

COMPREHENSIVE MOSQUITO SURVEILLANCE AND CONTROL PLAN

2003



The City of New York
DEPARTMENT OF HEALTH AND
MENTAL HYGIENE

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Comprehensive Mosquito Surveillance and Control Plan 2003

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EXECUTIVE SUMMARY

In 1999, New York City experienced an outbreak of illness, including encephalitis, caused by West Nile (WN) virus, a mosquito-borne virus never before detected in the Western Hemisphere. Among City residents, the outbreak resulted in 44 hospitalized cases, including 4 fatalities. In 2000, bird and mosquito surveillance data indicated that WN virus had become established throughout much of the northeastern United States. In New York City during 2000, WN viral activity in birds and mosquitoes was most intense on Staten Island, where 10 of the City's 14 human cases occurred. WNV appeared again in New York City in 2001, causing 7 hospitalized cases of encephalitis or meningitis and 2 milder human infections (West Nile fever) that did not require hospitalization. In 2002, there were 28 cases of West Nile encephalitis or aseptic meningitis, and one case of West Nile fever in New York City. Over the past four mosquito seasons, WN virus has spread throughout much of the United States, and last year was responsible for more than 4000 human cases of West Nile infection in 40 states, 240 human deaths along with thousands of horse and bird deaths.

The Department of Health and Mental Hygiene (DOHMH) has analyzed the previous year's surveillance and control efficacy data in order to better prepare for the upcoming mosquito-breeding season. To ensure a coordinated approach in 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 other State and Federal partners, along with many local organizations. Several New York City agencies have been crucial to the planning process, including the Mayor's Offices of Operations and Environmental Coordination, New York City Office of Emergency Management, and the Departments of Environmental Protection, Parks and Recreation, Sanitation, Police, Citywide Administrative Services, Information Technology and Telecommunications and the Housing Authority.

Key to DOHMH's planning efforts is a primary emphasis on prevention. DOHMH continues to devote 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 disease caused by mosquitoes through aggressive source reduction and larviciding. Should surveillance findings indicate that a substantial risk exists for WNV transmission to humans, adult mosquito control will be considered.

Surveillance data collected in 1999-2002 demonstrate that WN virus can be detected in birds and mosquitoes weeks before there is a significant risk to human health. Therefore, the tracking of dead bird reports, especially crows and blue jays, and the routine surveillance of mosquito populations will provide the City the opportunity to specifically target those neighborhoods and communities where virus is reappearing. 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.

Although mosquitoes are most active in New York City from June through October, our strong mosquito prevention, surveillance, and control efforts are year-round activities. The current Comprehensive Mosquito Surveillance and Control 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 by these diseases. The comprehensive nature of the plan ensures the efficacy of the control measures while minimizing adverse impacts to the environment and human health from these measures. The plan includes the following components:

Public Education and Community Outreach

Through the media, advertising, presentations to community groups and collaboration with community boards and elected officials, the Office of Communications will increase public awareness of mosquito-borne disease risk, surveillance, prevention and control. If surveillance data indicate an increased 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. Communications 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.

Host Surveillance

Animals will be monitored for infection and illness, with a focus primarily on dead birds, especially crows. DOHMH's Office of Vector Surveillance and Control (OVSC) in collaboration with the Office of Veterinary and Public Health Services (VPHS) will monitor disease among domestic animals, particularly horses. The public will be asked to report dead birds through DOHMH's telephone information line (1-877-WNV-4NYC) and via DOHMH's enhanced WN virus web site (nyc.gov/health). Broadcast alerts will be sent at the beginning of the season to all veterinarians in New York City. Veterinarians will be requested to report any suspected animal cases with neurological illnesses to DOHMH.

Human Surveillance and Provider Education

A system for detecting mosquito-borne diseases among humans will include active monitoring for suspected cases of viral encephalitis and aseptic meningitis in hospitals and laboratories. Broadcast alerts will be sent at the beginning of the season and periodically throughout the season to all hospitals in New York City. DOHMH's

laboratories will test blood and cerebrospinal fluid samples submitted by health care providers for WN virus and other mosquito-borne viruses, as indicated. Health care providers play a critical role in the detection, prevention and clinical management of mosquito-borne diseases. The Communicable Disease Program will continue its efforts to educate New York City health care providers regarding diseases transmitted by mosquitoes, especially WN virus, and encourage rapid reporting of suspected cases of encephalitis and other communicable

Mosquito Surveillance

DOHMH's Office of Vector Surveillance and Control will monitor mosquitoes citywide by collecting larval and adult mosquitoes to determine the distribution, abundance and species composition. DOHMH will continue to test adult mosquitoes collected in New York City for WN virus at its own laboratories. With testing taking place locally, the time it will take to get results should be significantly reduced. This will allow for increased public education, more focused mosquito breeding reduction activities as well as more targeted control of larval and adult mosquitoes in area with increased viral activity.

Larval Mosquito Control

DOHMH will reduce mosquito breeding through aggressive elimination of standing water and application of larvicide to sites that cannot be emptied or drained. Through a public information campaign, DOHMH will urge residents to reduce breeding sites around their homes and commercial properties and to report potential mosquito-breeding sites. 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 aggressively enforce the health code that 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, including catch basins citywide. Whenever WN virus is detected in an area, DOHMH will increase public education, breeding site reduction and larviciding.

Adult Mosquito Control

A timely and appropriate response to mosquito, bird, mammal and human surveillance findings is key for 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 suggest 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 abundance and distribution, mosquito species composition, persistence of WNV activity, weather, time of year, and the proximity to human populations will be 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

In 2001, DOHMH completed a comprehensive environmental impact study on the pesticides used for adult mosquito control. The 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 West Nile Virus or other mosquito-borne illness. 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 will monitor the adverse health effects associated with the application of pesticides for adult mosquito control.

Research and Evaluation

DOHMH will conduct research to better understand the mosquito ecology in New York City and how WN virus and other mosquito-borne viruses are maintained in our environment. Furthermore, DOHMH will continue to evaluate more specific bird, mammal and mosquito surveillance indicators that signal a threat to human health and to assess the efficacy of larval and adult mosquito control.

INTRODUCTION

In late August 1999, the New York City Department of Health and Mental Hygiene (DOHMH) detected an unusual cluster of encephalitis cases in northern Queens. This was due to West Nile virus (WNV), a mosquito-borne virus that had not been recognized in the Western Hemisphere prior to 1999. In 1999, the outbreak resulted in 44 hospitalized cases among City residents, including 4 fatalities.

