

# COMPREHENSIVE MOSQUITO SURVEILLANCE AND CONTROL PLAN

2026



The City of New York  
DEPARTMENT OF HEALTH AND  
MENTAL HYGIENE

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## PREFACE

This plan summarizes New York City's Mosquito Control Program. The program's goal is to prevent New Yorkers from getting sick with mosquito-borne diseases. New York City's mosquito control is overseen by the New York City Health Department's (DOHMH) Office of Vector Surveillance and Control, which integrates epidemiology, medical entomology, environmental health, and operational response.

At this time, West Nile (WN) virus is the only recognized locally acquired mosquito-borne human disease in New York City. WN virus first appeared in the Western Hemisphere in 1999. The first cluster of human cases was identified in Queens, New York City (NYC, the City). Since then, the disease has spread throughout the continental United States. WN virus is primarily spread by *Culex* mosquitoes, including *Culex pipiens*, *Cx. restuans* and *Cx. salinarius*. Most people infected with WN virus have no symptoms or they experience mild illness and recover on their own. In rare cases, the virus can cause severe neurological conditions, including inflammation of the spinal cord and brain, which can be fatal.

Each year, New Yorkers are diagnosed with travel associated mosquito-borne arboviral diseases, most notably dengue with occasional reports of chikungunya and over one thousand Zika virus infections in 2016 to 2017. These viruses are typically transmitted by *Aedes aegypti*, which is not found in NYC. A related mosquito species, *Ae. albopictus*, which is a less efficient vector of these viruses, is found throughout NYC. Locally acquired cases of these infections have not been identified among NYC residents. Sustained mosquito control efforts are important to prevent outbreaks from all mosquito-borne diseases. Beginning 2016, *Aedes*-borne disease prevention efforts have been incorporated into the DOHMH West Nile Virus Control Plan.

To reduce the risk of WN virus and other potential mosquito-borne diseases, the DOHMH uses Integrated Pest Management (IPM). IPM is safer and more effective than other vector control approaches. IPM relies on surveillance, education, and habitat reduction to proactively reduce mosquito populations instead of relying primarily on pesticide use.

Each mosquito season, DOHMH takes the following mosquito control steps:

- Removing standing water where mosquitoes can breed
- Reducing mosquito larvae in mosquito season using environmentally safe agents
- Working with the public to reduce standing water through outreach, education and investigation of standing water complaints reported to 311
- Surveillance of mosquito populations and disease prevalence.

This document explains the technical steps of mosquito control. It is intended for vector control professionals. For general health guidance on mosquitoes and bite prevention, visit [nyc.gov/health/mosquito](https://nyc.gov/health/mosquito).

## EXECUTIVE SUMMARY

In 1999, New York City (NYC) faced an unprecedented outbreak of encephalitis caused by the West Nile (WN) virus, a mosquito-borne pathogen previously unknown in the Western Hemisphere. That year, the NYC metropolitan area saw 59 cases of neuroinvasive diseases—such as encephalitis, aseptic meningitis, or acute flaccid paralysis—attributed to WN virus. Since then, the virus has made an appearance in NYC each year during mosquito season.

From 1999 to 2025, NYC residents experienced a total of 486 human cases of WN neuroinvasive disease, resulting in 64 deaths. Additionally, cases of WN fever—a milder form of the illness—have been reported (n=102), though the actual number of undetected or unreported cases is likely much higher. Over the past twenty-five years, WN virus has become established across much of the continental United States, emerging as a significant public health concern and leading to substantial outbreaks of neuroinvasive disease since 2002. Last year, 1,434 cases of WN neuroinvasive disease were identified nationwide.

Each year, New Yorkers traveling to affected regions are diagnosed with various mosquito-borne viral diseases. Among these, dengue is the most frequently reported, primarily linked to travel to the Caribbean, Central, and South America, with occasional cases from Asia. Dengue virus is endemic in tropical and sub-tropical regions, with varying severity from year to year. In 2024, there was a record high number of dengue cases, with over 14 million cases globally, primarily in the Americas. In 2014, a significant outbreak of chikungunya occurred in the Caribbean and Latin America, leading to over 600 cases of travel-associated chikungunya among New Yorkers. The following year, in 2015, the Western Hemisphere identified its first instances of local Zika virus transmission in Brazil. Originally discovered in Uganda in 1947, Zika virus, like WN virus, was not previously observed in the Americas. Zika virus poses severe risks, including microcephaly and its association with Guillain-Barre syndrome. A substantial outbreak in Latin America and the Caribbean in 2016 resulted in over 1,000 travel-associated Zika infections among NYC residents who visited affected areas. Concurrently, minor outbreaks of Zika virus occurred in Florida and Texas. As of now, no locally acquired cases of chikungunya, dengue, or Zika virus infections have been detected among NYC residents. While New York City lacks the *Aedes aegypti* species responsible for spreading chikungunya, dengue, and Zika virus, it harbors a related mosquito species, *Ae. albopictus*, commonly known as the Asian tiger mosquito. Although *Ae. albopictus* has not been directly linked to the recent Zika outbreak, laboratory evidence suggests its potential for carrying and transmitting the Zika virus. Moreover, *Ae. albopictus* mosquitoes have been implicated in chikungunya and dengue transmission in various regions across Europe, Africa, and Asia.

The Department of Health and Mental Hygiene (DOHMH) routinely analyzes surveillance and control data from previous years. This analysis enhances preparedness for the upcoming mosquito season. The 2026 Comprehensive Mosquito Surveillance and Control Plan is built on our extensive experience with West Nile virus prevention and control since 1999, alongside our current understanding of other mosquito-borne disease threats to NYC. To

ensure a cohesive approach to managing mosquito-borne disease outbreaks in the City, DOHMH has worked closely with the New York State Departments of Health (NYSDOH) and Environmental Conservation (NYSDEC), the U. S. Centers for Disease Control and Prevention (CDC), and local agencies such as the Mayor’s Offices of Operations (MOO) and Environmental Coordination, the New York City Emergency Management (NYCEM), Departments of Environmental Protection (DEP), Parks and Recreation (Parks, DPR), Sanitation (DSNY), Police (NYPD), Citywide Administrative Services (DCAS), Information Technology and Telecommunications (DIIT) and the New York City Housing Authority (NYCHA).

DOHMH takes a proactive approach for the prevention of mosquito-borne diseases in the City. DOHMH devotes considerable resources to a citywide effort to prevent mosquito breeding, while enhancing existing disease surveillance, and public and medical provider education activities. The goal of this plan is to prevent diseases transmitted by mosquitoes through aggressive source reduction and larviciding. If surveillance findings indicate that a substantial risk exists for disease transmission to humans, adult mosquito control (adulticiding) is considered.

Surveillance data collected from 2000-2025 demonstrate that WN virus can be detected in mosquitoes weeks before there is a significant risk to human health. Therefore, routine surveillance of mosquito populations provides the City the opportunity to specifically target those neighborhoods and communities where the virus is re-emerging or newly emerging. The goal of early detection is to enhance mosquito control in high-risk areas in an attempt to interrupt the amplification of the virus before it has a significant impact on human health.

Despite the fact that mosquitoes are active in New York City from April through October, our mosquito prevention, surveillance and control efforts are year-round. The current Comprehensive Mosquito Surveillance and Control Plan is based on the principles of Integrated Pest Management. This plan is designed to minimize the impact of mosquito-borne diseases through citywide surveillance measures and an integrated approach to mosquito management with control practices that are commensurate with the risk posed. The comprehensive nature of the plan ensures the efficacy of the control measures, while minimizing potential adverse impacts to the environment and human health from these measures. Below is a brief summary of the components of the plan:

### **Integrated Pest Management**

Integrated Pest Management or IPM is defined as “a decision support system for the selection and use of pest control tactics, singly or harmoniously coordinated into a management strategy, based on cost/benefit analyses that take into account the interests of and impacts on people, society, and the environment” [Modified from Bajwa, W. I. and M. Kogan. 2002. Compendium of IPM Definitions (CID) - What is IPM and how is it defined in the Worldwide Literature? IPPC Publication No. 998, Oregon State University, Corvallis, OR 97331]

The objective of the DOHMH Comprehensive Mosquito Control Program is “to prevent or reduce locally transmitted human cases of mosquito-borne illnesses in the City.” In the case of chikungunya, dengue and Zika virus, the Department seeks to reduce the risk that local transmission will occur, since only travel-related cases have been observed. IPM, especially for WN and *Aedes*-borne viruses, involves using all the tools available for prevention and control of mosquitoes and these viruses. Key components of mosquito-borne disease IPM include community outreach and education, prevention of biting of humans by vectors (infected mosquitoes), surveillance and control (non-chemical methods are considered first and if a chemical pesticide is used that it be the lowest toxicity pesticide that is most effective against mosquitoes).

### **Public Education and Community Outreach**

The Office of Vector Surveillance and Control (OVSC) conducts public education and community outreach through media platforms and in collaboration with community boards, elected officials, and other local stakeholders. Engagement with community groups is conducted virtually or in person whenever feasible. During the mosquito season, NYC regularly posts neighborhood-level mosquito surveillance data and updates on mosquito control activities on the Department of Health and Mental Hygiene website ([nyc.gov/health/wnv](http://nyc.gov/health/wnv)) to keep the public informed about current mosquito activity and prevention efforts.

OVSC works in collaboration with the DOHMH Office of External Affairs (OEA) to increase public awareness of mosquito-borne disease risk, mosquito surveillance findings, disease risk, and personal protective measures against mosquito bites, and mosquito habitat reduction. If surveillance data indicates a possible increase in human disease risk that requires the application of pesticides to control adult mosquitoes, accurate and timely information of these mosquito control activities will be provided to the public. OEA and NotifyNYC will provide the public with application schedules, the type of pesticides being used and how to reduce exposure. Additionally, the public will be informed about what to do in the event of pesticide exposure.

### **Human Surveillance and Provider Education**

The DOHMH system for detecting mosquito-borne diseases among humans includes passive surveillance for cases of viral encephalitis in hospitals (considered to be suspect cases of WN viral illness during peak mosquito season) and required reporting of laboratory results indicating current WN infection. Health care providers play a critical role in the detection, prevention and clinical management of mosquito-borne diseases. Advisories are sent at the beginning of the season and periodically throughout the season by e-mail to all hospitals and providers in New York City. The DOHMH’s Bureau of Communicable Disease (BCD) makes ongoing efforts to educate New York City health care providers regarding diseases transmitted by mosquitoes, especially WN virus, and encourages reporting and testing of patients with encephalitis, aseptic meningitis, fever syndromes compatible with WN fever, and other diseases possibly caused by arboviral infection. While providers are encouraged to pursue

routine testing through commercial laboratories, they can also submit specimens directly to the New York State Department of Health for WN virus PCR and immunoassay testing as well as testing for other arboviruses.

