aedes aegypti* is also known as the Yellow Fever Mosquito.

Chikungunya virus

Chikungunya virus (CHIKV) (*Alphavirus chikungunya)* is a single-stranded RNA virus that is transmitted to humans primarily through the bite of an infected mosquito in the genus Aedes (*Ae. aegypti* (not currently found in NYS) and *Ae. albopictus*). The incubation period of CHIKV is 1 to 12 days. Outbreaks have occurred in Africa, the Americas, Asia, Europe, and islands in the Indian and Pacific Oceans. The primary symptoms are fever and joint pain. Body pain is diffuse, like dengue fever, but more intense and localized in joints and tendons.

The name Chikungunya is derived from the root verb *kungunyala* from the Makonde language of east-central Africa, which means "that which bends up," "to become contorted," or "to walk bent over," reflecting the outward appearance of a person exhibiting the intense joint pain. Other symptoms of an infection with CHIKV include headache, muscle pain, joint swelling, and rash. Although the symptoms can be severe and disabling, death resulting from CHIKV infection is very rare. The risk for more severe disease is greatest for newborns, persons older than 65 years, and those with predisposing health conditions.

There is no medication to treat CHIKV infection. Supportive therapy is available through fluid replacement, medications for relief of fever and pain, and recommendation of rest. Illness can resolve within a week; however, some patients experience prolonged joint pain. People infected with CHIKV have high enough levels of virus in their blood (viremia) during the first few days of illness to transmit the virus to mosquitoes. Infected mosquitoes can then go on to infect other people with CHIKV.

A vaccine to protect against CHIKV is available in the U.S. The vaccine is approved for use in adults 18 years and older and is intended for travelers at higher risk of exposure to chikungunya virus or at increased risk of severe disease.

Dengue virus

Dengue virus (DENV) (*Orthoflavivirus dengue)* is an enveloped single-stranded RNA virus that is transmitted to humans primarily through the bite of an infected mosquito in the genus Aedes (*Ae. aegypti* (not currently found in NYS) and *Ae. albopictus*). Globally, DENV is the most common mosquito-borne viral disease of humans, with 40% of the world's population (2.5 billion people) living in tropical and subtropical areas with risk of transmission of DENV. The World Health Organization estimates 50-100 million DENV infections occur annually, including 500,000 cases of dengue hemorrhagic fever and 22,000 deaths, mostly in children. In urban areas, humans serve as the host (reservoir) of DENV during its epidemic cycle.

Clinical symptoms typically develop 3-10 days after the bite of an infected mosquito. Symptoms may include fever, rash, severe headache including pain behind the eyes, and excruciating pain in muscles and joints ('breakbone fever'). A mild case of the disease may last approximately one week with complete recovery. Severe cases, generally involving children, are characterized by blotchy rash, bleeding from the nose and gums, and shock. These severe cases are often referred to as dengue hemorrhagic fever or dengue shock syndrome.

There are four serotypes of DENV: DENV 1, DENV 2, DENV 3, and DENV 4. Infection with one serotype does not provide cross-protective immunity. Secondary infections with DENV are frequently more severe than primary infections. There is no specific treatment for DENV infection. Supportive therapy is available through fluid replacement, medicine for relief of fever and pain, recommendation of rest, and avoidance of aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs).

Historically DENV has been considered an introduced disease. No local transmission of DENV was recorded in the U.S. from 1946-1979. Sporadic locally acquired DENV infections in the U.S. have been reported since then, predominantly in Texas and the southeastern U.S. Local transmission of DENV to a single NYS resident occurred in NYS in 2013.

Mosquito species of concern for transmission of CHIKV, DENV, and ZIKV
Mosquito species in the genus *Aedes* are most often implicated in transmission of CHIKV, DENV, and ZIKV. Two species that live in close association with humans (synanthropic) and the human-modified environment (peridomestic) are considered the most important vectors, namely, *Ae. aegypti* and *Ae. albopictus*.

In NYS, known established populations of *Ae. albopictus* are currently limited to the counties of Suffolk, Nassau, Westchester, Orange, Rockland, Putnam, and the five boroughs of New York City. However, the geographic range of *Ae. albopictus* in NYS may change from year to year and may expand over time. *Aedes aegypti* is not known to occur in NYS.

ROLES AND RESPONSIBILITIES

New York State Public Health Law and the New York State Sanitary Code prescribe many of the roles and responsibilities of DOH and LHDs regarding mosquito-borne disease surveillance, response and control.[2]

DOH
DOH provides technical expertise to LHDs on methods for mosquito surveillance; performs laboratory testing of mosquito and clinical specimens; monitors statewide mosquito, animal, and human surveillance trends; provides timely data and subject matter expertise, advice, and support to LHDs; and promotes mosquito-borne disease prevention through educational activities, press releases, and social media campaigns.

DOH also provides funding to LHDs for mosquito surveillance and control efforts. In general, LHDs are reimbursed at 36% through the Article 6 program for these activities. DOH responds to requests from LHDs for a designation of an Imminent Threat to Public Health (ITPH), which may result from local EEEV or other mosquito-borne viral activity. The designation of an ITPH increases reimbursement of eligible costs through the Article 6 program to 50%.

LHDs

[2] New York State Public Health Law 602; New York State Public Health Law Article 15; New York State Sanitary Code Part 2.6; New York State Sanitary Code Part 44

LHDs are required to conduct human surveillance and public education and may establish mosquito surveillance programs. Available resources may include both county-supported and state-supported assets. County budgets for surveillance should reflect appropriate levels of personnel, supplies, equipment, and travel needs. State-supported resources include fiscal reimbursement for approved surveillance and control activities and laboratory testing of an allocated number of mosquito pools. LHDs should determine if it is necessary to divide a county or area of interest into smaller areas and allot traps to each. Since NYS is a home rule state, decisions on control measures, such as aerial adulticiding ("spraying"), must be arranged by local authorities. DOH provides technical assistance to help inform local decision making.

The following table summarizes key activities and the responsible public health agency and/or the New York State Department of Environmental Conservation (DEC) and AGM.