During the following summer of 2000, WN virus activity was again detected in the City. There were fourteen hospitalized cases of West Nile encephalitis or meningitis in the city, including one fatality. In addition, 176 birds, 170 mosquito pools, 10 horses and 1 squirrel from New York City tested positive for WN virus, with the majority of positive findings on Staten Island. Outside of New York City, WN virus was detected in 12 states and the District of Columbia.

WN virus appeared again in New York City in 2001, causing 7 hospitalized cases of encephalitis or meningitis and 2 cases of West Nile fever that did not require hospitalization. No fatalities attributable to WN virus occurred in New York City in 2001.

In 2002, WN virus caused 28 cases of encephalitis or meningitis and one non-hospitalized case of West Nile fever. Among these 29 human WN virus infections were three fatalities. In 2002, WN virus continued its spread through the continental United States. WNV activity was reported from 44 states and the District of Columbia. There were 4161 reported cases of human WN virus associated illness in 2002 including 277 deaths (as of 3/20/2003).

The 2002 WN virus epidemic in the United States was the largest documented arboviral meningoencephalitis epidemic in the Western Hemisphere. New routes of human transmission were documented including WNV transmission through organ transplantation, blood and blood product transfusion, to one infant via breast milk and to one fetus via intrauterine infection.

The considerable and rapid spread of the virus throughout the county in 2002 has provided ample evidence that WN virus is permanently established within the northeastern United States. With this establishment of WN virus throughout the City and the region having a routine, year-round Integrated Mosquito Management (IMM) program has become a necessity.

There are two probable mechanisms for WN virus overwintering within the City. The principle enzootic vector, *Culex pipiens*, overwinters in the adult stage; and it is believed that, at least, some infected mosquitoes successfully survive the winter. Alternatively, infected birds that remain in the area may harbor the virus throughout the winter months.

As spring returns, the virus recrudescens within the birds and is readily passed to early season mosquitoes. Hence, a small number of infected mosquitoes and/or birds are present within the City during the early spring months. At this time, the virus begins its amplification cycle. As mosquitoes feed on birds, the virus is transmitted back and forth between the vector and the reservoir host populations allowing an increasing number of birds and mosquitoes to become infected. If environmental conditions are optimum for transmission, the virus amplifies to a theoretical point of “spill over”. At this point in the amplification cycle, the virus bridges out of the enzootic, bird-mosquito cycle via bridge vectors. Bridge vectors are mosquito species that readily feed on humans and other mammals. It is at this point in the season, that transmission to humans occurs and when management actions are most critical.

An effective surveillance and control program should be able to detect virus during the amplification cycle prior to bridge vector involvement allowing for targeted, effective control of the mosquito population. Historically, the American crow, *Corvus brachyrhynchos*, has been the most sensitive indicator of viral activity. Typically, infected crows can be found a month or more prior to human transmission. As the viral amplification continues, infected mosquitoes are usually found several weeks before WN virus is detected in humans. Eventually, active surveillance will detect viral presence in the bridge vectors and finally in humans and other mammalian hosts. The goal of DOHMH’s vector surveillance program is to detect the virus in local bird and mosquito populations before sufficient amplification of the virus can occur, so that management practices can be implemented thereby reducing the number of infected mosquitoes and 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 Federal Centers for Disease Control and Prevention (CDC); the New York State Departments of Health (NYSDOH), Environmental Conservation (NYSDEC) and Agriculture and Markets; and New York City agencies, including the Mayor’s Offices of Operations and Environmental Coordination, New York City Office of Emergency Management and the Departments of Environmental Protection, Parks and Recreation, Sanitation, Police, Citywide Administrative Services, Information Technology and Telecommunications and the Housing Authority; along with other partners.

PUBLIC EDUCATION & COMMUNITY OUTREACH

Objective

To increase public awareness of mosquito-borne diseases and surveillance, prevention and control techniques and activities

Background

In 2000, DOHMH launched a public education campaign to increase awareness of WN virus. This campaign highlighted the need for New Yorkers to take personal protective measures against mosquito bites and to eliminate mosquito-breeding sites around their homes. With the theme *Mosquito-Proof NYC*, a poster campaign in English and Spanish appeared from May to October in New York City's mass transit system. Similar messages were also aired on television and radio. DOHMH developed 16 fact sheets and made information available in 17 languages to community boards, elected officials, schools, community-based organizations, and the general public. In subsequent years, DOHMH staff has made hundreds of presentations to various community gatherings.

DOHMH's toll-free West Nile Virus Information Line in English and Spanish (1-877-WNV-4NYC/968-4692), which uses an Interactive Voice Response System (IVR). Callers receive comprehensive information about the virus, including updated information about adulticiding schedules. During peak summer months, the IVR is expanded so that callers have the option of speaking to a live operator from 8 a.m. until 5 p.m. on weekdays and on weekends.

DOHMH also provides information on WN virus through its web site (nyc.gov/health/wnv) in the form of fact sheets, press releases, adulticiding schedules, and maps. This information is regularly faxed to City agencies, elected officials, community boards, the Department of Education, hospital, nursing homes, associations of green grocers, day camps, and community organizations.

Adulticiding information is made available through DOHMH's web site and phone line, regular news broadcasts, scheduled advertising times on local radio, print media, and web sites of news organizations.

Planned Activities

The following key messages will be communicated:

- 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 WN virus 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 a telephone information line (1-877-WNV-4NYC) and via DOHMH's enhanced Web site (nyc.gov/health). The public will be advised to eliminate standing water sites (tires, buckets, and other water-holding objects) where mosquitoes can breed 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 Office of Communications will increase public awareness about the nature of mosquito-borne diseases and the signs and symptoms of WN virus (headache, high fever, muscle pain, weakness and disorientation).
- The public will be informed about the proper personal protective measures to avoid mosquito bites such as ensuring that screens fit tightly on doors and windows, wearing protective clothing during peak mosquito activity (long pants, long-sleeved shirts, and socks) and appropriate use of insect repellents.
- The public will be informed about the importance of reporting dead birds to DOHMH for surveillance purposes, although it will also be made clear that the City does not pick up all dead birds that are reported. Information about the species being prioritized for testing, how to properly dispose of birds not being retrieved by the City, and the role that birds (especially crows) have in the transmission cycle of WN virus will be disseminated.
- If the application of pesticides to control adult mosquitoes becomes necessary, the public will be informed in a timely way to reduce direct exposure to pesticides. The public will also be given detailed information about the pesticides being used and the potential risks associated with exposure. The public will be encouraged to contact the Poison Control Hotline (212-POISONS/764-7667 or 1-800-222-1222) with any reported exposures.
 - Fact sheets in several languages distributed to community-based organizations, community boards, elected officials, schools, elder care facilities, libraries, outdoor activity sites, and many other organizations city-wide
- An automated, toll-free West Nile Virus Information Line (1-877-WNV-4NYC) will be regularly updated. Starting in first week of June, live operators will be available weekdays from 9 a.m. to 7 p.m.
- DOHMH's web site (nyc.gov/health), which will be regularly updated and, beginning in April, the public can use web-based forms for reporting dead birds and standing water.
- Regular updates to elected officials and community boards, who are essential to

the City's communication activities about WN virus activity. Presentations, available in multiple languages by DOHMH staff to community boards and a wide variety of organizations, that will provide information about mosquito breeding reduction and related DOHMH activities