### **Management of Mosquito Populations in New York City**

DOHMH's OVSC utilizes IPM techniques to manage mosquito breeding sites by eliminating, where practical, sources of standing water and treating with biological larvicides that kill the immature larval mosquitoes in areas of standing water that cannot be completely drained. DOHMH actively emphasizes, through public education and outreach efforts, the need to eliminate or report standing water. DOHMH conducts inspections following complaints of standing water and actively conducts surveillance for standing water and the presence of larvae. Mosquitoes trapped throughout the City are regularly tested for WN virus during the spring, summer, and early fall.

### **Mosquito Surveillance**

OVSC monitors mosquitoes citywide by collecting larval and adult mosquitoes to determine mosquito distribution, density and species. DOHMH tests adult mosquitoes collected in the City for mosquito-borne viruses at the Public Health Laboratory (PHL). With testing taking place locally, the time required to receive results is minimized, allowing for increased public education, and more targeted control of larval and mosquitoes in areas with increased viral activity. Mosquito surveillance allows for targeted mosquito control activities.

### **Larval Mosquito Control**

DOHMH will reduce mosquito breeding through the aggressive elimination of standing water and the application of larvicide to sites that cannot be emptied or drained. Through a public information campaign, DOHMH will urge residents to eliminate breeding sites around their homes and commercial properties and to report potential standing water in their neighborhoods. DOHMH will collaborate with elected officials, other City agencies and large property owners to eliminate standing water in empty lots, tire piles and other containers. DOHMH will also rigorously enforce the NYC Health Code which requires elimination of standing water from properties throughout the City. These activities will be augmented with the application of larvicide to potential breeding sites where water cannot be eliminated which includes catch basins citywide and natural mosquito breeding habitats. When WN or another mosquito-borne virus is detected in an area, DOHMH will increase public education, breeding site reduction activities, and larviciding.

### **Adult Mosquito Control**

A timely and appropriate response to mosquito and human surveillance findings is key to preventing an outbreak of human disease. DOHMH will implement a phased response to surveillance findings that will expand education, prevention, and control activities in relation to the threat of an outbreak of human disease. If surveillance indicators meet established thresholds, indicating that the level of WN virus activity poses a significant threat to human

health, adult mosquitoes will be controlled through the use of adulticides. Mosquito density and distribution, mosquito species, persistence of WN virus activity, weather, time of year, and the proximity to human populations will be carefully considered in determining the necessity for adult mosquito control. The accuracy, quality, and efficacy of the adulticide application will be closely monitored to ensure compliance with Federal and State guidelines. If application of adulticides becomes necessary, DOHMH will provide advance notice to the public and to health care providers.

### **Surveillance of Potential Adverse Health Effects from Pesticide Exposure**

DOHMH completed a comprehensive environmental impact study (EIS) on the pesticides used for adult mosquito control in 2001. Subsequently, the department filed a Technical Memo updating the EIS in 2017. This study concluded that at the relatively low levels at which adulticides are applied, the occurrence of adverse public health effects to the population from applying pesticides to reduce the adult mosquito population would not be considered significant when compared to the potential risk to the public health from WN virus or other diseases spread by mosquitoes. However, health care professionals are informed and reminded throughout the mosquito season about potential health effects of pesticide exposure and the need to report pesticide-related illness to DOHMH and NYSDOH. DOHMH monitors the adverse health effects associated with the application of pesticides for adult mosquito control through syndromic surveillance. Additional pesticide products have been approved for use in NYC by state and federal agencies. DOHMH will continue to assess the health effects of these and any products considered for use for its mosquito control program.

### **Research and Evaluation**

DOHMH uses mosquito surveillance and operational data to identify mosquito breeding areas across New York City and to better understand the factors that contribute to the persistence and transmission of West Nile virus (WN virus) and other mosquito-borne pathogens. Through systematic analysis of surveillance findings including mosquito abundance, species composition, geographic distribution, and seasonal trends, the Department identifies indicators that may signal increased risk to human health and evaluates the effectiveness of mosquito control activities. These analyses support data-driven decision making, enabling DOHMH to prioritize resources and implement targeted interventions that reduce mosquito populations and mitigate the risk of mosquito-borne diseases in New York City.

## INTRODUCTION

New York City experienced recurring outbreaks of yellow fever and malaria in the nineteenth century and early parts of the twentieth century, respectively. In present times, West Nile (WN) virus is the only mosquito-borne disease that has been transmitted by local mosquitoes in the City. WN virus is primarily transmitted by *Culex* mosquitoes. The City does not have the *Aedes aegypti* species, which has been demonstrated to spread chikungunya, dengue and Zika virus, but it does have related mosquitoes in the *Aedes* genus. *Ae. albopictus*, a known vector of chikungunya and dengue fever, is found in all boroughs of the City. There is laboratory evidence that this mosquito may also carry and spread Zika virus, however, it has not been implicated in the 2016-2017 outbreak, nor has its competence as a vector been demonstrated in natural transmission cycles.

Recent regional developments highlight the importance of continued vigilance for emerging mosquito-borne diseases. In 2025, Jamestown Canyon virus (JCV) was detected in mosquito pools collected in New York City; however, no locally acquired human cases have been identified to date. In addition, locally acquired transmission of chikungunya virus was reported in nearby Nassau County, New York, and locally acquired malaria cases were reported in New Jersey. Although these events occurred outside New York City, they demonstrate the potential for mosquito-borne diseases not historically established in the region to emerge under favorable ecological and epidemiological conditions.

In late August of 1999, the New York City Department of Health and Mental Hygiene (DOHMH) detected an unusual cluster of encephalitis cases in northern Queens. This cluster was attributed to West Nile virus, a mosquito-borne virus not previously recognized in the Western Hemisphere prior to 1999. The outbreak resulted in 59 human cases and four fatalities.

Since its introduction into New York City in 1999, WN virus has spread across the continental United States and now reappears each mosquito season. In 2003, WN virus caused the largest outbreak of neuroinvasive disease ever recorded in the Western Hemisphere, with 9,862 cases reported overall, including 264 deaths. In New York City, the virus has persisted and become endemic, causing at least 486 neuroinvasive cases and 64 deaths. From 1999 through 2025, the number of neuroinvasive cases among New York City residents has ranged from 2 to 45 cases per year (median: 14).

In 2025, 18 cases of WN disease (16 neuroinvasive and 2 fever) were detected among New York City residents, most of which were possibly or probably acquired within the City. Data from the CDC indicate that 2,076 human cases (1,434 neuroinvasive and 642 fever) were reported in the United States in 2025. For additional information, please refer to the CDC website ([www.cdc.gov/westnile](http://www.cdc.gov/westnile)).

Since 2003, universal screening of donated blood products has been conducted in New York City by the New York Blood Center. Between 2003 and 2025, 31 presumptively infected donors have been identified in New York City. All implicated blood products were retrieved and removed from the blood supply.

The recurrence of human WN virus cases each year and the repeated detection of WN virus in mosquito populations provide strong evidence that the virus is now permanently established in New York City and throughout the United States. As a result, maintaining a routine, year-round Integrated Pest Management (IPM) program has become essential.

There are two primary mechanisms that may explain the persistence of WN virus within the City. First, the principal enzootic vector, *Culex pipiens*, overwinters in the adult stage, and some infected mosquitoes are believed to survive through the winter months. Alternatively, the virus may be reintroduced each spring or early summer through infected migratory birds. As a result, infected mosquitoes and/or birds may already be present in the City during early spring. At this stage, the virus begins its amplification cycle. As mosquitoes feed on infected birds, the virus is transmitted between vector and reservoir host populations, allowing the number of infected mosquitoes and birds to increase over time. When environmental conditions are favorable, the virus amplifies to a point of “spillover.” At this stage, the virus bridges out of the enzootic bird–mosquito cycle through bridge vector mosquitoes.

Bridge vectors are mosquito species that readily feed on humans and other mammals. Transmission to humans typically occurs during this stage of the amplification cycle, highlighting the critical importance of early surveillance and timely control measures. Based on our comprehensive study of mosquito feeding behavior in New York City, *Cx. pipiens*, *Cx. restuans*, and *Cx. salinarius* have been identified as important bridge vector species. The study showed that urban *Culex* mosquitoes feed on humans more frequently due to limited wildlife hosts and high human population density. More than 25% of blood meals were derived from humans, compared with rural areas where birds remain the primary hosts. *Cx. salinarius* demonstrated an even stronger preference for human hosts, approximately 30% higher than the other species.

An effective surveillance and control program is designed to detect WN virus during its amplification cycle before it reaches a point of spillover to humans. Typically, the presence of local WN virus activity is signaled by infected mosquitoes, often occurring a month or more prior to human transmission. The objective of DOHMH’s vector surveillance program is to identify WN virus in local mosquito populations before significant amplification of the virus occurs. This proactive approach enables the implementation of targeted Integrated Pest Management (IPM) practices, aimed at reducing the population of infected mosquitoes while simultaneously reducing the risk of human transmission.

DOHMH extends its gratitude to the following collaborators with whom it has worked closely to develop a plan that meets the specific needs of New York City: the U.S. Centers for Disease Control and Prevention (CDC); the New York State Departments of Health (NYSDOH), Environmental Conservation (NYSDEC), Agriculture and Markets; and New York City agencies, including the New York City Emergency Management Department and the Departments of Environmental Protection, Parks and Recreation, Sanitation, Police, Citywide Administrative Services, Information Technology and Telecommunications, the New York City Housing Authority, Wildlife Conservation Society and other key partners.

## **INTEGRATED PEST MANAGEMENT (IPM)**

### **Prevention of Mosquitoes and Mosquito-borne illnesses in Humans**

Prevention is a key component of the DOHMH mosquito Integrated Pest Management (IPM) program. OVSC focuses on source reduction, identification of breeding sites, and larviciding using backpack, aerial, and catch basin applications with biorational pesticides.

A major component of source reduction includes citywide community outreach and education to engage the public in eliminating mosquito breeding habitats. Preventing mosquito larvae from developing into adults is the most effective and environmentally sound method for reducing mosquito populations capable of transmitting WN virus in New York City.

Mosquito breeding habitats include stagnant water found in artificial and natural containers such as tires, birdbaths, containers, clogged gutters, puddles, potholes, and tree holes, as well as larger areas such as flood-prone locations, marshes, and wetlands.

### **Key Recommendations for Preventing WN virus in Humans**

To reduce the risk of mosquito bites and WN virus infection:

- a) Individuals, particularly those 50 years of age and older or with weakened immune systems, should take additional precautions.
- b) Limit outdoor activities during dusk and dawn, when mosquito activity is highest. If outdoors, wear long sleeves, long pants, and socks.
- c) Use EPA-registered insect repellents containing active ingredients such as DEET, picaridin, IR3535, oil of lemon eucalyptus, or 2-undecanone, according to label instructions.
- d) Ensure that doors and windows have properly fitted screens. Repair or replace screens with openings or damage.
- e) Eliminate standing water around homes and properties to reduce mosquito breeding.