Activity	**Responsibility**
Establish a mosquito surveillance and control program	LHD
Trap collection	LHD
Identify areas of disease risk	Shared
Test mosquitoes, horses, birds, humans, and other animals, as appropriate	DOH
Estimate viral infection rates in mosquitoes	DOH
Track viral trends by geographic area	DOH
Provide mosquito surveillance data to guide local decision-making	DOH
Conduct surveillance for animal disease	DOH/AGM
Conduct surveillance for human disease	Shared
Educate human and animal medical practitioners on the appropriate procedures for diagnosing mosquito-borne disease	Shared
Educate the public on mosquito-borne diseases, risk, and preventive measures	Shared
Publish a weekly mosquito-borne disease activity report for the public, providers, local health departments, and the media	DOH
Provide 24/7/365 public health consultation to clinicians and LHDs who require technical assistance regarding mosquito-borne diseases	DOH
Provide funding to LHDs for mosquito surveillance and control efforts	DOH
Request Declaration of an Imminent Threat to Public Health	LHD
Approve Declaration of an Imminent Threat to Public Health	DOH
Provide technical assistance on mosquito control measures	DOH
Decide upon and conduct mosquito control measures (larviciding, aerial adulticiding, or "spraying")	LHD
Permit aerial pesticide/adulticide applicators	DEC
Authorize specific areas for targeted aerial adulticiding	DEC
On-site inspection of aerial pesticide/adulticide applicators prior to flight	DEC
Participate in the Centers for Disease Control and Prevention's Arbovirus Surveillance Network.	DOH

SURVEILLANCE

Mosquito surveillance
Mosquitoes are aquatic in three of their four life stages (eggs, larvae, and pupae). Larvae and pupae are concentrated in water sources, and adults are widely-dispersed terrestrially. Mosquito surveillance activities can be directed toward identifying and mapping larval habitats and monitoring adult activity. Both provide valuable information for public health.

Larval mosquito surveillance allows the identification of the location and characteristics of breeding areas and determination of population densities and geographic distribution, provides an estimate of adult emergence, and establishes optimal times for the application of larval control measures. Mosquito breeding can occur anywhere there is standing water. Examples are numerous and include temporarily flooded areas, swamps, marshes and other wetlands that are not subject to wind or wave action, flooded depressions, or stream edges where quiet water pools exist. Mosquitoes also breed in natural and artificial containers.

Because direct transmission to humans requires the bite of an adult mosquito, most vector surveillance activities are directed to the collection of mosquitoes in this stage. Monitoring adult mosquitoes in a standardized fashion provides information about species composition, population density, and virus infection rates; serves as an indicator of the threat of human infection and the identification of geographic areas at higher risk of disease transmission; provides information for public health authorities regarding the need for and timing of intervention activities; and allows for monitoring of the effectiveness of vector control methods, if utilized.

Surveillance should start in the late spring when daytime air temperatures are consistently greater than or equal to 50°F and mosquito populations begin to increase (often in early June) and should end in late September or October, as resources allow, unless warm air temperatures or evidence of continued activity warrants extended surveillance. Selection of surveillance sites should take into account the following: human, mammalian, or avian cases of arboviral infection; human populations at risk; habitat types that are representative of the area; and the ability to collect vector species of public health importance. Long term established trap sites provide the best available baseline information for detecting trends in mosquito abundance and virus prevalence that can be used to estimate the risk of human infection. Adult mosquitoes are collected using a variety of trapping techniques, including traps for host-seeking, resting, or gravid mosquitoes seeking a place to lay eggs. Additional information about mosquito surveillance traps can be found at: https://www.cdc.gov/mosquitoes/php/toolkit/mosquito-surveillance-traps.html. Mosquitoes collected through surveillance efforts are then tested for arboviruses at the Wadsworth Center Arbovirology lab.

Arbovirus test results from routine collections of mosquito pools (i.e., groups of mosquitoes collected from the same area and species) are made available to LHDs once testing is complete. If the emergence of large numbers of human-biting mosquitoes in an area with a high rate of virus activity occurs, or if unusual numbers/patterns of cases are reported, LHDs should consider enhancing surveillance with additional collection sites, with approval from the

Arbovirology lab for the testing of additional pools. When planning for the following mosquito season, LHDs should consider establishing these emerging areas as long-term trap sites.

Target species for laboratory submission varies. For WNV, in addition to *Cx. pipiens*, *Cx. Restuans,* and *Cx. salinarius,* species of interest include *Ae. cantator*, *Ae. japonicus, Ae. sollicitans, Ae. triseriatus, Ae. trivittatus, Ae. albopictus, Ae. vexans, An. punctipennis,* and *An. quadrimaculatus*. For EEEV, *Cs. melanura* is the primary enzootic vector, and its occasional feeding on large mammalian hosts (equines and deer) suggests it may also function as an epizootic vector. The role of other mosquitoes that are frequently referred to as "bridge vectors", including *Ae. canadensis, Cq. perturbans, Ae. Cinereus,* and *Ae. vexans* has recently come under scrutiny. For CHIKV, DENV, and ZIKV, *Ae. albopictus* is the potential mosquito vector in NYS.

Special considerations for Ae. albopictus surveillance

Historically, a major focus of mosquito surveillance in NYS has been the collection of adult *Cx. pipiens* and laboratory testing of specimens for WNV. LHDs that conduct mosquito surveillance have tailored their activities to the collection of *Cx. pipiens* using CDC light traps to capture adult host-seeking mosquitoes and gravid traps to capture mosquitoes that are ready to oviposit (lay eggs). These surveillance methods take advantage of the fact that *Cx. pipiens* generally bites at night and prefers ovipositing in the foul water presented by the gravid trap.

While *Culex* species and WNV testing remain a major focus of mosquito surveillance efforts in NYS, it has become increasingly important to understand where *Aedes albopictus* is present and how abundant it is due to its potential to serve as a local vector for transmission of CHIKV, DENV, and ZIKV. Surveillance for *Ae. albopictus* differs from standard WNV and EEEV surveillance protocols. *Ae. albopictus* frequently bites during the day, unlike *Culex and Culiseta* species. While CDC light traps can collect adult *Ae. albopictus,* gravid traps are considered poor collectors of this mosquito. For these reasons, LHDs in areas where *Ae. albopictus* has been found or is suspected to be located should develop alternate surveillance strategies for collecting this mosquito. Such strategies may include using BG-Sentinel traps set during daylight hours and conducting larval surveillance in tree holes or peridomestic artificial containers. Investigations of aggressive day-biting mosquitoes, particularly in areas where *Ae. albopictus* has not been reported, should be pursued with larval surveillance and/or adult trapping.

Evaluating mosquito surveillance data

The simplest method of evaluating mosquito surveillance data is the number of positive mosquito pools found in collections of a particular mosquito species over a defined time and area. LHDs should routinely incorporate virus infection rates (IR) into their evaluation of local activity. Regular tracking of the mosquito IR provides an important indicator used to predict transmission activity levels and human risk.