- Press releases regarding all activities and working closely with media to achieve accuracy of the WN virus coverage.
- In the event adulticiding is necessary:
 - Information will be released at least 24 hours in advance through the media, web site and West Nile Virus Information Line, and to hospital emergency departments, pertinent City agencies, elected officials, community boards, the Department of Education, nursing homes, associations of green grocers, day camps, and community organizations. Under certain conditions and with the approval of the NYSDOH, applications in green areas may take place with less than the required 24-hour notice. For these cases, the facility will be closed to the public during and a few hours after the application of adulticide.
 - If necessary, the availability of live operators on the West Nile Virus Information Line will be expanded.
 - Police Department escorts will accompany the applicator's trucks to announce that adulticiding is about to take place, and will urge people to go indoors to reduce exposure to pesticides.

HOST SURVEILLANCE

Objective

Utilize data on bird and mammal mortality associated with West Nile Virus as a means of early detection of West Nile Virus activity in the City in order to predict the spread of the disease before the onset of human illness.

Background

Many species of birds have tested positive for WN virus, however crows and blue jays continue to be the birds most susceptible to the disease. Consequently, these species are most closely monitored by DOHMH and State agencies. In 2002, over seven percent of the approximately 7,252 dead birds reported to DOHMH were crows. Of the 1,199 dead birds submitted by DOHMH and other organizations to NYSDEC, NYSDOH, and Centers for Disease Control (CDC) and the Wildlife Conservation Society for testing, 140 birds tested positive. Forty one percent of these positive dead birds were crows.

There will be no live bird surveillance conducted by DOHMH in 2003 as evidence suggests that it may have limited use as an early warning system for human disease in New York City. Mammals are not as sensitive to WN virus as birds. In 2001 and 2002, no mammals tested positive for WN virus in New York City. DOHMH's animal surveillance efforts have been assisted by a number of partner organizations, including the New York City Department of Parks and Recreation, the New York State Department of Agriculture and Markets, the Animal Medical Center, the Staten Island Zoo, and the Wildlife Conservation Society. In the future DOHMH will continue to ask veterinarians and other animal specialists to monitor for unusual illness and death among mammals.

OVSC will continue tracking dead birds, as this type of surveillance has shown promise for predicting the spread of WN virus. In addition, certain species of mosquitoes feed primarily on birds, cycling the virus between the two populations. Testing birds for WN virus is therefore particularly important for monitoring and subsequent control of mosquito-borne diseases.

Planned Activities

- Beginning in April, DOHMH will ask the public to report via a telephone information line (1-877-WNV-4NYC) and the DOHMH web site (nyc.gov/health) the number, location, and types of dead birds they find. This information will be collected 24 hours a day, 7 days a week.
- DOHMH will use WN virus positive bird reports as early indicators of WN virus activity. Particular attention will be placed on the number of infected birds.

- Beginning June 1, 2003 birds (with the exception of pigeons) that have recently expired will be retrieved when DOHMH is able to confirm the location of the bird with the reporting party and can gain access for pick-up. For those birds not retrieved by the City, the public will be advised to discard them safely. Although all birds may not be picked up, the reported dead bird information will be used by the Department to enhance its disease surveillance program.
- An appropriate sample of dead birds, especially crows and blue jays that have died within the previous 24 hours, will be submitted for testing. DOHMH's laboratory will conduct testing for WN virus, and a selection of birds will be sent to New York State for confirmatory testing.
- In May, DOHMH will ask veterinarians to enhance surveillance for encephalitis and other mosquito-borne diseases in vertebrates, especially in mammals such as horses, dogs, and cats, and to report suspected infections to DOHMH.

HUMAN SURVEILLANCE AND PROVIDER EDUCATION

Objective

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

Background

During 1999-2001, 67 New York City residents were hospitalized with encephalitis or aseptic meningitis due to WN virus. West Nile was responsible for five human deaths in the City over these three mosquito seasons. The epicenter in 1999 was northern Queens, and in 2000 was Staten Island; in 2001 there was no clear epicenter. Most of the hospitalized cases occurred in elderly persons (1999-2001: median age 69 years, range 5-90 years). However, serosurveys performed in Queens (1999) and Staten Island (2000) indicated that approximately 140 asymptomatic or subclinical WN virus human infections probably occurred for every one hospitalized case.

In 2002, 28 New York City residents had WN encephalitis or aseptic meningitis: 12 from Queens, 8 from the Bronx, 4 from Staten Island, 2 from Brooklyn, 1 from Manhattan, and 1 homeless. Ages ranged from 22-86 years with a median age of 72 years. Nineteen cases occurred in men and 9 cases occurred in women. These 28 cases included three deaths. The median age of the fatalities was 75 years and the case fatality rate was 10%. In addition, there was one case of West Nile fever in New York City in 2002: a 48-year-old female from the Bronx.

As part of an active surveillance and provider education program, DOHMH's Bureau of Communicable Disease has made more than 100 slide presentations to health care providers. Broadcast alerts are issued via e-mail and fax to all NYC hospitals, encouraging immediate reporting of suspected cases of encephalitis and aseptic meningitis from June 1 through October. Providers and laboratory personnel are also instructed on how to submit specimens for WN virus testing to DOHMH's laboratories through these same outreach methods.

In 2002, DOHMH conducted active physician-based surveillance at 16 sentinel hospitals (with regular phone calls to infectious disease, and neurology sub-specialists) and active laboratory-based surveillance at 6 sentinel laboratories to ascertain potential cases that might not be reported by physicians.