**Community Outreach and Education:** Public awareness of personal protection and source reduction is an important component of the mosquito control program. Increasing public understanding of mosquitoes, WN virus, and other mosquito-borne diseases supports individual protective behaviors and reduces mosquito breeding sources.

OVSC conducts outreach through in-person and virtual presentations and distributes information through the DOHMH website ([nyc.gov/health/mosquito](https://nyc.gov/health/mosquito)), digital communications, and printed materials. Educational resources focus on personal protection measures and actions the public can take to reduce mosquito breeding.

**Surveillance:** The DOHMH mosquito-borne disease surveillance program includes 1) monitoring of human cases, 2) “in-season” surveillance of larval and adult mosquitoes, 3) “off-season” surveillance of overwintering adult mosquitoes, and 4) identification and characterization of breeding sites. Larval surveillance helps OVSC to determine where to

treat by ground equipment (manual and backpack pesticide applicators) and determine the timing for aerial larviciding. Larval surveillance includes dipping, breeding site identification and larval identification. Dipping is performed by taking a small amount of water using a sampling device called “dipper” and examining the sample for the presence or absence of mosquito larvae. Adult mosquito surveillance is key to determining the type and density of mosquitoes present throughout the City and through their testing to determine the presence, location and intensity of WN virus. The mosquitoes are trapped using light and gravid traps in about 261 (2025) locations strategically located throughout the City. Locations of these traps are based on current and past surveillance data. If WN or any other mosquito-borne virus is found in a location, supplemental traps are added to better define the distribution of WN virus activity in the area.

**Control:** Control of mosquitoes using the principles of IPM includes 1) breeding source reduction, 2) habitat modification, 3) use of mass mosquito-trapping devices, 4) larviciding and 5) adulticiding. Non-chemical methods are always considered first, but if a chemical pesticide is required, then the lowest toxicity (and least persistent) pesticide that is most efficacious on mosquitoes will be used.

**Larviciding:** Larviciding is the most efficient method of mosquito control, involving treating aquatic breeding sites with naturally occurring biological pesticides to kill larvae before they emerge as adults. It includes manual or backpack treatment of key breeding sources, manual treatment of catch basins, and aerial application to inaccessible breeding areas.

**Adulticiding:** DOHMH performs adulticiding only as a last resort, when WN virus infected mosquitoes have been identified and meet established criteria for adulticiding. The decision to adulticide is based on data obtained from mosquito surveillance and testing and established and successful algorithms/decision trees.

For WN virus, OVSC uses two different algorithms depending on whether or not a human WN virus case is involved. The Positive Mosquito Pool Algorithm considers the presence of WN virus in mosquitoes, persistence of WN virus activity in locations, competency of infected mosquito species in transmitting WN virus, propensity of WN virus-positive mosquitoes to bite humans, and population density in areas with positive mosquitoes. The Positive Human Case Algorithm relies on the presence of human case(s) in an area and evidence of local virus transmission. Detailed descriptions of above-mentioned mosquito IPM practices are provided in the succeeding sections of this plan.

For *Aedes*-borne viruses, adulticiding is applied when there are high numbers of imported human cases in specific areas where *Aedes albopictus* is abundant, or upon detection of these viruses in *Ae. albopictus* mosquitoes, or if there are locally acquired human cases.

**Summary:** The DOHMH IPM program integrates surveillance, prevention, and targeted control measures to reduce mosquito populations and minimize the risk of mosquito-borne diseases in New York City. This approach emphasizes early detection, data-driven decision-making, and environmentally responsible control methods.

## **PUBLIC EDUCATION & COMMUNITY OUTREACH**

### **Objective**

To increase public awareness of mosquito-borne diseases and improve adoption of mosquito bite prevention and source reduction behaviors among NYC residents

### **Background**

Each year, DOHMH launches a public education initiative, called “Fight the Bite” to increase awareness of mosquito bite prevention, standing water reduction, West Nile virus, and other diseases spread by mosquitoes.

Prior to mosquito season, DOHMH will reach out to cemeteries and large property owners at high risk for mosquito breeding habitats to remind them of the importance of eliminating standing water from their properties.

At the start of each season, DOHMH issues a Health Advisory Notice (HAN) to remind healthcare providers to consider WN virus in patients presenting with compatible illness. A press release is also issued to inform the public about the risk of WN virus and other mosquito-borne diseases and to provide guidance on personal protection measures. In the previous season, the HAN on WN virus was distributed to over 40,000 recipients. DOHMH has developed educational fact sheets on mosquito bite prevention and standing water reduction in seven languages for distribution to community-based organizations, community boards, elected officials, schools, and the general public. These materials are also available for download on the DOHMH website. The outreach campaign is further supported by presentations and other educational activities conducted by DOHMH staff for community groups across the City.

OVSC’s community outreach activities include participation in community meetings, health fairs, and public presentations. Community members can request presentations for their groups through the DOHMH Speaker Request page. OVSC also collaborates with other education units across the agency to further amplify public health messaging. The Press Office supports these efforts by issuing spray notifications and personal precaution announcements through media outlets and press releases related to mosquito control activities in the City. Through these coordinated efforts, educational materials are made widely available in both hard copy and electronic formats (via email and the agency’s website), and are provided in multiple languages. Information is also accessible to the public through 311.

In 2026, DOHMH will take standing water and mosquito infestation reports via New York City’s NYC311 and DOHMH’s Web site ([nyc.gov/health/mosquito](http://nyc.gov/health/mosquito)). Callers can receive comprehensive information about WN virus, including updated information about adulticiding (mosquito spraying) schedules by dialing 311. The Citizen Service Center will

provide callers with a live operator 24 hours a day, 7 days a week. DOHMH will also provide information on WN virus through its web site ([nyc.gov/health/mosquitoes](http://nyc.gov/health/mosquitoes)) in the form of fact sheets, press releases, mosquito control schedules, and WN virus activity maps. This information is routinely faxed and/or electronically mailed to City agencies, elected officials, community boards, the Department of Education, hospitals, nursing homes, and associations of green grocers, day camps, and community organizations. DOHMH will work with the Department for the Aging (DFTA) for distribution of WN virus messaging and Department of Citywide Administrative Services (DCAS) on preventing the breeding of mosquitoes on publicly owned property.

Adulticiding information is made available through DOHMH's web site and 311, regular news broadcasts, scheduled advertising times on local radio, print media, and web sites of news organizations. To raise awareness of mosquito control events, DOHMH utilizes the Notify NYC system to inform residents in areas at higher risk of disease transmission and during adulticiding operations. This system enables residents to receive alerts through multiple channels, including cell phone text messages, mobile applications, landline calls, email, RSS feeds, and pagers. Residents are encouraged to register for Notify NYC via 311 or the web to receive advance notification of ground spraying (adulticiding) and aerial larviciding activities in their neighborhoods. In addition, prior to each mosquito control event, DOHMH distributes informational flyers in high-traffic areas within affected communities to provide advance notice of scheduled activities.

### **Planned Activities**

- The public will be informed about the City's comprehensive preventive strategies and activities (community education, surveillance, source reduction, larviciding, etc.) to address the threat of diseases spread by mosquitoes and to minimize the necessity of pesticide application for adult mosquito control.
- The public will be asked to help eliminate mosquito-breeding sites and to report standing water using NYC311 (<https://portal.311.nyc.gov/>). The public will be advised to eliminate standing water sites (tires, buckets, and other water-holding objects) from their property. They will also be urged to change the water in bird baths once each week; to clean and chlorinate swimming pools or drain and cover if not in use; to prevent water from accumulating in pool covers; and to unclog gutters and down spouts.
- The OVSC will conduct outreach on WN virus prevention and habitat reduction.
- The Office of Community Affairs and other education units throughout the agency will assist in increasing public awareness of the nature of mosquito-borne diseases.
- The public will be informed about personal protective measures to use to avoid mosquito bites such as ensuring that screens fit tightly on doors and windows, wearing protective clothing (long pants, long-sleeved shirts, and socks) and appropriate use of insect repellents.
- Maps and tables showing recent WN virus activity by zip code will be posted on the DOHMH website in order to provide the public with up-to-date information on location

of WN virus activity in the City. This information will be updated on a weekly basis until viral activity has ceased.

- Fact sheets in several languages will be distributed to community-based organizations, community boards, elected officials, schools, senior care facilities, libraries, outdoor activity sites, and many other organizations citywide.
- NYC311 will be updated regularly with information pertaining to DOHMH pesticide spraying activities.
- DOHMH's web site ([nyc.gov/health/mosquito](https://nyc.gov/health/mosquito)) will be regularly updated and, from April 1<sup>st</sup> through October 31<sup>st</sup>, the public can use City websites to report standing water.
- Regular updates will be provided to elected officials and community boards, which play a key role in communicating information about WN virus activity to their constituents. DOHMH staff offer presentations, available in multiple languages, to community boards and community-based organizations. Community organizations may request presentations or tabling opportunities through the DOHMH Speaker Request Form (<https://survey.alchemer.com/s3/6886844/Speaker-Request-Form>).
- The public can request mosquito bite prevention materials through 311, which are distributed via the DOHMH Call Center.
- Press releases regarding all activities will be issued regularly and DOHMH will work closely with the media to achieve accuracy of the media's coverage.
- If the application of pesticides to control adult mosquitoes becomes necessary, the public will be informed in a timely manner (at least 24 hours in advance with a goal of 48 hours prior to event) to reduce exposure to pesticides. The public will also be provided detailed information about the pesticides being used and the potential risks associated with exposure. The public will be encouraged to contact the NYC Poison Control Center (212-POISONS/764-7667 or 1-800-222-1222) with any suspected pesticide-related illness, symptoms or exposure.
- Information will be released at least 24 hours in advance (in compliance with Local Law 37 and NYS DEC Regulation) with a goal of 48 hours in advance through the media, DOHMH Website, and NYC311, and Notify NYC (if applicable). In addition, hospitals, key City agencies, elected officials, community boards, schools, nursing homes, day camps, and community organizations will receive notice via fax and/or electronic email. Under certain conditions and with the approval of the NYSDOH, applications in green spaces (parks/cemeteries) may take place with less than the required 24-hour notice. For these cases, the green area will be closed to the public during and a few hours after the application of adulticide.
- Flyers will be placed in public areas alerting residents of the upcoming spray event.
- During adulticiding events, DOHMH applicator trucks are escorted by Police Department vehicles or other authorized vehicles equipped with loudspeakers to announce that spraying is about to begin and to advise residents to go indoors to reduce potential exposure to pesticides. Announcements are made in both English and Spanish.