Estimates of IR are usually presented as the number of infected mosquitoes per 1,000 tested. The simplest estimate, the minimum infection rate (MIR), can be calculated on the DOH Vector Surveillance System. It is calculated as the ([number of positive pools / total specimens tested] x 1000), with the data representing a single species or species group

collected over a specific time period and geographic area. The MIR calculation assumes that a positive pool contains only one infected mosquito and should be interpreted as such, especially when infection rates are high. When MIR is tracked over time in a standardized manner by location and species, it can identify an increasing risk of viral transmission to humans or other mammals.

Avian surveillance

DOH no longer recommends the routine collection of dead birds for WNV surveillance as the presence of WNV in NYS has been established; however, some local health jurisdictions may choose to supplement arboviral surveillance activities with captive or wild bird surveillance particularly in areas where there is no mosquito surveillance. For EEEV, while most native birds that are infected with EEEV survive, some non-passerine birds including chukar partridges, pheasants, turkeys, and ratites (emus, ostriches), may also show signs of illness when infected with EEEV. In certain circumstances and upon consultation with DOH, it may be advised to submit specimens from domestic birds for WNV/EEEV testing. Several U.S. states have utilized sentinel chicken flocks for surveillance; however, the effectiveness of this approach can vary, especially when compared to mosquito and equine surveillance. Avian surveillance is not indicated for DENV, CHIKV, or ZIKV.

Animal surveillance

Routine surveillance for mosquito-borne zoonotic pathogens in mammals is not considered a primary surveillance tool for public health. In NYS, both EEEV and WNV routinely occur in mammals, primarily horses, as spillover from their bird-mosquito transmission cycles. As with all encephalitic/neurologic disease occurring in mammals, rabies infection should be a primary consideration for horses and other mammals presenting with primary encephalitis or progressive neurologic disease. Veterinarians are reminded annually by DOH and AGM to consider rabies first in such cases and to report them to LHDs. Wadsworth Center's Rabies Laboratory has a standard protocol to submit equine brain specimens for viral encephalitis testing if rabies tests are negative.

In situations where rabies exposure is not a consideration and a veterinarian wishes to have diagnostic work performed on brain tissue, LHDs should advise the veterinarian to pursue diagnostic testing through their veterinary laboratories, including AHDC. AHDC staff will determine if rabies testing should be performed first and will coordinate directly with the Wadsworth Center.

DOH and LHDs are notified of animals testing positive for vector-borne zoonotic encephalitis viruses, regardless of the laboratory performing the testing. While veterinary medical information is not subject to Health Insurance Portability and Accountability Act (HIPAA) requirements, all such medical information is confidential under NYS law. Press announcements or public service announcements should not provide information that would lead to the identification of the animal, owner, or location where the animal was housed. If such information is considered necessary to release, DOH should first be consulted, and communication messages coordinated with AGM.

In the absence of an active mosquito and mosquito-borne virus surveillance program, a case of WNV/EEE in a mammal having no travel history is an indication that virus was present where the mammal resided. Virus can spread to surrounding locations, and additional cases may occur.

When interpreting animal surveillance data, LHDs should remember that an effective equine vaccine exists against WNV and EEEV, potentially limiting the number of positive horses irrespective of viral activity in the environment.

Human surveillance

In NYS, cases of mosquito-borne diseases are reportable to LHDs. The rapid detection and timely reporting of suspected cases by medical providers is a critical component of surveillance efforts. At the beginning of each mosquito season, DOH distributes an advisory to healthcare providers statewide to encourage them to consider mosquito-borne viruses in the differential diagnosis of any patient with clinical evidence of viral encephalitis or viral meningitis to rapidly identify endemic viruses such as WNV and EEEV. Providers are also reminded to include exotic viruses in their differential diagnoses of patients with consistent symptoms and recent travel to areas with active mosquito-borne disease transmission of DENV, CHIKV, ZIKV, and other arboviruses. During the mosquito season, LHDs should supplement DOH's outreach by working with their local and regional healthcare providers to ensure providers know how/where to test patients with clinically compatible illness and how to report such cases to public health authorities.

Endemic mosquito-borne viruses

Immediate reporting of viral encephalitis cases is required of healthcare providers and laboratories year-round. Viral meningitis is also reportable under public health law, but immediate notification is not required.

Exotic mosquito-borne viruses

Other suspected presentations of arboviral infection, including those associated with DENV, CHIKV, ZIKV, and yellow fever, are also reportable. Prompt reporting of suspected cases with no travel history is particularly important because these cases may indicate local transmission and the need for public health intervention.

Provider reporting requirements also apply to patients who are diagnosed and treated based solely or in part on clinical presentation and history, as well as cases of GBS and microcephaly with a history of recent travel to an area with active mosquito-borne transmission of ZIKV. Immediate reporting is needed because of the potential for local transmission if *Ae. albopictus* feeds on infected persons during their viremic period.

Testing and collection of human specimens

Wadsworth Center offers testing for both endemic and exotic mosquito-borne viruses including but not limited to WNV, EEEV, CHIKV, DENV, and ZIKV. Cerebrospinal fluid (CSF) and serum testing by polymerase chain reaction (PCR) is more sensitive early in infection, while serology testing (for antibody) will better detect cases that are beyond the viremic phase. Ideally, both CSF and acute/convalescent serum specimens should be submitted for testing

when neuroinvasive disease is suspected. Convalescent specimens should be drawn at least 3 weeks after acute specimens.

Wadsworth Center also requests that urine and whole blood also be sent to improve the opportunity for detection and identification of suspected arboviral infections if submitting samples to Wadsworth for testing. WNV and ZIKV reach higher titers and are present longer in urine and whole blood than in CSF. Published studies have shown that molecular detection is improved by the inclusion of these additional specimen types for Flavivirus testing. Although there is very little data available for other arboviruses, the Wadsworth Center will test the entire panel of arboviruses in these four specimen types to see where improved detection rates are achieved.

Testing for DENV (PCR and serology), CHIKV (PCR and serology), and ZIKV (PCR and serology) is available through many NYS-permitted commercial laboratories and the Wadsworth Center. Testing for yellow fever is available through Wadsworth Center and a limited number of specialized laboratories nationally.

LHDs should coordinate specimen submission to Wadsworth Center whether sent directly from providers or forwarded from commercial laboratories. Instructions on the collection and submission of clinical specimens can be found at https://www.wadsworth.org/programs/id/virology/services/encephalitis.