Serologic testing for arboviral causes of encephalitis and meningitis continued at DOHMH's Public Health Laboratory. The laboratory performs tests for antibodies to WN virus and St. Louis encephalitis (SLE). Positive specimens are sent for confirmation by plaque reduction neutralization testing to the NYSDOH and the CDC if appropriate. Cerebrospinal fluid specimens are also forwarded to the NYSDOH for testing by

polymerase chain reaction for other viruses that cause human encephalitis.

Planned Activities

- Beginning in June, DOHMH will implement enhanced surveillance for WN virus encephalitis (all ages), acute flaccid paralysis with fever (all ages) and viral meningitis (especially in adults).
- In early June, DOHMH will request by broadcast facsimile and e-mail that physicians city-wide report immediately all suspected cases of viral encephalitis, acute flaccid paralysis with fever, and adult cases of viral meningitis and submit appropriate laboratory samples to determine if the cause is a mosquito-borne virus.
- From June through October, regular broadcast facsimile and e-mail updates will be sent to all City hospitals and infectious disease specialists regarding the importance of reporting suspected cases of encephalitis, meningitis and acute flaccid paralysis with fever. DOHMH will provide the criteria for reporting and submission of appropriate laboratory specimens for WN virus testing. To maintain physician awareness throughout the mosquito season, these alerts will be sent at least monthly with updated information on WN virus activity.
- DOHMH's laboratory will conduct diagnostic testing for WN virus and other mosquito-borne viral causes of encephalitis and meningitis, as indicated.
- DOHMH will work closely with NYSDOH and CDC to ensure that surveillance information is standardized and remains confidential.
- DOHMH will conduct health care provider education to increase knowledge about the proper detection, prevention and clinical management of mosquito-borne diseases and other types of encephalitis and meningitis. Presentations will be made at local hospitals and to specialty societies as requested. Also, DOHMH will provide educational opportunities on mosquito-borne diseases through its Continuing Medical Education and Continuing Nursing Education programs.
- The Bureau of Communicable Disease will work with other agencies to ensure that any case of West Nile infection in a person who has received or donated blood products or organs is rapidly investigated and reported so that other affected blood products or organs can be promptly identified and withdrawn before they are used.

MOSQUITO SURVEILLANCE

Objective

To monitor the seasonality and abundance of mosquito populations and detect the presence of WN viruses

Background

Mosquitoes were collected weekly from mosquito traps at 96 locations throughout New York City in 2002. Of the more than 7,500 mosquito pools submitted to the Public Health Laboratories, New York City for testing, 197 tested positive. *Culex pipiens* was identified as the primary enzootic vector of WN virus from 1999-2002 based upon the number of positive pools. In addition, WN virus was found in 12 other species of mosquitoes in New York City (i.e., *Aedes vexans*, *Aedes albopictus*, *Anopheles punctipennis*, *An. quadrimaculatus*, *Cx. restuans*, *Cx. salinarius*, *Ochlerotatus cantator*, *Oc. Sollicitans*, *Oc. triseriatus*, *Oc. trivittatus*, *Psorofora ferox* and *Uranotaenia sapphirina*).

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

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.
- Larval habitat information will be collected and updated throughout the season.
- From June to October, DOHMH will trap adult mosquitoes at more than 40 locations that have had prior WN virus activity throughout the 5 boroughs. The trapping season may be lengthened or shortened depending on the weather.
- Mosquitoes will be collected using CDC miniature light and gravid traps on a weekly basis. Each trap collection will be sorted by species of mosquitoes collected. Information on the location, collection date, trap type and the total

number female mosquitoes will be recorded.

- Adult mosquito trapping will be expanded in areas where WN virus is detected in mosquitoes, birds, other animals, and humans. This will help determine a zone of potential local transmission and guide interventions.
- 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.
- The DEP will continue to use mosquito magnet traps to survey and control adult mosquitoes at wastewater treatment plants. Additionally, DOHMH will place mosquito magnet traps to survey and control adult mosquitoes in the Rockaway Peninsula.

LARVAL MOSQUITO CONTROL

Objective

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

Background

All mosquitoes begin their life in water. *Culex pipiens*, a primary enzootic vector of WN virus and one of the most common mosquitoes found in northern urban areas, breed quickly and use standing or slow-moving water containing decaying organic materials to lay their eggs. Prime breeding sites include discarded tires left outdoors, poorly maintained bird baths, clogged rain gutters, unused swimming and plastic wading pools, pots and pans with standing water, and puddles that last for a week or more. Eliminating 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 and buildings to determine if conditions are conducive to mosquito breeding and endeavor to eliminate those conditions. Mosquito breeding can be prevented by either eliminating the standing water (source reduction), or if that is not possible, treating the water with larvicide to prevent mosquitoes from developing.

DOHMH's public education campaign emphasizes the need for New Yorkers to eliminate mosquito-breeding sites around their homes. From April to October 2002, DOHMH received 2,138 complaints of standing water through the City's West Nile Virus Information Line, on DOHMH's web site, and from elected officials and community groups. The NYC DOHMH responded to and acted upon each of the complaints. Additional sites were handled by other City agencies. Every report led to a letter being sent to the property owner regarding the need to eliminate mosquito-breeding sites. In order to respond to egregious conditions, the Board of Health adopted a resolution that made standing water a public health nuisance and allowed for the issuance of Notice of Violations to unresponsive property owners.

DOHMH will conduct extensive 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 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 potential breeding sites for mosquitoes, and has expanded the use of mosquito larvae-eating fish at DEP wastewater treatment plants. Approximately 135,000 catch basins across the City will be inspected and/or treated at least twice each season by hand application of larvicides. In areas that are inaccessible by ground vehicles, larvicide may be applied aurally.

The larvicides most commonly used in New York City are VectoLex (*Bacillus sphaericus*), VectoBac (*Bacillus thuringiensis* var. *israelensis* (Bti) and Altosid (methoprene). *Bacillus sphaericus* and *Bacillus thuringiensis* var. *israelensis* are naturally occurring soil bacteria that produce toxins that cause disease in mosquito larvae. These products are considered ideal for mosquito management because of their specificity to mosquitoes and because of their lack of toxicity to humans or the natural enemies of mosquito larvae. These bacteria form asexual reproductive cells, called spores, which enable them to survive in adverse conditions. They also produce unique crystalline bodies. When eaten, the crystalline bodies dissolve in the intestine of the larvae and paralyze the cells in the gut, interfering with normal digestion and triggering the larvae to stop feeding. The spores can then invade other tissues, multiplying in the larva's blood, until the insect dies. Death typically occurs within a few hours of ingestion. Altosid is an insect growth regulator that interferes with the development cycle of mosquitoes and other aquatic dipteran.