## HUMAN SURVEILLANCE AND PROVIDER EDUCATION

### Objective

To quickly detect human illness due to mosquito-borne diseases, especially WN virus

From 1999-2025, 486 New York City residents were reported with neuroinvasive disease due to WN virus. Among these cases, 64 died as a result of West Nile infection. Most of the neuroinvasive cases have occurred in older New Yorkers (median: 65 years; range 1-95). The tables below summarize WN virus disease by borough and syndrome. One hundred and two

### **West Nile Viral Disease by Borough, NYC, 1999-2025 (includes neuroinvasive and non-neuroinvasive cases)**

Year	Bronx	Brooklyn	Manhattan	Queens	Staten Island	Total
2025	3	4	3	5	3	18
2024	3	12	7	12	2	36
2023	2	8	5	9	8	32
2022	1	16	6	13	10	46
2021	4	3	4	9	1	21
2020	0	1	3	2	1	7
2019	0	3	0	4	3	10
2018	4	7	6	18	1	36
2017	0	9	4	8	0	21
2016	0	2	0	2	2	6
2015	2	12	1	17	6	38
2014	1	5	2	5	2	15
2013	1	3	0	2	4	10
2012	4	12	9	10	6	41
2011	2	2	2	5	0	11
2010	7	6	6	14	9	42
2009	1	1	0	1	0	3
2008	1	3	1	5	5	15
2007	2	7	1	7	1	18
2006	1	0	1	2	8	12
2005	3	3	1	5	2	14
2004	0	0	3	1	1	5
2003	6	8	3	11	4	32
2002	9	2	2	12	4	29
2001	0	2	3	2	2	9
2000	0	2	1	1	10	14
1999	9	3	1	34	0	47
<b>Total Cases</b>	<b>66</b>	<b>136</b>	<b>75</b>	<b>216</b>	<b>95</b>	<b>588</b>

(102) cases of WN fever were also detected during this time period. In 2025, 16 New York City residents were diagnosed with WN neuroinvasive disease. Most of these cases of WN viral disease probably became infected locally.

The table below summarizes morbidity and mortality due to WN virus in New York City from 1999-2025:

**West Nile Viral Disease, NYC, 1999-2025**

Year	Cases	Syndrome		Median Age*			Deaths
		Neuroinvasive	WN Fever	Yrs.	Range	#	Case Fatality Rate*
2025	18	16	2	64	(27-91)	1	6%
2024	36	26	10	74	(29-95)	3	12%
2023	32	31	1	67	(24-95)	2	6%
2022	46	36	10	64.5	(28-95)	2	6%
2021	21	18	3	65	(26-87)	0	-
2020	7	6	1	54	(39-87)	1	17%
2019	10	8	2	71	(39-89)	0	-
2018	36	30	6	60.5	(31-88)	2	7%
2017	21	20	1	62	(28-87)	2	10%
2016	6	6	0	49.5	(32-77)	0	-
2015	38	30	8	58	(22-89)	6	20%
2014	15	12	3	59	(36-81)	3	25%
2013	10	8	2	64	(45-81)	2	25%
2012	41	26	15	61.5	(1-88)	7	27%
2011	11	9	2	69	(41-82)	1	11%
2010	42	34	8	64	(19-87)	5	15%
2009	3	3	0	63	(60-73)	1	33%
2008	15	8	7	64	(33-86)	1	13%
2007	18	13	5	75	(41-90)	5	38%
2006	12	8	4	64.5	(44-80)	2	25%
2005	14	11	3	61	(27-84)	2	18%
2004	5	2	3	33.5	(1-66)	0	-
2003	32	31	1	68	(8-93)	7	23%
2002	29	28	1	72	(22-86)	3	11%
2001	9	7	2	51	(44-75)	1	14%
2000	14	14	0	62	(36-87)	1	7%
1999	47	45	2	70	(5-90)	4	9%
<b>Summary</b>	<b>588</b>	<b>486</b>	<b>102</b>	<b>65</b>	<b>(1-95)</b>	<b>64</b>	<b>13%</b>

\* Median age and case fatality rate calculated for neuroinvasive cases only

Serosurveys performed in Queens (1999) and Staten Island (2000) provided an estimate of the proportion of WN viral infections that are asymptomatic or subclinical. Accordingly, an estimated 140 subclinical WN virus infections, and an additional 30 cases of WN fever, occur

for each case of neuroinvasive disease. Therefore, approximately 68,040 asymptomatic infections and 14,580 cases of WN fever have likely occurred among New York City residents from 1999-2025. The majority of asymptomatic infections and WN fever cases are undetected and unreported in New York City, since many individuals with febrile illness may not seek medical attention and may not be tested for WN virus even if they do see a healthcare provider.

As part of a surveillance and provider education program, BCD offers presentations to health care providers. Medical alerts and advisories are issued via the Health Alert Network (broadcast e-mail) to all NYC hospitals and providers, encouraging providers to consider WN virus testing for any patients presenting with encephalitis, aseptic meningitis and acute flaccid paralysis from July through October. In July 2010, the DOHMH Public Health Laboratory discontinued routine serologic testing for WN virus. Providers are asked to send specimens to commercial laboratories for WN virus testing. Under special circumstances specimen transportation and testing is arranged by DOHMH (e.g. high suspicion for WN virus, possible transfusion or transplantation related case or unusual clustering suggestive of an outbreak of WN virus or another cause of encephalitis).

If physicians request antibody testing for other arboviruses, such as dengue, eastern equine encephalitis (EEE) and/or St. Louis encephalitis (SLE) viruses, specimens can also be referred to the NYSDOH Wadsworth Laboratory or the Centers for Disease Control and Prevention (CDC) for testing. Physicians may send cerebrospinal fluid (CSF) specimens from hospitalized patients with encephalitis to the Wadsworth Laboratory New York State Department of Health (NYSDOH) for testing by polymerase chain reaction (PCR) for a panel of viruses that cause human encephalitis.

In addition to West Nile, several other mosquito-borne infections have been diagnosed among NYC residents. Cases of dengue fever are detected every year. Investigations have determined that all infections were acquired outside NYC in areas where dengue is known to be endemic. Over the past six years from 2019 to 2025, NYC reported 547 cases of dengue. In 2014 a new outbreak of chikungunya virus in the Caribbean resulted in over 600 cases identified among NYC residents. The numbers declined with 59 cases reported from 2019 to 2025. Interviews with patients revealed that most had acquired their infection while traveling in South and Southeast Asia, South America, and the Caribbean, with a few cases more recently coming from areas with localized outbreaks. While no cases of Zika virus infection were identified among NYC residents in 2015, a large outbreak in Latin America, Mexico and the Caribbean that year resulted in 993 travel-associated Zika infections among NYC residents who traveled to affected areas in 2016. As the outbreak wound down in the affected areas, the number of cases in NYC declined. Between 2016 and 2020, 181 cases were reported; one case was reported in 2025. We will continue to conduct human surveillance to identify travel associated mosquito-borne disease cases among NYC residents. DOHMH conducts passive surveillance for dengue virus, chikungunya virus and Zika virus infections, and facilitates testing for new arboviruses not normally found among NYC residents.

### **Planned Activities**

- Beginning in early July, DOHMH will remind providers to report all suspected cases of WN virus neuroinvasive disease (encephalitis, aseptic meningitis or acute flaccid paralysis), and to test all hospitalized patients with these conditions for WN virus. Providers will also be reminded to consider dengue, chikungunya and Zika in patients with a history of travel and compatible illness.
- From July through October, periodic e-mail advisories will be sent to all City hospitals and healthcare providers describing current WN virus activity in NYC and emphasizing the importance of reporting suspected WN virus cases. DOHMH will provide the criteria for reporting and submission of appropriate laboratory specimens for WN virus testing.
- DOHMH will work closely with NYSDOH and CDC to ensure that surveillance data are standardized and remain confidential.
- DOHMH will educate health care providers to increase knowledge about the proper detection, prevention and clinical management of mosquito-borne diseases and other types of encephalitis and meningitis.
- If possible, presentations will be made at local hospitals and to specialty societies as requested.
- BCD will work with partners to ensure that cases of WN virus infection in persons who have received or donated blood products or organs are rapidly investigated and reported so that other affected blood products or organs can be promptly identified and withdrawn before they are used.
- BCD will facilitate diagnostic testing for providers who want to pursue mosquito borne infections other than WN virus, dengue, chikungunya or Zika.

## MOSQUITO SURVEILLANCE

### Objective

To monitor the abundance of mosquito populations and detect the presence of arboviruses.

### Background

The risk of mosquito-borne disease depends on the number of mosquitoes capable of transmitting the virus and the prevalence of the virus among those mosquitoes. Proper surveillance data for larval and adult mosquitoes are important for guiding appropriate prevention and control activities. Larval surveillance can help predict expected adult mosquito density and can indicate areas where efforts to eliminate mosquitoes at their source (breeding sites) should be targeted. Adult mosquito surveillance and viral testing provide early predictive information about the potential for a disease outbreak.

For the 2026 mosquito season (April–October), DOHMH will conduct weekly surveillance at 53 permanent trap locations strategically placed throughout the five boroughs. To monitor adult mosquito populations, DOHMH will utilize light traps, gravid traps, and BG (Biogents®) sentinel traps. Light traps and gravid traps will be deployed in pairs at all 53 sites to assess the risk of WN virus transmission to humans. Light traps attract female mosquitoes seeking blood meals and help estimate mosquito population sizes, while gravid traps specifically target fertilized female *Culex* mosquitoes that have already taken blood meals and are more likely to test positive for WN virus.

In 2016, DOHMH deployed BG sentinel traps at 60 additional locations due to their effectiveness in capturing *Aedes* mosquitoes, which are potential vectors for chikungunya, dengue, and Zika viruses. Currently, these diseases are not transmitted locally in New York City. For the 2026 mosquito season, DOHMH will use BG sentinel traps at 10 locations, focusing on monitoring *Aedes* mosquito density across various boroughs. Due to the low risk of local transmission, *Aedes* mosquitoes will not be tested for chikungunya, dengue, or Zika viruses; instead, mosquitoes collected from BG sentinel traps will be tested only for WN virus. Additionally, DOHMH will deploy resting boxes at 10 sites across the city to monitor *Culiseta melanura*, the primary vector of Eastern Equine Encephalitis (EEE), and *Culex erraticus*, a sporadic mosquito species with increasing populations and positivity rates.

Field collected mosquitoes are sorted by species and grouped into pools of up to 50 mosquitoes for viral infection analysis. *Culex* and *Aedes* mosquitoes are tested for WN virus, Eastern Equine Encephalitis (EEE), Jamestown Canyon (JCV), La Crosse Encephalitis (LACV), St. Louis Encephalitis (SLEV) infection. In 2025, the DOHMH collected and identified a record number of 256,691 mosquitoes by species. Of the 5,312 mosquito pools (183,889 mosquitoes) analyzed, 1378 tested positive for WN virus in ten different species (*Cx. pipiens*, *Cx. restuans*, *Cx. salinarius*, *Cx. erraticus*, *Ae. albopictus*, *Ae. taeniorhynchus*, *Ae. sollicitans*,

*Ae. triseriatus*, *Ae. vexans vexans*, and *Coquillettidia perturbans*). One pool (*Cx. salinarius*) tested positive for Jamestown Canyon virus (JCV). Results from our 2010 mosquito host feeding and preference study indicate that all major *Culex* species, including *Culex pipiens*, *Cx. restuans*, and *Cx. salinarius*, serve as primary and bridge vectors of WN virus in New York City. However, *Cx. salinarius* plays a more significant role in disease transmission compared to the other species.