Additional human surveillance activities

Areas that have had significant mosquito-borne viral activity in the past may consider conducting enhanced passive and/or active human disease surveillance during the mosquito season. Enhanced passive surveillance efforts may include the broadcast of health advisories to hospitals and healthcare providers regarding the importance of healthcare provider reporting, criteria for reporting, and instructions for submission of appropriate laboratory specimens to Wadsworth Center. Active surveillance may include regular calls to hospitals to canvass for suspect cases. Additionally, LHDs should ensure that providers and laboratories submit specimens to Wadsworth Center for testing if clinical illness is consistent with mosquito-borne disease, even if commercial testing is inconclusive or negative. Additional information on specimen submission requirements is available at https://www.wadsworth.org/programs/id/virology/services/encephalitis.

Communication of surveillance information

DOH provides timely mosquito, animal, and human surveillance information to LHDs to guide planning and control measures to reduce the risk of human disease. Staff routinely communicate with neighboring states and share relevant findings. Key activities include:

- Prior to the beginning of the season, clinical information and specimen submission procedures are provided to LHDs and providers. Additional information and fact sheets are posted on the DOH website and are available for healthcare providers, veterinarians, other agencies, and the public.
- Positive viral findings in mosquitoes are reported to the LHD immediately.
- Laboratory confirmation of human mosquito-borne viral cases is reported to the submitting healthcare provider and the LHD where the individual resides.

- Laboratory confirmation of infection in a horse (or other animal) is reported to the submitting veterinarian and AGM. This information is then shared with DOH and the LHD.
- Publication of a weekly mosquito-borne disease activity report for the public, providers, LHDs, and the media.

LHDs should also consider working with one another to create coordinated, regional approaches to sharing surveillance information. DOH will support these efforts with regular conference calls upon request during which LHDs can share findings and strategies, ask questions, and report concerns. DOH will regularly update LHDs with maps for each county/region that visually summarize testing results from mosquito samples, animals, and humans. Weekly mosquito, animal, and human surveillance data will also be posted on the DOH website and sent to the Centers for Disease Control and Prevention's (CDC) ArboNET reporting system.

Education and risk communication
Each mosquito season, DOH engages in renewed educational campaigns to improve knowledge about mosquito-borne diseases of public health importance (both endemic and exotic), encourage the elimination of mosquito breeding sites, support the adoption of appropriate personal protection techniques, and promote the proper use of effective mosquito repellents and considerations for deciding on their use. Specific resources include generic public service announcements and press releases, social media messages, brochures (in multiple languages), and other branded informational and marketing materials. These materials are available through the DOH public website to all LHDs and the public at no cost.

LHDs should share surveillance data and its implication for public health with local stakeholders and high-risk populations in their community, as appropriate. LHDs should utilize both traditional and social media when there is an indication of an increased risk of human disease or if a significant surveillance event occurs (e.g. the first mosquito-borne viral activity of the season). In general, messaging should include the context surrounding current data and should emphasize prevention strategies. If an LHD opts to report the presence of a non-pathogenic virus in mosquitoes, context should be included to inform the public that the virus is not known to cause human disease.

Counties should also work with one another to create coordinated, regional approaches to risk communication. DOH will support these efforts and recommends that in addition to using social media, LHDs give specific consideration to utilizing *NY-Alert*, New York State's web-based, all-hazards alert and notification portal. *NY-Alert* allows LHDs to create specific messages to targeted audiences and the public. The system uses a variety of technologies to distribute real-time warnings and emergency messages to those who opt-in to receiving information including notifications via phone call, e-mail, text message, and fax.

Prevention, Response and Control Considerations:

Since multiple factors contribute to the risk of mosquito-borne disease, local decisions on control measures should be made only after consideration of all available data for an area.

Mosquito control

In addition to personal protective measures, mosquito control is an effective means of protecting people and animals from mosquito-borne diseases. An effective control program includes source reduction and/or larval and adult mosquito control activities. When planning, LHDs should consider their long-term knowledge of the area with regard to mosquito species and populations, mosquito-borne viruses, human disease, seasonal weather patterns, and potential impacts of significant weather events such as hurricanes and floods. Ongoing, local decision-making also requires assessing surveillance data as it becomes available.

LHDs should consider several factors when contemplating products used for mosquito control, including efficacy against the target species or life cycle stage, DEC requirements, pesticide resistance and label requirements, availability of pesticide and application equipment, environmental conditions, and toxicity to non-target species, including humans.

Source reduction

Source reduction, also known as physical or permanent control, typically is one part of a county's existing integrated pest management (IPM) program. Source reduction is usually the most effective mosquito control technique and is accomplished by eliminating mosquito breeding sites. Members of the public can play an important role in source reduction.

Examples are numerous and include removing unused plastic pools, old tires, or buckets; clearing clogged gutters; emptying standing water from children's outdoor toys, flowerpots, or any object that can hold water; and keeping swimming pools chlorinated and their covers free of stagnant water. Source reduction can virtually eliminate the need for pesticide use in and adjacent to affected areas and can be a particularly effective tool in reducing breeding in a residential landscape, especially in the control of container breeding *Aedes* species, such as *Ae. albopictus*.

Larval control[3]

Control of mosquito larvae and pupae is the first line of defense for mosquito control as it prevents mosquitoes from becoming biting female adults capable of transmitting disease and producing another generation of mosquitoes. Larval control focuses target-specific agents in definable aquatic breeding sites and has three key components: environmental management, biological control, and chemical control[7].

Environmental management decreases habitat availability or suitability for immature mosquitoes through techniques such as increasing the water disposal rate through evaporation, percolation, recirculation, or drainage. Environmental management also may entail vegetation management because emergent vegetation provides food and refuge for mosquito larvae. Strategies include the periodic removal or thinning of vegetation, restricting growth of vegetation, and controlling algal growth.

[3] Compounds currently approved for larval mosquito control are available from DEC. LHDs should consider several factors when contemplating such products including efficacy against the target species or life cycle stage, DEC requirements, pesticide resistance and label requirements, availability of pesticide and application equipment, environmental conditions, and toxicity to non-target species, including humans.

Biological control uses natural predators, parasites, or pathogens to reduce the number of immature mosquitoes. Fathead minnows (*Pimephales promelas*) can be used as a biological control agent in NYS. These fish are released annually in a variety of habitats, such as small ponds and canals. Naturally occurring vertebrates and invertebrates in ponds feed on immature and adult mosquitoes. LHDs should contact DEC when considering release of species to control mosquitoes to ensure it is done properly.