Planned Activities

- Under the direction of the Mayor's Office of Operations WN virus Task Force, OVSC and other City agencies have identified areas of standing water associated with surface grading problems, road construction, clogged sewers and catch basins, obstructed waterways, etc. that are serving as mosquito-breeding habitat. These areas will be remediated as they are identified.
- The WN virus Task Force will work with large-property owners and managers. They will be informed of the need to eliminate mosquito-breeding sites on their property or to properly treat them with larvicide.
- 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.
- The public will be asked to help eliminate mosquito-breeding sites and to report standing water using a telephone information line (1-877-WNV-4NYC) and the DOHMH Web site (nyc.gov/health).
- OVSC will monitor 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.
- Beginning in May, larvicide will be applied at wastewater treatment plants, parks, and other surface waters. Applications will be made by hand, backpack or aurally via helicopter and continue to be applied as needed throughout the mosquito-breeding season.
- Beginning in July, larvicide will be applied to sewers and to more than 135,000

catch basins citywide. Applications will continue, based upon larval surveillance findings, as needed throughout the mosquito-breeding season.

- With the identification of an infected bird or mosquito in the area, OVSC staff will intensify larval control. Targeted neighborhoods will have expanded public outreach regarding breeding site elimination and personal protection; also community-specific media materials will be distributed.
- DOHMH will work with the Parks Department and other partners to ensure that green areas (e.g., parks, cemeteries, and golf courses) receive intensified mosquito prevention activity, especially in areas where infected dead birds or mosquitoes are found.
- The DEP will continue to use larvae-eating fish at wastewater treatment plants.
- DOHMH will again use VectoLex (*Bacillus sphaericus*), VectoBac (*Bacillus thuringiensis* var. *israelensis*, Bti) and/or Altosid (methoprene) to control mosquito larvae.
- DOHMH will provide “Mosquito Dunks” to property owners in cases where property owners are absent during inspection and where standing water is inaccessible. Property owners will be given clear written instructions on how to use the larvicide products and will be requested to return an enclosed form letter to DOHMH that will confirm that larvicide was applied to standing water as instructed.
- DOHMH will provide occupational safety and health training to all employees involved in mosquito surveillance and control operations. Additionally, DOHMH again will require that all employees of contracted vendors be provided with similar training as well as appropriate personal protective equipment.
- In July and August, New York City high school students (assigned to all 5 boroughs) will systematically canvas neighborhoods to increase public awareness of the need to eliminate breeding sites and ways to reduce the risk of mosquito bites.
- For residents conserving rainwater, OVSC recommends covering the barrels or other water holding devices with a tight-fitting lid or very fine mesh screen. Also, bacterial larvicides, containing Bti, can be placed in the barrels to control any mosquito larvae that may be developing.

ADULT MOSQUITO CONTROL

Objective

To reduce the abundance of WNV infected adult mosquitoes in targeted areas through the judicious use of pesticides

Background

Comprehensive vector, bird and human surveillance data collected during the last three seasons have allowed DOHMH to develop more sensitive surveillance criteria for determining the level of WN virus activity in birds and mosquitoes that indicate a significant risk for humans. DOHMH will monitor surveillance data on a citywide basis to identify areas at risk for human transmission.

The adulticides used during the last three seasons in New York City is Sumithrin. This product is a first-generation synthetic pyrethroid that has been used for more than 30 years. Sumithrin, similar to other pyrethroids, provides a rapid knockdown of adult mosquitoes. It exhibits very low mammalian toxicity, degrades very rapidly in sunlight, provides little or no residual activity, and does not bio-accumulates in the environment. This product is applied at very small quantities per acre and is therefore referred to as ultra low volume (ULV) application. ULV-delivery techniques minimize environmental impacts while effectively managing adult mosquito populations. DOHMH adulticide application operations are monitored by City, State and Federal officials to ensure compliance with all USEPA and NYSDEC regulations and requirements.

The presence of mosquito-borne pathogens in or near New York City will result in one or more responses or interventions by DOHMH. These interventions can range from routine continuing existing surveillance to, in worst-case scenarios, large-scale aerial application of adulticides. DOHMH will utilize its surveillance data to assess the risk of an outbreak of human disease and the need to apply pesticides in a limited and targeted area to control adult mosquitoes by considering habitat; time of year; weather conditions; the level of documented virus; the distribution, density, species, age and infection rate of the vector population; and the density and proximity of human populations to the vectors. The response of DOHMH will depend upon, but not be limited to: the intensity and persistence of pathogen activity, proximity of pathogen activity to human populations within the city, time of year, mosquito population density, and weather conditions. Because these conditions can vary greatly and cannot be predicted, a consultation process will be used to determine which, if any, responses are appropriate, on a case-by-case basis. The responses initiated by the DOHMH can be grouped into 3 broad categories or levels of risk.

Planned Activities

Level 1 – No Pathogen Detection

DOHMH *Responses*: 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 pathogens in mosquito populations or avian populations in or near New York City will result in a move to Level 2 responses.

DOHMH *Responses*: 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 recent findings. Surveillance programs will continue with the following added activities:

- CDC Light Traps will be added to the area of concern if additional surveillance data are required.
- Larval surveillance will be enhanced in affected areas if needed.
- Laboratory testing of mosquito pools will be given priority in bridge vector mosquito species (i.e. *Aedes* spp., *Ochlerotatus* spp., *Cx. salinarius*).
- Data from these additional traps and surveillance measures will aid in determining the extent of pathogen transmission and mosquito populations and 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 or near New York City will result in a move to Level 3 responses.

DOHMH *Responses*: 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 recent findings. Surveillance programs will continue as noted above. Control measures will be implemented.

- CDC Light Traps will be added to the area of concern if additional surveillance data are required.
- Larval surveillance will be enhanced in affected areas if needed.
- Laboratory testing of mosquito pools will be increased in bridge vector mosquito

species (i.e. *Aedes* spp., *Ochlerotatus* spp., *Cx. salinarius*).