In addition to conducting disease-focused adult mosquito surveillance during mosquito season, DOHMH monitors adult mosquito populations in selected locations to track overwintering populations during the winter. Data from overwintering mosquito surveillance helps DOHMH anticipate early-season mosquito activity and develop proactive vector control strategies. This data is also used to model mosquito population trends, and predict future outbreaks. By integrating overwintering mosquito data with seasonal surveillance, DOHMH enhances its ability to manage vector populations, mitigate disease risks, and improve public health preparedness.

### **Planned Activities**

- DOHMH will continue to work closely with other City agencies to collect and map information on potential mosquito-breeding habitats.
- DOHMH will determine which areas should be regularly inspected for the presence of larvae. These sites will be subjected to routine inspection to determine the presence of mosquito larvae and need for treatment.
- Larval habitat information will be collected and updated throughout the season.
- In targeted urban areas, mosquito trapping will be conducted from sewer and adjacent buildings by using light traps in response to resident complaints.
- From April through October, DOHMH will conduct adult mosquito surveillance of at 53 permanent trap locations strategically placed throughout the five boroughs using three different types of traps. The trapping season may be lengthened or shortened depending on the weather.
- Mosquitoes will be collected on a weekly basis using light, gravid and sentinel traps. Each trap collection will be sorted by species of mosquitoes collected. Information on the location, collection data, trap type and the total number of female mosquitoes will be recorded.
- Adult mosquito trapping will be expanded in areas where traps indicate increased disease risk. This will help determine extent of risk and determine control methods.
- In the event that pesticides are applied for adult mosquito control, DOHMH will set traps more frequently to evaluate the efficacy of the control measures.
- Mosquito Magnet™ traps will be used to survey and control adult mosquitoes at parks and wastewater treatment plants. Additionally, DOHMH will place Mosquito Magnet™ traps to survey and control adult mosquitoes in the Rockaways.

## LARVAL MOSQUITO CONTROL

### Objective

To reduce the abundance of adult mosquitoes through the use of Integrated Mosquito Management (IMM) practices.

### Background

Mosquitoes breed in water. Eliminating their breeding sites is the simplest and most effective way to reduce the number of mosquitoes. Every residential and commercial property owner should regularly inspect their property to determine if conditions are conducive to mosquito breeding and attempt to eliminate those conditions. Mosquito breeding can be prevented by either eliminating the standing water (source reduction), or treating the water with larvicide to prevent mosquitoes from developing.

*Culex pipiens*, a primary vector of WN virus and one of the most common mosquito species in New York City, lays eggs in standing or slow-moving water with decaying organic matter. Key breeding sites include storm drains, discarded tires, poorly maintained birdbaths, clogged gutters, unused swimming pools, plastic wading pools, and puddles that last a week or more. A single female *Cx. pipiens* can lay 100 to 300 eggs in rafts, which develop into adults within 10 to 14 days under ideal conditions like warm temperatures and ample food supply. Larvae of *Aedes vexans*, *Cx. salinarius*, *Ae. sollicitans*, *Ae. taeniorhynchus*, and *Coquillettidia perturbans* inhabit both freshwater and saltwater marshes, depending on species' ecological preferences. *Ae. albopictus* (Asian tiger mosquito) and *Ae. japonicus* (Asian bush mosquito) are container breeders that need only small amounts of water for egg and larval development. They lay eggs in both natural and artificial containers, such as tree holes, tires, buckets, flowerpots, and discarded debris. *Ae. albopictus* is an aggressive daytime biter capable of transmitting multiple mosquito-borne diseases. Public education on identifying and removing larval habitats is key to mosquito control, helping to reduce populations and lower disease risks.

DOHMH's public education campaign emphasizes the need for New Yorkers to eliminate mosquito-breeding sites around their homes. Standing water is a violation of the New York City Public Health Code and residents are encouraged to report standing water that can potentially breed mosquitoes to 311. Reports of standing water are investigated by DOHMH inspectors. When standing water is found in violation, the private property owner receives a Notice of Violation and is called for a hearing by the Environmental Control Board. Standing water may also be referred for extermination by the inspector or will be referred to the proper agency for evaluation and remediation if the water is identified on public property.

In 2025, DOHMH received 1,274 complaints of standing water through NYC311, on the DOHMH web site, from elected officials and community groups, and through field surveys performed by inspectors and exterminators. The DOHMH investigated each of these complaints. As a result of these inspections, 416 Notice of Violations were issued to unresponsive landlords and homeowners.

DOHMH will conduct need-based larviciding in accordance with permits issued by NYS Department of Environmental Conservation (DEC) in catch basins (street corner storm drains), sewage treatment plants, and areas of permanent standing water. DOHMH works with the New York City Department of Environmental Protection (DEP), the New York City Housing Authority, and the New York City Department of Parks and Recreation to treat catch basins and other mosquito breeding sites.

Approximately 150,000 catch basins across the City will be inspected and if justified, treated at least three times each season by hand application of larvicides. In natural areas that are inaccessible by ground vehicles, larvicide may be applied aurally by helicopter periodically during mosquito season. DOHMH plans to continue to use all these methods in 2026.

Presently, DOHMH uses larvicides with the active ingredients *Lysinibacillus sphaericus*, *Bacillus thuringiensis var. israelensis* (Bti), and/or methoprene. *L. sphaericus* and *Bti* are naturally occurring soil bacteria that produce toxins used to control mosquito larvae. These microbial larvicides are well-suited for mosquito management due to their specificity to mosquitoes and minimal toxicity to humans and other non-target organisms. The bacteria produce crystalline endotoxins that, when ingested, dissolve in the larval gut and disrupt digestive cells, causing the larvae to stop feeding. The spores then invade other tissues and multiply within the larva, leading to death, typically within a few hours of ingestion.

Beginning in 2026, DOHMH will also incorporate Sumilarv® (pyriproxyfen) for catch basin treatments as part of an insecticide resistance management strategy. Pyriproxyfen is an insect growth regulator (IGR) that mimics juvenile hormone and disrupts normal mosquito development. It prevents larvae from successfully maturing into adults by interfering with metamorphosis at the pupal stage. Unlike microbial larvicides, pyriproxyfen does not immediately kill larvae but instead prevents adult emergence, thereby reducing the adult mosquito population. The addition of Sumilarv® supports a rotation of larvicidal modes of action, which is critical for delaying the development of resistance in mosquito populations and maintaining the long-term effectiveness of mosquito control interventions.

### **Planned Activities**

- DOHMH and other City agencies continuously identify areas of standing water associated with surface grading problems, road construction, clogged sewers and catch basins, obstructed waterways that are mosquito-breeding habitat. Through

interagency collaborative efforts, these conditions will be remediated as they are identified.

- DOHMH will inform large-property owners and managers of the need to eliminate mosquito-breeding sites on their property or to properly treat them with larvicides.
- DOHMH will work with the New York City Department of Sanitation to prioritize and enhance the enforcement of lot cleaning and to ensure an aggressive tire disposal program. Abandoned lots are particularly conducive to mosquito breeding, and in areas where WN virus has already been detected these lots will be targeted for remediation.
- DOHMH will work with the New York City Department of Buildings to develop and implement a protocol requiring all City's demolition and excavation contractors to larvicide when their activities result in significant sources of mosquito breeding.
- The public will be asked to help eliminate mosquito-breeding sites and to report standing water by calling 311 and using DOHMH Web site ([nyc.gov/health/mosquito](http://nyc.gov/health/mosquito)).
- From April 1 through October 31, OVSC investigates all public complaints of standing water. OVSC will monitor the reported breeding sites, send letters to property owners

asking them to address the problem, conduct on-site inspections of the more egregious conditions, make referrals to appropriate agencies for abatement, and, if necessary, issue notices of violation.

- DOHMH will use VectoLex® (*Lysinibacillus sphaericus*), VectoBac®/AquaBac®/Submit Bti Briquets® (*B. thuringiensis* var. *israelensis*, Bti), and VectoMax® larvicides (mixture of *L. sphaericus* and *Bti*). Pesticide resistant management is a core component of this comprehensive mosquito control plan. DOHMH will continue monitoring local mosquito populations for resistance development for all above mentioned larvicides.
- Use of methoprene (Altosid®) and Bti-methoprene combination products (VectoPrime®) may be used in specific situations. Methoprene is an insect growth regulator used to control many types of insects. This chemical quickly breaks down in water and sunlight and does not persist in the soil. The U.S. Environmental Protection Agency has placed methoprene into the category of "least toxic" with regard to humans. Additionally, DOHMH will continue to explore other registered products that may increase the effectiveness of the larviciding program.
- Beginning in May, bacterial larvicides will be applied at wastewater treatment plants, parks, and other surface waters, if larval breeding is present. Applications will be made by hand, backpack, or aerially via helicopter. Larvicides will continue to be applied as needed throughout the mosquito-breeding season.

- Beginning in May/June, bacterial larvicides will be applied to sewers and to more than 150,000 catch basins citywide. Applications will continue, based upon larval surveillance findings, as needed throughout the mosquito-breeding season.
- OVSC staff will intensify larval surveillance and control once WN virus activity or high abundance of *Ae. albopictus* (the vector of chikungunya and dengue virus, and a potential vector of Zika virus) is identified in an area. Targeted neighborhoods will have an expanded public outreach regarding breeding site elimination and personal protection; community-specific media materials will also be distributed.
- DOHMH will work with the Parks Department and other partners to provide mosquito control in green areas (e.g., parks, cemeteries, and golf courses), especially in areas where infected mosquitoes are found.
- DOHMH will provide occupational safety and health training to all employees involved in mosquito surveillance and control operations. Additionally, DOHMH will require that all employees from contracted vendors be provided with similar training as well as appropriate personal protective equipment.
- If local transmission of a vector-borne disease occurs, DOHMH will assist residential property owners in identifying and remediating standing water on their property.

For residents conserving rainwater, OVSC will recommend covering the barrels or other water holding containers with a tight-fitting lid or very fine mesh screen. Also, bacterial larvicides containing *Bti* can safely be placed in the barrels for mosquito larvae control.

## **ADULT MOSQUITO CONTROL**

### **Objective**

To reduce the abundance of WN virus infected adult mosquitoes in targeted areas through the judicious use of pesticides.

### **Background**

Comprehensive vector and human surveillance data collected during the past twenty-five seasons has allowed DOHMH to develop a more sensitive protocol for determining and monitoring the level of WN virus activity and the risk for human disease throughout the City.