There are several larval mosquito control products that are highly specific and thus have minimal impact on non-target organisms. These include microbial control agents such as *Bacillus thuringiensis israelensis* (Bti) and *Bacillus sphaericus*. Importantly, these agents, sometimes known as dunks, are registered for use in contained sources of water (e.g. abandoned swimming pools). Dunks are not for use in surface waters that may drain into streams or wetlands.[4]

Other products, such as insect growth regulators (e.g., methoprene), that prevent immature mosquitoes from developing into adults may negatively impact non-target organisms. The documented effectiveness of these agents on *Cs. melanura* larvae in research studies, including one conducted in the Toad Harbor-Big Bay swamp complex in Oswego County, is limited.[5] In addition to its potential negative impact on non-target organisms, significant technical, logistical, environmental and regulatory barriers exist. Surface films are very effective against both larvae and pupae but also may suffocate other surface breathing aquatic insects.

Species specific larval control
Culiseta. melanura is the primary enzootic vector of EEEV. This mosquito species develops in wooded wetlands in dark, water-filled spaces created by tree roots, often termed "crypts." Reasons why larviciding for *Culiseta* control may not be effective or desirable include the inability of the product to penetrate the wooded canopy and crypts, potential negative effects on non-target organisms, potential restrictions on aerial product application, and truck-mounted or backpack delivery systems not lending themselves to use in these habitats. The fact that *Cs. melanura* is a bivoltine or trivoltine species (i.e., has two or three generations per season) complicates control since determining the proper timing of multiple larvicide applications can be difficult.

Aedes. albopictus is largely a container breeder and as such can be difficult to control as larvae. Emptying containers of standing water can be an effective, but logistically difficult, method of reducing breeding sites. Public involvement in this effort can increase chances of success. Truck and aerial application of larvicide can also be considered in areas where there are large biting populations of this mosquito and/or there is evidence of disease transmission.

Mosquitoes may breed in unexpected locations. *Culex* species, for example, may breed and develop in association with abandoned, nutrient-rich swimming pools, storm drains, and sumps.

[4] There are several pesticide active ingredients approved for use in the state to control larval and adult mosquitoes. The registration status of a particular pesticide is available from DEC.
[5] Woodrow RJ, Howard JJ, White DJ. Field trials with methoprene, temephos, and Bacillus thuringiensis serovar israelensis for the control of larval Culiseta melanura. J Am Mosq Control Assoc. 1995 Dec;11(4):424-7.

An application of larvicide product to this contained habitat may provide mosquito control for a length of time.

Adult control[6]

When larval control is not possible or has been used to the fullest extent possible, adult mosquito control may be required to suppress populations of infected mosquitoes. While DOH provides technical assistance and a list of permitted commercial applicators to LHDs contemplating adult control measures, the decision to implement adult mosquito control is a local decision. Recommendations for adult mosquito control regarding specific mosquito-borne diseases (WNV, EEEV, CHIKV/DENV/ZIKV) can be found in the phased response tables below.

Factors that should be considered in adult mosquito control decision making include but are not limited to:

- The numbers and species of positive mosquito populations and trends (some species are more likely to bite humans while others are more likely to bite birds).
- Trends in minimum infectivity of mosquitoes.
- The most recent human, animal, and mosquito surveillance data and trends.
- Whether the current positive results are geographically focal or widespread and/or in emerging geographic areas that have not recently had infected mosquitoes.
- The density and proximity of human populations to positive mosquitoes.
- The time of year that positive results are found relative to historical trends and the expected remaining duration of mosquito season.
- The geography of and accessibility to the area where mosquitoes are located.
- The potential harmful impact that adulticides may have on humans, other insect species, and the environment.

Adult mosquito control products may be applied using ground-based equipment, fixed wing airplanes, or helicopters. These products include organophosphates such as malathion, and pyrethroids such as prallethrin, sumithrin, and permethrin. For day-biting mosquitoes like *Ae. Albopictus*, products that both excite and kill resting adults are used. This enables the spraying to be conducted at night when there is less human activity.

Aerial adulticiding has uncertain and potentially limited benefits for preventing disease among humans. It is only feasible in relatively limited geographic areas due to cost, the location of mosquitoes, and accessibility for spraying by planes. Aerial adulticiding is not recommended when air temperatures are less than 55ºF, if rain has occurred during the previous 24 hours and has not dried from vegetation, or if winds are >10 mph. More urban and suburban areas may require ground-based equipment such as trucks. Adulticiding also has a time-limited benefit because it does not kill all mosquitoes in the area, and those that are killed can rapidly be replaced by new mosquitoes that can become infected. DOH subject-matter experts are

[6] Compounds currently approved for adult mosquito control are available from DEC. LHDs should consider several factors when contemplating such products including efficacy against the target species or life cycle stage, DEC requirements, pesticide resistance and label requirements, availability of pesticide and application equipment, environmental conditions, and toxicity to non-target species, including humans.

available to provide consultation to LHDs who may be working through this local decision-making process.

Given the limitations of adulticiding, the primary strategy to prevent mosquito-borne disease among humans must continue to be the promotion of personal preventive measures.

NYSDOH Educational Resources

Websites:
Mosquitoes and Disease: https://www.health.ny.gov/diseases/mosquitoes/

Statewide Mosquito-borne Disease Activity Reports:
https://www.health.ny.gov/diseases/mosquitoes/reports/

Brochures, Factsheets and Posters:
NYSDOH offers limited quantities of free mosquito-borne disease educational materials to NYS residents and organizations. To preview, verify availability or order any of the following materials, please visit https://www.health.ny.gov/diseases/communicable/lyme/publications.htm.

Brochures:
Mosquitoes and Disease (English and Spanish)
Tick and Insect Repellent: Deciding on Their Use (Spanish)

Factsheets:
What Do I Do if There is Spraying in My Community?
WNV: Do Mosquitoes Love Your Home & Yard?
WNV: Information for Outdoor Workers
WNV: Senior Citizens
WNV: Suggested Community Activities

Posters and Flyers:
Dress to Repel – 11" x 17" (English and Spanish)
Protect Yourself Against Mosquito & Tick Bites (English and Spanish)