- Control measures to be considered:
 - Application of larvicides (including aerial applications) to areas breeding large numbers of mosquitoes
 - Ground application of adulticides to immediate areas of concern
 - Aerial application of adulticides to broader areas, based upon surveillance data
 - Recommend the restriction and/or cancellation of outdoor evening activities
 - Recommend the closing of recreational areas
- Monitor the efficacy of the adulticiding activities.
- DOHMH will consider EPA and NYSDEC registered products for mosquito control that contain the following active ingredients: resmethrin, sumithrin, permethrin, dibrom or malathion. The City will continually review all of 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.
- 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 that will be used will be provided to the public, physicians and other health care providers.
- For quality assurance purposes, a private contractor, independent of the pesticide applicator, will provide guidance and assist with the technical elements of pesticide application so that operations are conducted according to plan and pursuant to applicable regulations.
- Adult mosquito control will be scheduled when mosquitoes are most active and when weather conditions are conducive to its success.
- Information will be released at least 24 hours in advance through the media, the DOHMH web site and West Nile Virus Information Line and pertinent City and community organizations.
- 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 may apply targeted adulticides in response to community concerns about nuisance mosquitoes on the Rockaway Peninsula.

SURVEILLANCE OF POTENTIAL ADVERSE HEALTH EFFECTS FROM PESTICIDE EXPOSURE

Objective

To perform passive and syndromic surveillance to monitor for possible adulticide exposure and the potential health sequelae due to adulticide exposure

Background

Since exposure to any pesticide has the potential to cause adverse reactions, particularly among those with pesticide sensitivity or respiratory conditions, DOHMH took care to provide advance notification in 2000, 2001, and 2002 whenever adulticide applications occurred. Prior to conducting adult mosquito control activities, information on pesticides was sent to all hospital emergency departments, which included product information on pesticides, Material Safety Data Sheets, and other information relevant to identifying possible exposures to pesticides. In 2000, calls to the New York City Poison Control Center (NYC PCC) were monitored during pesticide spraying and were subsequently forwarded to the New York State Pesticide Poisoning Registry (NYS PPR). Additionally in 2001, active surveillance was performed. In this regard, chart review was 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.

In 2002, calls placed to the NYC PCC continued to be monitored and forwarded to the NYS PPR. Based on the results of the active surveillance activities performed in 2001, no such activities were performed in 2002. However, in 2002, in addition to monitoring calls placed to the NYC PCC and forwarding them to the NYS PPR, syndromic surveillance was examined as a surveillance tool to identify any possible asthma cluster in zip codes in which a spray action occurred. If such a cluster had been identified, emergency department chart review would have been considered to investigate the possible etiology of that cluster. However, no such cluster was identified in 2002.

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, Material Safety Data Sheets, and other information relevant to identifying possible exposure to pesticides. Calls received by the New York City Poison Control Center (NYC PCC) will continue to be monitored during pesticide spraying and forwarded to the NYS PPR for possible follow-up and inclusion in

the Registry. Syndromic surveillance will also continue to be utilized to identify any possible asthma cluster in the zip codes in which spraying occurs. In the event that a possible asthma cluster is identified, emergency department chart review will be considered to investigate the possible etiology of that cluster at near by hospitals.

RESEARCH AND EVALUATION

Objective

To better understand the ecology of mosquito-borne diseases and to assess the effectiveness of DOHMH surveillance, prevention and control methods

Background

One of the most important roles of public health professionals is to assess the potential impact of a disease on a population and to devise safe and effective methods for reducing the risk of disease transmission. In order to make accurate predictions of risks associated with mosquito-borne disease, it is imperative to study the ecologic relationships among vectors, pathogens and hosts. DOHMH, in collaboration with CDC and NYSDOH, has closely studied the risk factors associated with WN virus. However, in order to understand these ecological relationships further, research needs to be conducted to address questions such as how the virus circulates in nature, host preference, and host feeding patterns in the vector population, and vector competence.

Furthermore, some of the control methods used for managing mosquito populations, especially the application of pesticides for adult mosquitoes, are not without potential impact. However, alternative control measures lack sufficient efficacy or environmental impact data to allow their wholesale integration into the City's IMM Plan. The environmental impact statement and other research endeavors are important tools used to assess potential adverse health effects associated with pesticide exposure. Additional research is needed in this area as well as in assessing improved techniques for larval and adult mosquito control in New York City.

Planned Activities

- DOHMH will continue to work closely with Federal, State, and Local partners to conduct research that will identify the most effective predictors of human illness due to WNV in New York City and the use of predictive dead bird cluster models.
- DOHMH in collaboration with the Connecticut Agricultural Experiment Station will survey hibernating mosquito populations in NYC to study the overwintering mechanism of WN virus.
- DOHMH will continue to refine the New York City-specific phased response for risk categories of mosquito-borne disease outbreaks based on the ongoing analyses of bird, mosquito, mammalian and human surveillance data.
- DOHMH will evaluate the most cost-effective methods of surveillance and control.

- DOHMH will research and evaluate the potential public health and environmental impact of the application of pesticides for adult mosquito control.
- In collaboration with CDC and NYSDOH, DOHMH will publish new and relevant information about mosquito-borne disease transmission in New York City in peer-reviewed public health and medical journals.
- DOHMH will conduct research to determine the blood feeding preference of mosquito vectors of WN virus in NYC using molecular techniques. This information will help determine what animals are the primary hosts and focus surveillance and control activities accordingly.
- DOHMH in collaboration with Cornell University will research and evaluate the development of resistance in mosquitoes due to the application of pesticides (microbial larvicides and adulticides).
- DOHMH in collaboration with University of Illinois will conduct an analysis to predict the risk of West Nile virus infections and the outcome of interventions in New York City using Spatial Statistics and Geographic Information Science (GIS).

APPENDIX A: QUESTIONS AND ANSWERS ABOUT WEST NILE VIRUS

Q: What is West Nile virus?

A: West Nile virus is a mosquito-borne virus that can infect humans, birds, horses, and other mammals. In humans, infection with the virus usually causes no symptoms at all or a mild, flu-like illness. However in some cases, particularly among the elderly, it can also cause more severe neurological disease such as encephalitis or aseptic meningitis. West Nile virus first appeared in North America in New York City in 1999. Since then, the virus has spread across the continental United States.

Q: How is West Nile virus spread?

A: West Nile virus is spread predominantly to humans by the bite of an infected mosquito. In 2002 other methods of human transmission were discovered. It has now been shown that West Nile virus can be transmitted to humans who receive infected organs through transplantation, or who receive transfusions of infected blood or blood products. Also, in 2002 there was one case of transmission a pregnant woman to her fetus and one case of probable mother-to-child transmission through breast-milk. West Nile virus is NOT spread by person-to-person contact such as touching, kissing, or caring for someone who is infected.

Q: Who is most at risk for getting West Nile encephalitis after being bitten by a WNV infected mosquito?