DOHMH employs an Integrated Pest Management (IPM) approach to control mosquito populations in New York City. Adulticiding operations are conducted only as a last resort, when surveillance data indicate an increased risk of disease transmission to humans.

From 2000 to 2015, DOHMH exclusively used Anvil 10+10™, which contains sumithrin (d-phenothrin), a synthetic pyrethroid widely used in mosquito control for over 40 years. Between 2016 and 2018, DOHMH introduced Duet™ alongside Anvil 10+10™. Duet™ differs in that it contains prallethrin, an additional active ingredient that acts as an exciter, increasing mosquito activity and improving exposure to the insecticide. Prallethrin is particularly effective against daytime-biting mosquitoes such as *Aedes albopictus*. If necessary, DOHMH may expand its adulticiding options to include DeltaGard® and Merus™. Merus™ is a botanical pesticide whose active ingredient consists of pyrethrins, a mixture of six naturally occurring esters derived from pyrethrum, a compound found in chrysanthemum flowers. Anvil 10+10™, Duet™, DeltaGard®, and Merus™ all provide rapid knockdown of adult mosquitoes and are used as part of a targeted and data-driven approach to vector control when conditions warrant.

Natural pyrethrins and synthetic pyrethroids exhibit low mammalian toxicity, degrades rapidly in sunlight, provides little or no residual activity, and does not accumulate in the environment. These products are applied at very small quantities per acre (0.00089-0.0036 pounds/acre) and are referred to as ultra-low volume (ULV) application. ULV-delivery techniques minimize environmental impacts while effectively managing adult mosquito populations. All DOHMH adulticiding events are monitored by City, State and Federal officials to ensure compliance with applicable laws and regulations.

DOHMH plans to evaluate the newly developed pesticide ReMoa Tri® during the 2026 mosquito season. ReMoa Tri® is the first mosquito control product to enter the market in 50 years and features a formulation that combines abamectin, fenpropathrin, and the novel fatty acid C8910. This unique combination may provide a viable alternative to Anvil 10+10™, offering potential advantages in efficacy, safety, and environmental impact. If testing demonstrates its effectiveness, ReMoa Tri® could significantly enhance mosquito control efforts. However, rigorous evaluation is essential before widespread implementation to

ensure its safety and efficiency. The synergistic nature of ReMoa Tri®'s formula suggests promising outcomes, underscoring the importance of comprehensive testing.

DOHMH conducts adulticiding only as a last resort, when established criteria indicate a need for intervention. Pesticides are used solely when necessary and only when a spray event can effectively reduce the risk of disease transmission. Several factors are carefully evaluated before initiating adult mosquito control in a particular area, including mosquito density and distribution, species composition, the persistence of WN virus, weather conditions, time of year, and proximity to human populations.

The decision to conduct adulticiding is based on surveillance data, mosquito testing results, and established decision-making algorithms. The Office of Vector Surveillance and Control (OVSC) uses different criteria depending on disease risk. For WN virus, two distinct algorithms guide decision-making: the Positive Mosquito Pool Algorithm and the Positive Human Case Algorithm. The Positive Mosquito Pool Algorithm considers: (1) the presence of WN virus in mosquitoes, (2) ongoing virus activity in previously affected locations, (3) the competency of infected mosquito species in transmitting WN virus, (4) the likelihood of infected mosquitoes biting humans, and (5) population density in areas where WN virus-positive mosquitoes were found. The Positive Human Case Algorithm is triggered by (1) the presence of confirmed human WN virus cases in an area and (2) evidence of local transmission, such as WN virus-positive mosquitoes found near the human case.

In the event that DOHMH identifies a mosquito pool testing positive for chikungunya, dengue, or Zika virus—or detects a locally transmitted human case—adulticiding operations will be conducted in the affected area to reduce transmission risk.

DOHMH will utilize its surveillance data to assess the risk of an outbreak of above-mentioned mosquito borne diseases. DOHMH only applies pesticides in a limited and targeted area to control adult mosquitoes which is determined by considering habitat; time of year; weather conditions; the intensity of viral activity; the distribution, density, species, age and infection rate of the vector population; and the density and proximity of human populations.

### **Planned Activities**

DOHMH will conduct adulticiding activities when surveillance data implicate a serious risk for human disease.

### **Outline of Control Activities Based on West Nile Virus Presence**

#### **Level 1 – No Pathogen Detection**

DOHMH *Response*: Surveillance and control programs continue as outlined in the City's Mosquito Surveillance and Control Plan. Periodic reports or communications are made to the

WN Virus Steering Committee providing current status of the various surveillance programs. Periodic press releases are issued providing the public with current surveillance results.

#### Level 2 – Initial or Single Pathogen Detection

Initial or a single detection of mosquito-borne viral pathogens in mosquito populations or avian populations in New York City will result in a move to Level 2 responses.

DOHMH Response: OVSC recommendations will be communicated to the WN Virus Steering Committee and the DOHMH Commissioner. Upon approval by the Commissioner, a press release will be drafted, notifying the public of the findings. Surveillance programs will continue with the following added activities:

- CDC Light and Gravid Traps will be added to the area of concern if additional surveillance data are required.
- Larval surveillance and enhanced adult trapping will be conducted in affected areas if needed.
- Laboratory testing will prioritize mosquito pools containing *Culex* vectors, specifically *Culex pipiens*, *Cx. restuans*, and *Cx. salinarius*.
- Data from these additional traps and surveillance measures will aid in determining the extent of pathogen transmission and abundance of mosquito populations and will be used to guide control measures, if applicable.

#### Level 3 – Continued or Multiple Pathogen Detections

Persistent detection of mosquito-borne pathogens or detection in bridge vector mosquitoes or in non-avian vertebrate populations in New York City will result in a move to Level 3 responses.

DOHMH Response: OVSC recommendations will be communicated to the DOHMH Commissioner. Upon approval by the Commissioner, a press release will be drafted, notifying the public of the recent findings. Surveillance programs will continue as noted above. Control measures will be implemented.

- CDC Light and Gravid Traps will be added to the area of concern if additional surveillance data are required.
- Larval surveillance and enhanced adult trapping will be conducted in affected areas if needed.
- Laboratory testing of mosquito pools will be increased in primary and bridge vector species, specifically *Culex pipiens*, *Cx. restuans*, and *Cx. salinarius*.
- Control measures to be considered:
  - Application of larvicides (including aerial and truck mounted applications) to areas breeding large numbers of mosquitoes
  - Ground application of adulticides to immediate areas of concern.

- Aerial application of adulticides may be considered in the event of epidemic
  - Recommend the restriction and/or cancellation of outdoor evening activities
  - Recommend the closing of outdoor recreational areas
- 
- DOHMH will consider EPA and NYS DEC registered products for mosquito control that contain the following active ingredients: pyrethrin, sumithrin, permethrin, or naled. The City will continually review the available information on the health impact of pesticides. Any products used will be applied in compliance with City, State, and Federal laws and regulations. For information on local pesticide laws, please visit Appendix B (page # 36).
  - The public will be notified of adulticide schedules in advance, which will allow sufficient time to take any necessary precautions to reduce pesticide exposure. (See Public Education and Community Outreach)
  - Hospitals will be notified regarding the adulticiding schedule. Information on the pesticide to be used will be provided to the public, physicians and other health care providers.
  - Adult mosquito control will be scheduled when mosquitoes are most active and when weather conditions are conducive to successful application.
  - Information will be released at least 24 hours in advance of the scheduled spray event through the media, the DOHMH web site, 311, and pertinent City and community organizations.
  - Spray event notification flyers will be distributed and posted at public places in the neighborhoods to be treated 24-72 hours in advance of pesticide application.
  - DOHMH will monitor and assess control activities for any potential environmental and health effects through several measures, including pre- and post-spray environmental sampling and addressing pesticide exposure complaints received by DOHMH.
  - Depending on surveillance findings and other criteria, DOHMH or its contractor, may apply targeted adulticides in response to community concerns about nuisance mosquitoes in the Rockaways.

## **SURVEILLANCE OF POTENTIAL ADVERSE HEALTH EFFECTS FROM PESTICIDE EXPOSURE**

### **Objective**

To perform passive and syndromic surveillance to monitor for possible exposure to pesticides used to control adult mosquitoes and the potential health sequelae due to such exposure.

### **Background**

Since exposure to pesticides has the potential to cause adverse reactions, particularly among those with pesticide sensitivity or underlying health conditions, beginning in 2000, DOHMH took additional care to provide advance notification whenever adulticide applications were to occur. Prior to conducting adult mosquito control activities, information on pesticides was sent to all hospital emergency departments, which included product information on pesticides, Safety Data Sheets (SDS), and other information relevant to identifying possible exposures to pesticides. Each year since 2000, calls to the New York City Poison Control Center (NYC PCC) has been monitored during pesticide spraying and relevant exposures were forwarded to the New York State Pesticide Poisoning Registry (NYS PPR) for review and possible inclusion in the registry. In 2001, active surveillance for pesticide-related health complaints was performed. In this regard, chart reviews were conducted in emergency departments and physicians were randomly surveyed in the affected areas by telephone to determine if any individuals had sought care for symptoms related to possible exposure to adulticides. No cases of individuals reporting to emergency departments or seeking care from their physicians for health complaints related to adulticide exposure were found through these activities. Additional research was conducted to determine whether pesticide applications associated with mosquito control were associated with negative health outcomes. As a recent publication reported, no such associations have been identified.<sup>1</sup>

Beginning in 2002, syndromic surveillance was adopted as a surveillance tool to identify any possible respiratory symptom related clusters in areas in which a spray action occurred. If such a cluster is identified, DOHMH conducts further review of emergency department data to investigate the possible etiology of that cluster. In addition, the NYC Poison Control Center monitors pesticide-related calls for number and severity that are geographically and temporally associated with spray events.

### **Planned Activities**

- Prior to conducting adult mosquito control activities, information on pesticides and their possible adverse health effects will be sent to all hospital emergency departments, including product information on pesticides and other information relevant to identifying possible exposure to pesticides.

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<sup>1</sup> Karpati AM, Perrin MC, Matte T, Leighton J, *et al.* Pesticide Spraying for West Nile Virus Control and Emergency Department Asthma Visits in New York City, 2000. *Environ. Health Perspect.* 2004 Aug; 112(11): 1183-7.

- Calls received by the New York City Poison Control Center (NYC PCC) will continue to be monitored during pesticide spraying for geographic and spatial associations with spray events. These data will continue to be forwarded to the NYS Pesticide Poisoning Registry for possible follow-up and inclusion in the Registry.
- Syndromic surveillance will also continue to be utilized to identify possible asthma and respiratory illness clusters in the zip codes in which spraying occurs. Statistical and field investigation methods for evaluating spatial and temporal clustering are described in recent publications.
- In the event that a possible respiratory symptom cluster is identified, emergency department chart review will be considered to investigate the possible etiology of that cluster at nearby hospitals.