Other Educational Resources

Websites:
CDC/ Mosquitoes: https://www.cdc.gov/mosquitoes/index.html
CDC/ West Nile Virus: https://www.cdc.gov/west-nile-virus/index.html
CDC/ Eastern Equine Encephalitis: https://www.cdc.gov/eastern-equine-encephalitis/about/index.html
CDC/ Chikungunya Virus: https://www.cdc.gov/chikungunya/about/index.html
CDC/ Dengue: https://www.cdc.gov/dengue/index.html
CDC/ Zika Virus: https://www.cdc.gov/zika/index.html
CDC/ Surveillance and Control of Aedes aegypti and Aedes albopictus in the United States:
https://www.cdc.gov/mosquitoes/pdfs/mosquito-control-508.pdf
CDC/ West Nile Virus Surveillance and Control Guidelines: https://www.cdc.gov/west-nile-virus/media/pdfs/2024/08/WestNileVirus-SurveillanceControlGuidelines_508-h.pdf
CDC/ Eastern Equine Encephalitis Virus Surveillance and Control Guidelines:
https://www.cdc.gov/eastern-equine-encephalitis/media/pdfs/2024/09/EasternEquineEncephalitis-SurveillanceControlGuidelines_508-h.pdf
CDC/ Response to Dengue Cases in Non-Endemic Areas of the United States:
https://www.cdc.gov/dengue/media/pdfs/2024/08/response_to_dengue.pdf

Summary of Recommendations for Phased LHD Response to WNV Surveillance Data

This two-page chart includes suggested annual preparation and response activities related to West Nile virus (WNV) for local health departments (LHDs). The guidance is based on a timeline of evidence of WNV activity in humans, mammals, or mosquito pools. **Activities in Phase 2** are organized by the category of recommended activity (e.g., Human Disease Surveillance, Public Education, Adult Mosquito Surveillance, etc.) as well as location of positive WNV findings. LHDs are encouraged to consult with NYSDOH staff following any evidence of local WNV.

PHASE 1

Suggested Activities from May 1st until First Positive WNV Finding in a Human, Mammal, or Mosquito Pool

1. Conduct passive surveillance of viral encephalitis/meningitis. Fully investigate cases of viral encephalitis/meningitis to rule out arboviral disease. Counties may wish to send an alert to providers at the beginning of the season to convey the importance of reporting viral encephalitis/meningitis cases in warmer months due to potential for WNV. Prepare a list of contacts for local emergency rooms and health care providers to conduct active case surveillance during the mosquito season.
2. Request mosquito surveillance/ID training session from NYSDOH if necessary.
3. Contact NYSDEC and certified pest control applicators for routine mosquito control and/or emergency contingencies.
4. Perform larval and/or habitat surveillance for mosquito species involved in WNV transmission.
5. Conduct adult mosquito surveillance for mosquito species involved in WNV transmission, using CO_2-baited CDC light traps and gravid traps.
6. Share public health education messages focusing on personal protection and behaviors that can minimize mosquito breeding. Use any available resources: press releases, submitted articles, LHD websites, social media, etc.

PHASE 2 [OTHER SIDE]

PHASE 2

Suggested Activities Following the First Identification of WNV in a Human, Mammal, or Mosquito Pool

	If WNV+ Finding Prior to September 1st		If WNV+ Finding From September 1st to the First Hard Frost	
	Affected County	**Adjoining County**	**Affected County**	**Adjoining County**
Human Disease Surveillance	Conduct active human surveillance for viral encephalitis and/or meningitis cases. Notify emergency departments, infectious disease physicians, infection control practitioners, and other relevant clinicians of finding and provide information on viral testing and reporting of viral encephalitis and/or meningitis cases. Routinely contact healthcare facilities to ensure all such cases have been reported. Viral encephalitis cases should be prioritized if resources are limited.		Conduct active human surveillance for viral encephalitis and/or meningitis cases. Notify emergency departments, infectious disease physicians, infection control practitioners, and other relevant clinicians of finding and provide information on viral testing and reporting of viral encephalitis and/or meningitis cases. Routinely contact healthcare facilities to ensure all such cases have been reported. Viral encephalitis cases should be prioritized if resources are limited.	
Public Education	Perform education concerning personal protection messages; if human cases, consider using big media (TV, radio).	Educate public on personal protection measures.	Educate public on personal protection measures.	
Healthcare Provider Education	Disseminate information on WNV including clinical signs/symptoms, testing availability, and reporting requirements.		Disseminate information on WNV including clinical signs/symptoms, testing availability, and reporting requirements.	
Adult Mosquito Surveillance	Enhance adult mosquito surveillance to include high risk areas, target species, habitat, and seasonal activity. Consider using gravid traps which catch mosquitos more likely to be infected.		Enhance adult mosquito surveillance to include high risk areas, target species, habitat, and seasonal activity.	
Large Mammal and Captive Avian Surveillance	Alert veterinary community to local WNV transmission and suggest equine vaccination. Avian surveillance no longer recommended.		Alert veterinary community to local WNV transmission and suggest equine vaccination. Avian surveillance no longer recommended.	
Mosquito Control	Depending on number of positive mosquito pools and presence of positive bridge vectors (i.e., vectors that could spread virus from avian to mammalian species), consider larviciding and/or ground-based and aerial adult mosquito control.	Based on mosquito surveillance results, habitat, and proximity to other findings, consider larval and/or adult mosquito control.	Consider mosquito surveillance data, weather conditions, and day length in adult mosquito control decision making.	
Other	Request ITPH if desired; contact NYSDOH for technical assistance as needed.	Contact NYSDOH for technical assistance as needed.	Request ITPH if desired; contact NYSDOH for technical assistance as needed.	Contact NYSDOH for technical assistance as needed.

Summary of Recommendations for Phased LHD Response to EEEv Surveillance Data

This two-page chart includes suggested annual preparation and response activities related to eastern equine encephalitis virus (EEEv) for local health departments (LHDs). The guidance is based on a timeline of evidence of EEEv activity in humans, mammals, birds, or mosquito pools. **Activities in Phase 2** are organized by the category of recommended activity (e.g., Human Disease Surveillance, Public Education, Adult Mosquito Surveillance, etc.) as well as location of positive EEEv findings. LHDs are encouraged to consult with NYSDOH staff following any evidence of local EEEv.

PHASE 1

Suggested Activities from May 1st until First Positive EEEv Finding in a Human, Mammal, Bird, or Mosquito Pool

1. Establish communication with large animal veterinarians or County Supervising Veterinarians; encourage testing of specimens from equines and captive birds with clinically compatible illness. Encourage equine vaccination.
2. Locate captive bird farms (pheasants, quail, ducks, emus, etc.). Contact farmers to educate them about the effects of EEEv on captive birds and to encourage them to report bird deaths to their LHD or the NYS AGM.
3. Request mosquito surveillance/ID training sessions from NYSDOH, if desired.
4. Perform larval and/or habitat surveillance for *Culiseta melanura*.
5. Conduct adult mosquito surveillance near *Cs. melanura* habitats using CO_2-baited CDC light traps and diurnal resting boxes,
6. Contact NYSDEC and certified pest control applicators for mosquito control contingencies.
7. Conduct passive human surveillance of viral encephalitis/meningitis. Fully investigate cases of viral encephalitis/meningitis to rule out arboviral disease. Counties may wish to send an alert to providers at the beginning of the season to convey the importance of reporting viral encephalitis cases in light of historic EEE activity. Prepare a list of contacts for local emergency rooms, infection control, and health care providers to conduct active case surveillance during the mosquito season.