A: Persons older than 50 years of age have the highest risk of severe disease, such as encephalitis. It is unknown if immunocompromised persons are at increased risk for WNV disease.

Q: Where did the West Nile virus come from?

A: Outbreaks of the West Nile virus have occurred before in Africa, Egypt, Israel, Asia, Romania, Russia and France. Before 1999, the West Nile virus had never before been found in the Americas. The virus was most likely introduced by an infected bird or mosquito that was imported from a country where the virus is common.

Q: Can you get West Nile virus directly from birds?

A: Currently, there have been no reported cases of West Nile virus being spread directly from live or dead birds to the general public. However, dead birds can carry a variety of other diseases and should never be handled with bare hands. **Use gloves to carefully place dead birds in double-plastic bags and then place dead birds in the outdoor trash.**

Q: Besides mosquitoes, can you get West Nile virus directly from other insects or ticks?

A: Infected mosquitoes are the primary source of West Nile virus and caused the recent outbreaks in NYC. Although several types of ticks in Africa and Europe have been found infected with WNV, there is no information to suggest that ticks or other

insects in this country are able to transmit West Nile virus.

Q: What are the symptoms of West Nile virus?

A: Most people who are infected with West Nile virus either have no symptoms or experience mild illness such as fever, headache and body aches before fully recovering. Some persons may also develop mild rash or swollen lymph glands. In some individuals, particularly the elderly, West Nile virus can cause serious disease that affects brain and spinal tissue. Severe illness may include encephalitis (inflammation of the brain), meningitis (inflammation of the membrane around the brain), and acute flaccid paralysis (a polio-like syndrome in which muscles become very weak or paralyzed). Symptoms may include: headache, high fever, stiff neck, confusion, coma, tremors, convulsions, and muscle weakness or paralysis. At its most serious West Nile virus can cause permanent neurological damage and death.

Q: If a pregnant woman gets infected with West Nile virus, can it affect her fetus?

A: In 2002 there was one case of transmission of West Nile virus from mother to fetus during pregnancy. The newborn was infected with West Nile virus at birth and had severe medical problems, including abnormalities of the brain; however, it is unknown whether these problems are due to West Nile virus or some other cause. Pregnant women should take precautions to reduce their risk for West Nile virus infection by avoiding mosquitoes, wearing protective clothing and using insect repellents containing DEET. (Please see the DOHMH fact sheet on Insect Repellent Use & Safety for more information on DEET). When West Nile virus transmission is occurring in an area, pregnant women who have illness with fever should see their health care provider.

Q: How is West Nile encephalitis treated?

A: There is no specific therapy. In more severe cases, intensive supportive therapy is indicated, i.e., hospitalization, intravenous (IV) fluids and nutrition, airway management, ventilatory support (ventilator) if needed, prevention of secondary infections (pneumonia, urinary tract, etc.) and good nursing care.

Q: Is there a vaccine against West Nile virus?

A: No, but several companies are working towards developing a vaccine.

Q: How long does it take to get sick if bitten by an infected mosquito?

A: Most people who are infected with West Nile virus have no symptoms or experience only mild illness. If illness does occur, symptoms appear within 3 to 15 days of being bitten by an infected mosquito.

Q: What should I do if I think I have West Nile encephalitis?

A: You should seek medical care as soon as possible if you develop signs of encephalitis, with fever, muscle weakness, and confusion,

Q: What can I do to reduce my risk of becoming infected with West Nile virus?

A: From June through October, when mosquitoes are most active, take the following precautions:

- Wear protective clothing such as long pants and long-sleeved shirts during peak mosquito activity.

- Avoid shaded, bushy areas where mosquitoes like to rest.
- Limit outdoor evening activity, especially at dusk and dawn when mosquitoes are most active.
- Use insect repellent containing DEET (Please see DOHMH Fact Sheet on Insect Repellent Use and Safety).

Q: What can I do around my home to help reduce exposure to mosquitoes?

A: Mosquitoes lay their eggs in standing or slow moving water. Also weeds, tall grass, and bushes provide an outdoor resting place for mosquitoes. Mosquitoes breeding or resting on your property can then enter homes through unscreened windows or doors, or broken screens.

- Repair or replace all screens in your home that have tears or holes.
- Eliminate any standing water that collects on your property.
 - Remove all discarded tires from your property.
 - Dispose of tin cans, plastic containers, ceramic pots, or similar water-holding containers.
 - Make sure roof gutters drain properly. Clean clogged gutters in the spring and fall.
 - Clean and chlorinate swimming pools, outdoor saunas and hot tubs. If not in use, keep empty and covered.
 - Drain water from pool covers.
 - Change the water in birdbaths once each week.
 - Turn over plastic wading pools and wheelbarrows when not in use.
- Remind or help neighbors to eliminate breeding sites on their properties.

Q: What is the City doing to address the possible return of West Nile virus?

A: DOHMH, along with other City, State and Federal agencies, has developed a comprehensive plan to reduce the risk of illness due to West Nile virus. The main goal of this plan is to decrease the number of adult mosquitoes by eliminating their breeding sites wherever possible, and applying larvicides (to kill the immature larval form of the mosquito) to areas with stagnant water that cannot be drained completely. The City also will regularly test mosquitoes and birds for West Nile virus throughout the spring and summer. If West Nile virus is found at levels that indicate a threat to human health, local applications of pesticides may be undertaken to prevent people becoming infected.

Q: Is the City planning to apply pesticides as was done previously?

A: If West Nile virus is detected in the community, the City's initial response will be to intensify its efforts to reduce mosquito-breeding sites and increase its levels of larviciding in those areas in which WN virus has been found. Reducing the adult mosquito population with pesticides (adulticides) approved by the US Environmental Protection Agency (EPA) will be done if necessary to prevent human illness. The decision to spray, either on the ground or by air, will be based on surveillance information and the documentation of West Nile virus activity at a level that indicates a threat to human health. Adulticiding will be concentrated in areas most at risk for disease occurrence.

Q: What health risks are posed to people and pets from pesticides for adult mosquitoes?

A: In the amounts used, risks to people and pets are relatively low. However, some people may be more sensitive to such pesticides and may want to reduce their chance of exposure by following the suggestions below. Anyone that thinks they are experiencing persistent or significant adverse reactions to pesticides should seek medical care or call the NYC Poison Control Center at (212) POISONS or (212) 764-7667.

Q: Will the public be notified in advance about spraying activities?