## RESEARCH AND EVALUATION

### Objective

To advance the understanding of transmission dynamics and overwintering mechanisms of mosquito-borne diseases, and to evaluate and improve the effectiveness of DOHMH surveillance, prevention, and control strategies

### Background

A central responsibility of public health programs is to assess disease risk and develop safe, effective, and evidence-based strategies to reduce transmission. DOHMH, in collaboration with the Centers for Disease Control and Prevention (CDC) and the New York State Department of Health (NYSDOH), has conducted extensive research on the risk factors associated with infection, morbidity, and mortality from WN virus. Despite significant progress, important questions remain regarding virus ecology, transmission dynamics, and environmental drivers.

An effective Integrated Pest Management (IPM) program requires continuous evaluation to ensure that mosquito control strategies remain both effective and environmentally responsible. Mosquito populations have a well-documented ability to develop resistance to pesticides, necessitating ongoing monitoring and evaluation of all control interventions.

OVSC has established a strong foundation in applied research and scientific evaluation, supporting both operational decision-making and broader public health knowledge. Over the past five years, OVSC has contributed to at least eight peer-reviewed publications in high-impact scientific journals, reflecting the program's leadership in urban vector surveillance, mosquito ecology, and disease risk assessment. Ongoing research efforts include studies on vector competence, host-feeding patterns, genomic sequencing of WN virus, insecticide resistance, predictive modeling of arbovirus transmission, and environmental determinants of mosquito populations. Additional pesticide products approved by state and federal agencies continue to be evaluated for use in NYC. DOHMH systematically assesses the efficacy, environmental impact, and potential human health effects of these products prior to and during their use.

While adult mosquito control remains an important tool, it may have potential environmental impacts. Alternative control strategies are also evaluated; however, many lack sufficient evidence regarding efficacy or environmental impact for large-scale implementation. Environmental assessments, including formal impact evaluations and targeted research studies, are essential tools used to guide responsible mosquito control practices.

Furthermore, emerging challenges such as climate variability, globalization, and the introduction of invasive mosquito species require continued investment in research and innovation. OVSC integrates traditional surveillance with advanced analytical methods,

including predictive modeling, spatial analysis, and genomic approaches, to enhance preparedness and response capabilities.

### **Planned Activities**

- DOHMH will continue to collaborate with federal, state, and local partners to identify key predictors of human illness from WN virus and other mosquito-borne diseases, including analysis of overwintering mosquito populations and development of predictive disease models.
- DOHMH will refine New York City–specific phased response frameworks for mosquito-borne disease risk, based on integrated analyses of avian, mosquito, mammalian, and human surveillance data.
- DOHMH will evaluate emerging surveillance and control methods, including innovative trapping technologies, molecular tools, and data-driven decision systems.
- DOHMH will assess the public health and environmental impacts of adult mosquito control, including pesticide application and exposure.
- DOHMH will conduct ongoing research on insecticide resistance, including resistance to microbial larvicides and adulticides, to ensure continued effectiveness of control strategies.
- DOHMH will test overwintering mosquitoes for WN virus infection to better understand virus persistence between transmission seasons.
- DOHMH will study host-seeking behavior of mosquitoes using collection bottle rotator traps in diverse habitats, including marsh, urban, and park environments.
- DOHMH will conduct pre- and post-treatment larval surveillance in catch basins and natural habitats to evaluate the effectiveness of larviciding operations.
- DOHMH will expand surveillance at ports of entry, including airports, cargo terminals, and cruise ship terminals, to detect invasive mosquito species and prevent their establishment.
- DOHMH will monitor environmental impacts of mosquito control activities, including collection of fish mortality data and water sampling before and after adulticiding events. Water samples will be analyzed by certified laboratories, with findings shared with regulatory agencies such as NYS DEC and the U.S. EPA.
- DOHMH will evaluate biological control methods, including the use of native larvivoracious species such as fathead minnows and copepods, to support sustainable mosquito management.
- DOHMH will monitor non-target effects of mosquito control products to ensure selection of effective products with minimal environmental impact.
- **DOHMH will conduct research on the impact of climate** variability and land use patterns on mosquito populations, species composition, and disease risk.
- Additional research will include evaluation of urban mosquito trapping strategies, habitat suitability, community-based control approaches, and integration of genomic and ecological data to improve understanding of vector-borne disease dynamics in NYC.

## **APPENDIX A**

### **FREQUENTLY ASKED QUESTIONS ABOUT WEST NILE VIRUS AND MOSQUITO SURVEILLANCE AND CONTROL**

#### **What is mosquito control, and why is it needed?**

Mosquito control is the effort to protect public health by reducing mosquito populations. Mosquitoes can spread West Nile virus and other diseases.

#### **What is West Nile virus?**

West Nile virus is a virus spread by mosquitoes that can affect people and animals. Mosquitoes may become infected with the virus when they feed on infected birds. Infected mosquitoes can then spread the virus to humans and other animals.

West Nile virus may cause fever, headache, fatigue or body aches. People typically recover on their own. In rare cases, the virus may cause inflammation of the brain and spinal cord.

#### **Is there a vaccine or treatment for West Nile virus?**

No. Currently there is no vaccine or treatment for West Nile virus, but in many cases, medications may be used to relieve symptoms. In severe cases, patients may need to be hospitalized to receive treatment.

#### **If I get bitten by a mosquito, should I be treated for West Nile virus?**

Not all mosquitoes carry West Nile virus. However, if you are bitten by a mosquito and have symptoms such as fever, headaches, stiff neck, confusion, muscle weakness or sensitivity to light, contact your doctor.

#### **Can my pet be infected by West Nile virus?**

Pets may get West Nile virus from mosquito bites, but they don't usually get sick. Contact your veterinarian if you are concerned about your pet's health. There is no evidence that dogs and cats can transmit West Nile virus to humans.

#### **What does the City do to control mosquito populations?**

The City's Health Code requires property owners to eliminate standing water, where mosquitoes easily breed, on their property. The City also regularly tests mosquitoes for West Nile virus and destroys mosquito breeding sites wherever possible. When standing water cannot be drained, the City applies treatments called larvicides that kill mosquitoes before they mature and can spread disease. (Mosquitoes that have not yet matured into adults are called larva.)

#### **Does the City spray for mosquito infestation?**

If mosquito surveillance and testing show that there is a threat to human health, the City may spray pesticides to kill adult mosquitoes. Spraying is conducted in high-risk areas. The City follows the New York State Department of Environmental Conservation (NYSDEC) and Federal Environmental Protection Agency (EPA) requirements when spraying and only sprays for mosquito control in the evenings or early mornings. The City does not take requests from the public for mosquito spraying.

### **Do the pesticides used during spraying hurt people and pets?**

The City conducts spraying carefully and follows all state and federal requirements. Most people and their pets do not have health effects during and after pesticide spraying. Some people who are sensitive to spray ingredients may have short-term eye or throat irritation, or a rash. If you have stronger reactions after spraying, contact your doctor.

### **How will I be notified about spraying in my neighborhood?**

The Health Department alerts the public of spraying at least 24 to 48 hours before the event. It notifies local media and distributes fact sheets in several languages and alerts to community-based organizations, elected officials, senior care facilities, libraries and many citywide organizations. You can sign up for Notify NYC (<https://a858-nycnotify.nyc.gov/notifynyc/>) to receive direct alerts.

### **How can I avoid exposure to pesticides during spraying?**

Whenever possible, stay indoors during spraying. You may keep air conditioners on; however, you may choose to close vents or use the recirculation setting as an added precaution, though this is not required.

### **What can I do to protect myself and my family from mosquito bites and West Nile virus?**

- Use insect repellents and wear long sleeves or pants in the evening during mosquito season (June through September). Mosquitoes are most active at these times. See below for more information about repellants.
- Empty standing water from containers such as flowerpots, gutters, buckets, pool covers, pet water dishes, discarded tires and birdbaths.
- Make sure backyard pools are properly maintained and chlorinated.
- Install or repair screens on windows and doors to reduce the likelihood of mosquitoes entering your home.
- Call 311 to report groups of dead birds. They may be a sign of West Nile virus in the area.

### **How should I choose an insect repellent?**

Always read the label carefully. Look for the repellent's Environmental Protection Agency (EPA) registration number, active ingredients and use instructions.

Active ingredients approved by the Environmental Protection Agency (EPA) and New York State include DEET and picaridin, picaridin, IR3535 and Oil of lemon eucalyptus (typically only for mosquitoes, unless otherwise indicated). DEET is the most common active ingredient proven to prevent mosquito bites. DEET-based repellents come in a wide range of percentages, but in New York City, you do not need a repellent with more than 30% DEET. Repellents with greater than 10% DEET should not be used on children.

Picaridin-based repellents ranging from 5 to 15% have shown similar protection times to DEET. Protection times vary for different people and depend on factors such as the species of mosquito in the area, how much a person sweats and how hot it is outside.

### **Are there any non-chemical, natural or botanical products that are effective in repelling mosquitoes?**

Some products made with botanical oils provide protection from mosquito bites. However, studies suggest that these products work for much shorter periods of time.

**If my neighbors don't take care of the standing water in their yards, should I report the issue to the Health Department?**

Residents and business owners should take primary responsibility for emptying standing water from their property. If they do not, you may file a standing water complaint online or by calling 311. More information is below.

**What happens after I report standing water complaints to the City?**

The Health Department inspects properties for standing water. If an inspector notices conditions that attract mosquitoes, he or she will issue a violation to the property owner, which may result in fines of up to \$2,000.