PHASE 2 [OTHER SIDE]

PHASE 2

Suggested Activities Following the First Identification of EEEv in a Human, Mammal, Bird, or Mosquito Pool

	If EEEV+ Finding Prior to September 1st		If EEEV+ Finding From September 1st to the First Hard Frost	
	Affected County	**Adjoining County**	**Affected County**	**Adjoining County**
Human Disease Surveillance	Conduct active human surveillance for viral encephalitis and/or meningitis cases. Notify emergency departments, infectious disease physicians, infection control practitioners, and other relevant clinicians of finding and provide information on viral testing and reporting of viral encephalitis and/or meningitis cases. Routinely contact healthcare facilities to ensure all such cases have been reported. Viral encephalitis cases should be prioritized if resources are limited.		Conduct active human surveillance for viral encephalitis and/or meningitis cases. Notify emergency departments, infectious disease physicians, infection control practitioners, and other relevant clinicians of finding and provide information on viral testing and reporting of viral encephalitis and/or meningitis cases. Routinely contact healthcare facilities to ensure all such cases have been reported. Viral encephalitis cases should be prioritized if resources are limited.	
Public Education	Educate public re: personal protection measures using multiple media outlets (TV, radio, social media, print news, etc.) Recommend limiting outdoor activity, especially at dusk and dawn.	Educate public on personal protection measures.	Educate public on personal protection measures.	
Healthcare Provider Education	Disseminate information on EEE including clinical signs/symptoms, testing availability, and reporting requirements.		Disseminate information on EEE including clinical signs/symptoms, testing availability, and reporting requirements.	
Adult Mosquito Surveillance	Enhance adult mosquito surveillance to include high risk areas, target species, habitat, and seasonal activity.		Enhance adult mosquito surveillance to include high risk areas, target species, habitat, and seasonal activity.	
Large Mammal and Captive Avian Surveillance	Alert veterinary community to local EEEv transmission, request samples from equines and captive birds with clinically compatible illness, and coordinate testing.		Alert veterinary community to local EEEv transmission, request samples from equines and captive birds with clinically compatible illness, and coordinate testing.	
Adult Mosquito Control	Depending on number of positive mosquito pools and presence of positive bridge vectors (i.e., vectors that could spread virus from avian to mammalian species), consider ground-based and aerial adult mosquito control.	Based on mosquito surveillance results, habitat, and proximity to other findings, consider larval and/or adult mosquito control.	Consider mosquito surveillance data, weather conditions, and day length in adult mosquito control decision making.	
Other	Request ITPH, if desired; contact NYSDOH for technical assistance as needed.	Contact NYSDOH for technical assistance as needed.	Request ITPH if desired; contact NYSDOH for technical assistance as needed.	Contact NYSDOH for technical assistance as needed.

Summary of Recommendations for Phased LHD Response to Local Transmission of Zika/Chikungunya/Dengue

This two-page chart includes suggested preparation and response activities related to **local transmission** of Zika, chikungunya, and/or dengue viruses. *Please note, routine preparation activities are limited as local transmission of these diseases is a very rare occurrence.* The guidance is based on a timeline of evidence of Zika, chikungunya, and/or dengue virus activity in humans or mosquito pools (*Aedes albopictus)*. **Activities in Phase 2** are organized by the category of recommended activity (e.g., Human Disease Surveillance, Public Education, Adult Mosquito Surveillance, etc.) as well as location of positive Zika, chikungunya, and/or dengue virus findings. LHDs are encouraged to consult with NYSDOH staff IMMEDIATELY following any evidence of **local** Zika, chikungunya, and/or dengue virus transmission. Additional information can be found at:
https://www.cdc.gov/dengue/media/pdfs/2024/08/response_to_dengue.pdf

PHASE 1

Suggested Activities from May 1st until Finding of LOCALLY ACQUIRED Zika, Chikungunya, or Dengue Virus in a Human or Mosquito Pool