A: Residents can learn about adulticiding schedules in advance through public service announcements, the media, the City's website (nyc.gov/health), and a telephone information line (1-877-WNV-4NYC).

Q: If the City sprays pesticides for adult mosquitoes, what can I do during spraying to reduce the risk of exposure to pesticides?

A: If spraying becomes necessary, the NYC DOHMH recommends that all individuals take the following precautions to avoid direct exposure to pesticides and reduce the risk of reactions:

- Some individuals are sensitive to pesticides. Persons with asthma or other respiratory conditions are especially encouraged to stay inside during spraying since there is a possibility that spraying could worsen these conditions
- Air conditioners may remain on. But if you wish to reduce the possibility of exposure to pesticides, set the air conditioner vent to the closed position, or choose the recirculate function
- If you wish to minimize your risk of exposure to pesticides, you may want to bring children's toys, outdoor equipment and clothes from outdoor areas inside during spraying.
- If outdoor equipment and toys are exposed to pesticides, they may be washed with soap and water to reduce the possibility of exposure
- Wash skin and clothing exposed to pesticides with soap and water.

Anyone experiencing adverse reactions to pesticides should seek medical care or call the NYC Poison Control Center at (212) POISONS or (212) 764-7667.

Q: If I live in an area where birds or mosquitoes with West Nile virus have been reported, and a mosquito bites me, am I likely to get sick?

A: No. Evidence indicates that the chance of human infection and illness resulting from West Nile virus is quite low. In addition, the greatest risk is to those over age 50, particularly the elderly. These members of the population should take the greatest care to prevent exposure to mosquito bites.

Q: I've gotten a mosquito bite. Should I be tested for West Nile virus?

A: No. Illnesses related to mosquito bites are still uncommon. However, you should see

a doctor immediately if you develop symptoms such as high fever, confusion, muscle weakness, severe headaches, and stiff neck or if your eyes become sensitive to light. Patients with mild symptoms should recover completely and do not require any specific medication or laboratory testing.

Q: Should I report dead birds to the Health Department?

A: Yes. DOHMH encourages New York City residents to report all dead bird sightings within NYC, especially crows and blue jays. This will assist us in our efforts to monitor possible WNV activity. However, while every report is important to our monitoring efforts, we will be collecting only a sample of the dead birds and not every dead bird reported. If you do not receive a phone call from DOHMH to arrange pick up of the dead bird within two business days of making the report, please dispose of the dead bird. While there is currently no evidence that West Nile virus can be spread directly from birds to the general public, dead birds can carry other diseases and, therefore, should never be handled with bare hands. **Use gloves to carefully place dead birds in double-plastic bags and then place dead birds in the outdoor trash.**

For more information about West Nile virus, call the New York City Department of Health and Mental Hygiene's Toll-Free West Nile Information Line, 24 hours a day, seven days a week, at (877) WNV-4NYC or (877) 968-4692; TTY/TDD (212) 788-4947 Monday-Friday during business hours; or check our Website at nyc.gov/health.

GLOSSARY

adulticide	a pesticide used to kill adult mosquitoes
<i>Aedes sollicitans</i>	<i>See Ochlerotatus sollicitans</i>
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 organisms that do not have a backbone, have segmented bodies and jointed walking appendages (e.g., insects, spiders and lobsters).
<i>Bacillus sphaericus</i>	a bacterium; type of biological pesticide used to control mosquito larvae in water (mosquito larvae die after ingesting this bacteria)
<i>Bacillus thuringiensis</i> <i>var. israelensis</i> (Bti)	a bacterium; used as a biological pesticide to control mosquito larvae in water (mosquito larvae die after ingesting the bacteria); bacteria found in Mosquito Dunks®
bridge vector	an arthropod (in this case, a specific species of mosquito) that serves as a vector in transmitting a pathogen such as WN virus between the reservoir (birds) and mammals (e.g., humans, horses, etc.).
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 in the Northeast, commonly found in urban areas; breeds in fresh, but prefers stagnant water, such as backyard containers, puddles, ponds, storm drains, etc.
DEET	DEET (chemical name, N,N-diethyl-meta-toluamide) is the active ingredient in many insect repellent products
Eastern equine Encephalitis (EEE)	a 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).
gravid traps	mosquito traps designed to attract pregnant female mosquitoes
Interactive Voice System	an automated telephone system by which information can be accessed by choosing from a set of options
landing rate counts	a measure of the number of adult mosquitoes landing on an individual's body within a predetermined time interval, used to assess the abundance of host-seeking mosquitoes
larvae	immature mosquitoes that live in water; stage which hatches from the egg, prior to adult stage
larvicide	a pesticide used to control immature or larval mosquitoes
light traps	mosquito traps outfitted with a light to attract mosquitoes
malathion	an organophosphate pesticide used to control adult mosquitoes; active ingredient in the product Fyfanon®
meningitis	inflammation of the lining of the brain and spinal cord that can be caused by a virus or a bacteria
methoprene	a type of insect growth regulator used to control larval mosquitoes; it prevents mosquito larvae from developing into adult mosquitoes
mosquito breeding site	a location where mosquitoes lay eggs, often in stagnant water with organic material
mosquito pools	a group of mosquitoes consisting of 1-50 individuals of the same species, collected in given area on a given day and combined for testing to detect 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
<i>Ochlerotatus sollicitans</i>	species of mosquito that breeds in salt marshes, commonly known as the salt marsh mosquito

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 used to kill insects
piperonyl butoxide	An additive to pyrethroid pesticides that improves the effectiveness of the active ingredient
resmethrin	a synthetic pyrethroid pesticide used to control adult mosquitoes; active ingredient in the product Scourge®
salt-marsh	areas of vegetation in bodies of salt water, generally in the upper tidal zone; these habitats may support the breeding of certain types of mosquitoes such as <i>Ochlerotatus 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	removal or reduction of larval mosquito habitats
St. Louis encephalitis (SLE)	a mosquito-borne viral disease that causes inflammation of the brain; very similar to West Nile virus
sumithrin	a synthetic pyrethroid pesticide used to control adult mosquitoes; active ingredient in the product Anvil 10+10®
VectoBac	brand name for the larvicide that contains <i>Bacillus thuringiensis</i> var. <i>israelensis</i> (<i>Bti</i>)
VectoLex	brand name for the larvicide that contains <i>Bacillus sphaericus</i>
vector	an organism (an arthropod in most cases) capable of carrying and transmitting a disease-causing agent from one host to another
viral	relating to, or caused by a virus
viral encephalitis	inflammation of the brain caused by a virus, such as West Nile virus