**Where can I get more information?**

- For more information about mosquito control and West Nile Virus, call 311 or visit <https://www.nyc.gov/health/wnv>.
- To register for updates on mosquito spraying, sign up for NotifyNYC (<https://a858-nycnotify.nyc.gov/notifynyc/>), follow the Health Department on X and Instagram @nycHealthy or visit <https://www.nyc.gov/health/wnv>.
- For more information about mosquito repellent, go to <https://www.nyc.gov> and search "insect repellent."
- To file a standing water complaint, go to <https://www.nyc.gov> and search "standing water" or call 311.
- For more information about West Nile virus, call 311, 24 hours a day, seven days a week, by dialing 311 or check the DOHMH Website at <http://www.nyc.gov/health/westnile>


## Appendix B

### Useful Links

- [City of New York: 311 Portal](https://portal.311.nyc.gov/) (https://portal.311.nyc.gov/)
- [City of New York: Notify NYC Information and Registration Page](https://a858-nycnotify.nyc.gov/) (https://a858-nycnotify.nyc.gov/)
- [City of New York: Local Law 37: Pesticides Used by City Agencies](https://www.nyc.gov/site/doh/health/health-topics/local-law-37.page) (https://www.nyc.gov/site/doh/health/health-topics/local-law-37.page)
- [City of New York: Local Law 71 - Cleaning Park Playground Equipment](https://codelibrary.amlegal.com/codes/newyorkcity/latest/NYCrules/0-0-0-119902) (https://codelibrary.amlegal.com/codes/newyorkcity/latest/NYCrules/0-0-0-119902)
- [NYC Department of Health and Mental Hygiene: Mosquito Control](https://on.nyc.gov/MSE) (https://on.nyc.gov/MSE)
- [NYC Department of Health and Mental Hygiene: Mosquito Information Page](https://nyc.gov/health/mosquito) (https://nyc.gov/health/mosquito)
- [NYC Department of Health and Mental Hygiene: West Nile Virus](https://www.nyc.gov/site/doh/health/health-topics/west-nile-virus.page) (https://www.nyc.gov/site/doh/health/health-topics/west-nile-virus.page)
- [NY State Department of Health: Mosquitoes and Disease](https://health.ny.gov/diseases/west_nile_virus/) (https://health.ny.gov/diseases/west\_nile\_virus/)
- [Center for Disease Control \(CDC\): West Nile Virus Information Page](https://www.cdc.gov/westnile/) (https://www.cdc.gov/westnile/)
- [U.S. Environmental Protection Agency: Protection against Mosquitoes, Ticks and Other Arthropods](https://epa.gov/insect-repellents) (https://epa.gov/insect-repellents)

Appendix C

Sample Public Facing Documents




## Public Notice

The New York City Health Department will use the pesticide DeltaGard® and/or Anvil® 10 +10 to reduce mosquitoes in your neighborhood.

**9/17/2020 (Or 9/21/2020 in case of inclement weather)**

**8:30 p.m. to 6:00 a.m.**



The map is an approximation of the area to be treated.

**Keep Yourself and Your Family Safe From Pesticides**  
The risks of pesticides applied by the Health Department for mosquito control to people and pets are low. Some people who are sensitive to spray ingredients may experience short-term eye or throat irritation, or a rash. People with asthma and other respiratory conditions may also be affected.


**During spraying:**

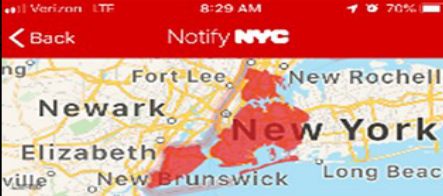
- Stay indoors, when ever possible. Air conditioners can remain on. While unnecessary, you may wish to close air conditioner vents, or choose the recirculate function.

**After spraying:**

- Wash skin and clothing exposed to pesticides with soap and water.
- Always wash homegrown fruits and vegetables with water.

If you experience serious reactions to a pesticide spraying, call your doctor or the NYC Poison Control Center at 1.800.222.1222.

 [nyc.gov/health/mosquito](http://nyc.gov/health/mosquito) 311




## Mosquito Aerial Larviciding

Notified 7/15/19 at 1:22PM

Weather permitting, the NYC Department of Health and Mental Hygiene will conduct aerial-based application of mosquito larvicide to help prevent West Nile Virus between 6 AM and 7 PM on 7/17 - 7/19. The alternate time frame is between 6 AM and 7 PM on 7/19 and 7/22 - 7/23. The application will be conducted in parts of the following Brooklyn, Queens, Staten Island and Bronx ZIP codes: 10303, 10314, 10305, 10306, 10308,


## GET RID OF STANDING WATER AROUND YOUR HOME

Prevent mosquitoes from breeding



Mosquitoes are more than an annoyance. They can spread disease. Mosquitoes need water to lay their eggs. Even very small amounts of water, in a space as small as a bottle cap, can serve as a breeding ground. Homeowners are required to remove all standing water from their property. Use this checklist to find and get rid of standing water around your home.

Potential Breeding Site	How to Fix
<input type="checkbox"/> Trash and garbage	Pick up all trash.
<input type="checkbox"/> Potted plants with saucers	Dump and clean saucers every three or four days. Do not overwater plants.
<input type="checkbox"/> Wading pools	Turn over wading pools when not in use.
<input type="checkbox"/> Bird baths	Clean and change bird bath water at least once a week.
<input type="checkbox"/> Flat roofs	Remove any standing water that collects on the roof.
<input type="checkbox"/> Rain gutters	Clean gutters in the spring and fall. Keep clear of debris and make sure water flows through.
<input type="checkbox"/> Air conditioner/HVAC runoff	Make sure runoff drains and does not collect beneath the unit.
<input type="checkbox"/> Pet dishes	Rinse twice a week.
<input type="checkbox"/> Ornamental ponds	Stock with fish, keep aerated or treat with Bti ( <i>Bacillus thuringiensis israelensis</i> ).



## FIGHT THE BITE

Protect Yourself Against Diseases Spread By Mosquitoes

## GLOSSARY

abamectin	a natural insecticide derived from the soil bacterium <i>Streptomyces avermitilis</i>
adulticide	a type of pesticide used to kill adult mosquitoes
<i>Aedes albopictus</i>	a day biting species of mosquitoes
<i>Aedes sollicitans</i>	a species of mosquito that breeds in salt marshes
Altosid®	brand name of methoprene, a type of larvicide
arbovirus	shortened term for arthropod-borne virus, a virus that is carried by arthropods
arthropod	a group of an animal that does not have a backbone and have jointed walking appendages, such as insects, spiders and lobsters
<i>Bacillus thuringiensis</i>	a bacterium; type of biological pesticide used to var. <i>israelensis</i> (Bti) mosquito larvae in water (mosquito larvae die after ingesting this bacterium); bacteria found in Mosquito Dunks®
biopesticides	naturally occurring substances that control mosquitoes and other pests by non-toxic mechanisms
bridge vector	an arthropod (in this case, a specific species of mosquito) that serves as a main transmission of virus between the reservoir (birds) and humans.
catch basins	grates seen at street corners and in other properties for water runoff
<i>Culex pipiens</i>	a species of mosquito, the primary vector for West Nile virus, commonly found in urban areas; breeds in fresh, but stagnant water, such as backyard containers and storm drains
DEET	DEET (chemical name, N,N-diethyl-meta-toluamide) is the active ingredient in many insect repellent products
DeltaGard®	a pyrethroid-based pesticide for adult mosquito control
Deltamethrin	an insecticide belonging to the pyrethroid family
Duet®	a pyrethroid-based pesticide for adult mosquito control
Eastern Equine Encephalitis (EEE)	mosquito-borne viral disease that causes inflammation of the brain; similar to West Nile
encephalitis	inflammation of the brain, which can be caused by numerous viruses and bacteria, including West Nile virus
Environmental Impact Statement (EIS)	a document that describes the impact on the environment from a proposed action (in this case, the application of

	pesticides to control adult mosquitoes).
fathead minnows	a species of temperate freshwater fish belonging to the genus <i>Pimephales</i> , commonly used as a baitfish in the USA.
gravid traps	mosquito traps designed to attract pregnant female mosquitoes Guillain-Barré syndrome an uncommon sickness of the nervous system in which a person's own immune system damages the nerve cells, causing muscle weakness, and sometimes, paralysis.
Interactive Voice System	an automated telephone system by which information can be accessed by choosing from a set of options
IR3535	IR3535 (3-[N-Butyl-N-acetyl]-aminopropionic acid, ethyl ester) is the active ingredient in many insect repellent products
larvae	immature mosquitoes that live in water; stage which hatches from the egg, prior to adult stage
larvicide	a type of pesticide used to control immature or larval mosquitoes
light traps	mosquito traps outfitted with a light to attract mosquitoes
<i>Lysinibacillus sphaericus</i>	a bacterium; type of biological pesticide used to control mosquito larvae in water (mosquito larvae die after ingesting this bacterium)
meningitis	inflammation of the lining of the brain and spinal cord that can be caused by a virus or bacteria
methoprene	a type of (synthetic) insect growth regulator used to control larval mosquitoes; it prevents mosquito larvae from emerging and developing into adult mosquitoes
Merus™	a botanical pesticide based on the active ingredient pyrethrin
mosquito breeding site	a location where mosquitoes lay eggs, usually in stagnant water with organic material
mosquito pools	a group of mosquitoes of the same species, collected in given area and combined at the laboratory for testing for the presence of West Nile and related viruses
naled	an organophosphate pesticide used to control adult mosquitoes
neurology	the study of the nervous system and its disorders
outbreak	an unexpected increase in frequency or distribution of a disease
permethrin	a synthetic pyrethroid pesticide used to control adult mosquitoes; active ingredient in the product Biomist®
pesticide	substance used to kill pests such as insects, mice and rats; an insecticide is a form of pesticide
picaridin	(chemical name, 1-Piperidinecarboxylic acid, 2-(2-hydroxyethyl)- 1-methylpropylester) is the active ingredient in many insect repellent products
piperonyl butoxide	An additive to pyrethroid pesticides that improves the effectiveness of the active ingredient

pyriproxyfen	An insect growth regulator that mimics juvenile hormone in insects and disrupts normal development, preventing mosquito larvae from maturing into adults
ReMoa Tri®	A new adulticide under trial in NYC. This pesticide has three active ingredients: 0.5% abamectin, 4% fenpropathrin (a pyrethroid), and 1% C8910. Abamectin, a microbial product with antiparasitic properties, is currently used in humans and animals. C8910, a novel fatty acid, repels at low doses and is lethal at higher doses, impacting mosquito respiration.
salt marsh	areas of vegetation in bodies of saltwater that may support the breeding of certain types of mosquitoes such as <i>Aedes sollicitans</i> ; example of salt marshes is Jamaica Bay.
sentinel	an early warning system, in this case, for the presence of virus (e. g., sentinel chickens)
serologic	of, or relating to, serum
source reduction	the removal or reduction of larval mosquito habitats
St. Louis encephalitis (SLE)	mosquito-borne viral disease that causes inflammation of the brain; very similar to West Nile virus
Sumilarv®	A commercial mosquito larvicide containing the active ingredient pyriproxyfen, an insect growth regulator (IGR). It is commonly used in catch basins and other breeding sites as part of resistance management strategies due to its different mode of action compared to microbial larvicides.
sumithrin	a synthetic pyrethroid pesticide used to control adult mosquitoes; active ingredient in the product Anvil 10+10®
VectoBac	brand name for the larvicide <i>Lysinibacillus thuringiensis</i> var. <i>israelensis</i> ( <i>Bti</i> )
VectoLex	brand name for the larvicide <i>Lysinibacillus sphaericus</i>
VectoMax	brand name for the larvicide based on mixture of <i>Bacillus sphaericus</i> and <i>B. thuringiensis</i> var. <i>israelensis</i> ( <i>Bti</i> )
vector	an organism (an insect in most cases) capable of carrying and transmitting a disease-causing agent from one host to another
viral encephalitis	inflammation of the brain caused by a virus, such as West Nile virus
Zika virus	a mosquito-borne flavivirus that was first identified in Uganda in 1947. In October 2015, Brazil reported microcephaly in infants of pregnant women infected with Zika virus.

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