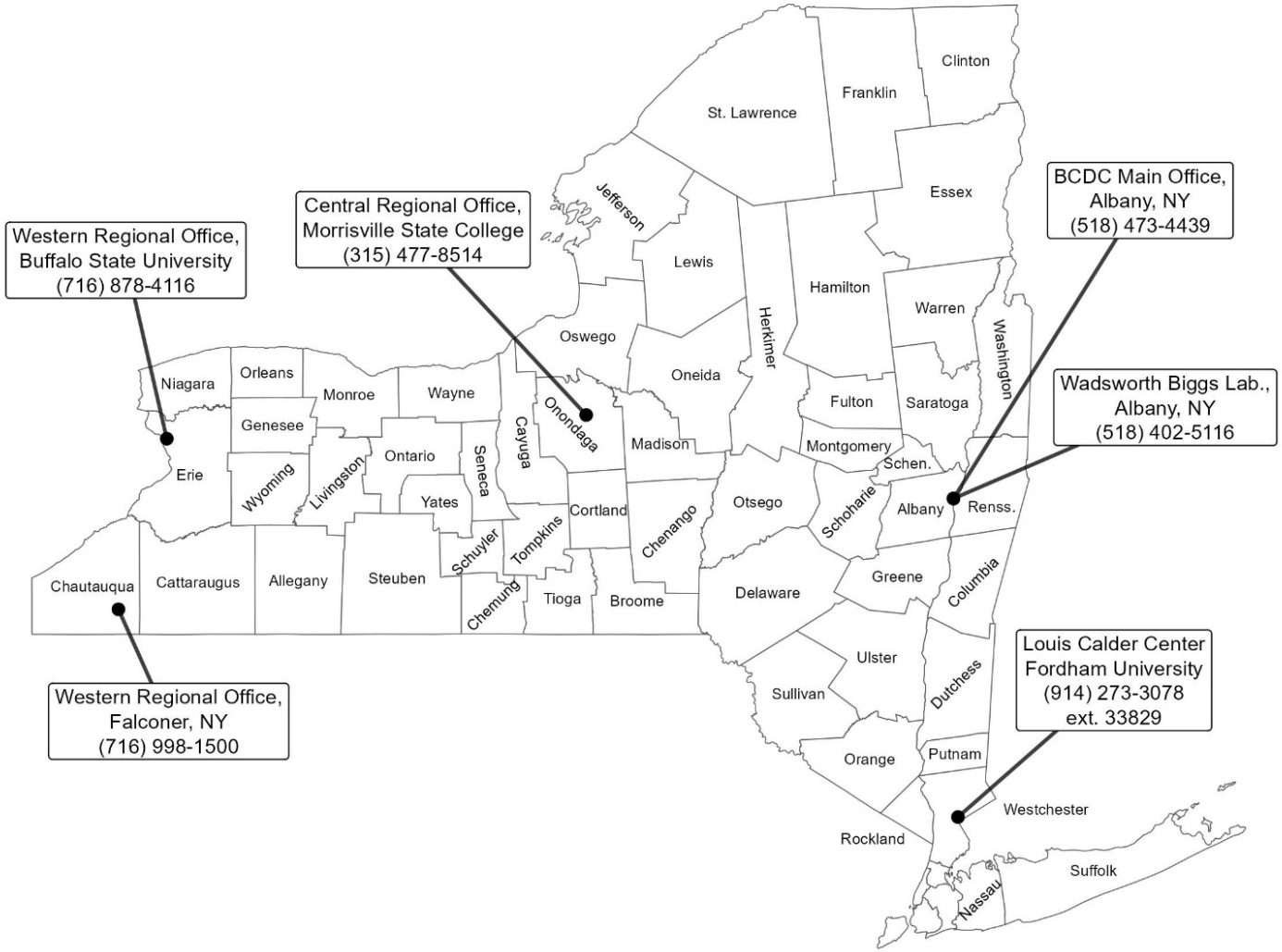
1. Conduct passive surveillance for human cases of Zika, chikungunya, and dengue viruses. Fully investigate cases of these diseases to rule out locally acquired disease. Counties may wish to send an alert to providers at the beginning of the season to convey the importance of reporting these diseases to public health.
2. Communicate to healthcare providers the importance of mosquito-bite prevention education, particularly among travelers returning from areas where Zika, chikungunya, and/or dengue are common.
3. Share public health education messages focusing on personal protection and behaviors that can minimize mosquito breeding. Use any available resources: press releases, submitted articles, LHD websites, social media, etc.

PHASE 2 [OTHER SIDE]

PHASE 2

Suggested Activities Following Evidence of LOCALLY ACQUIRED Zika, Chikungunya or Dengue Virus in a Human or Mosquito Pool

	If LOCALLY ACQUIRED Zika, Chikungunya, Dengue Finding Prior to September 1st		If LOCALLY ACQUIRED Zika, Chikungunya, Dengue Finding From September 1st to the First Hard Frost	
	Affected County with known *Ae. albopictus* populations	**Adjoining County OR Affected County with no known *Ae. albopictus***	**Affected County with known *Ae. albopictus populations***	**Adjoining County OR Affected County with no known *Ae. albopictus***
Human Disease Surveillance	If locally-acquired disease is suspected, conduct active surveillance of disease. Identify other ill people in the household and recommend dengue testing. Notify emergency departments, infectious disease physicians, and large practices of findings, make calls to canvass for suspect cases, and encourage workup and reporting of such cases. Prioritize communication with OB/GYNs if positive findings are Zika virus.		If locally-acquired disease is suspected, conduct active surveillance of disease. Identify other ill people in the household and recommend dengue testing. Notify emergency departments, infectious disease physicians, and large practices of findings, make calls to canvass for suspect cases, and encourage workup and reporting of such cases. Prioritize communication with OB/GYNs if positive findings are Zika virus.	
Public Education	Educate public on personal protection and habitat reduction measures using multiple media outlets (TV, radio, social media, print news, etc.). Consider inspecting case property and educate on elimination of *Ae. albopictus* breeding habitats.	Educate public on personal protection and habitat reduction measures.	Educate public on personal protection and habitat reduction measures.	
Healthcare Provider Education	Disseminate information on Zika, chikungunya, and/or dengue including clinical signs/symptoms, testing availability, and reporting requirements. Prioritize communication with OB/GYNs if positive findings are Zika virus.		Disseminate information on Zika, chikungunya, and/or dengue including clinical signs/symptoms, testing availability, and reporting requirements. Prioritize communication with OB/GYNs if positive findings are Zika virus.	
Adult Mosquito Surveillance	Enhance adult mosquito surveillance to include high risk areas, target species, habitat, and seasonal activity, using traps appropriate for *Ae. albopictus* (BG Sentinel traps, CO_2 baited CDC light traps, gravid traps, mosquito magnets).		Enhance adult mosquito surveillance to include high risk areas, target species, habitat, and seasonal activity, using traps appropriate for *Ae. Albopictus.*	
Mosquito Control	Depending on number of positive mosquito pools, and/or presence of locally-acquired human cases, consider ground-based mosquito control around locations of positive pools and/or human cases; larviciding may be considered.	Based on mosquito surveillance results, habitat, and proximity to other findings, consider larval and/or adult mosquito control.	Consider mosquito surveillance data, weather conditions, and day length in adult mosquito control decision making.	
Other	Request ITPH, if desired; contact NYSDOH for technical assistance as needed.	Contact NYSDOH for technical assistance as needed.	Request ITPH if desired; contact NYSDOH for technical assistance as needed.	Contact NYSDOH for technical assistance as needed.


Western Regional Office,
Buffalo State University
(716) 878-4116
Central Regional Office,
Morrisville State College
(315) 477-8514
BCDC Main Office,
Albany, NY
(518) 473-4439
Wadsworth Biggs Lab.,
Albany, NY
(518) 402-5116
Louis Calder Center
Fordham University
(914) 273-3078
ext. 33829
Western Regional Office,
Falconer, NY
(716) 998-1500
St. Lawrence
Franklin
Clinton
Essex
Jefferson
Lewis
Hamilton
Warren
Washington
Herkimer
Oswego
Oneida
Fulton
Saratoga
Niagara
Orleans
Monroe
Wayne
Onondaga
Madison
Montgomery
Schen.
Genesee
Erie
Wyoming
Livingston
Ontario
Seneca
Cayuga
Yates
Cortland
Otsego
Schoharie
Albany
Renss.
Chautauqua
Cattaraugus
Allegany
Steuben
Schuyler
Tompkins
Chemung
Tioga
Broome
Chenango
Delaware
Greene
Columbia
Ulster
Sullivan
Dutchess
Orange
Putnam
Westchester
Rockland
Suffolk
Nassau