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# West Nile Virus in the United States[1]

## *A State of the Art Assessment of Law and Policy*

**As of August 15, 2002**

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**WEST NILE VIRUS IN THE UNITED STATES**
***A STATE-OF-THE-ART ASSESSMENT***
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### *Preface*

Each year, the *Center for Law and the Public's Health* produces "state-of-the-art assessments" on the role or use of law as a tool for promoting the public's health. These assessments are comprehensive research reports that examine the intersection of legal, social, and public health issues on selected public health law topics. The standard "State-of-the-Art Assessment" combines:

1. Legal research to describe and analyze local, state or federal law in areas of public health importance; and
2. Review of the epidemiological and social science literature to determine what is known:
    a. about the effects of the law on health outcomes; and/or
    b. the social and political factors that influence passage, implementation and effectiveness of law; and/or
    c. areas where more research is needed; and
3. Recommendations for improving the effectiveness of law in achieving its public health goals.

Assessments will be useful in planning and assessment of law-related interventions, and in identifying areas where more research is needed. Legal data collected and the *Center's* analysis will be published and made available on the *Center's* website. In addition, the results of assessments may be

published through articles in legal, medical, and public health journals.

## I. Introduction

In February, 2001, **Dr. Stephen M. Ostroff**, Associate Director for Epidemiologic Science, Centers for Disease Control and Prevention [CDC], asked the *Center* to assess and report on legal issues related to the spread of the West Nile Virus (WNV). At the time, WNV had spread from its domestic origins in the Northeast states to east coast states as far south as North Carolina. As Dr. Ostroff predicted, during the mosquito season of the spring and summer of 2001, WNV spread significantly further. WNV has been found in birds or horses as far south as Miami-Dade County, Florida (and most states along the Eastern seaboard), and as far west as Wisconsin and Missouri. Sixty-six cases of WNV were diagnosed in humans during the Summer, 2001. For individuals who are particularly vulnerable (the elderly or others with suppressed immune systems), these cases can be debilitating or fatal. CDC confirms that at least ten individuals have died from the disease since 1999.

CDC has sponsored expert committees that have developed and reviewed guidelines for surveillance, prevention, and control of epidemic or epizootic cases of WNV in the United States. State and local public health agencies have utilized these guidelines to attempt to limit the spread of the virus through mosquitos to birds, horses, and humans. While WNV is believed to be spread only through direct mosquito contact, recent evidence suggests that infected birds may spread the disease to other birds, thus potentially complicating the means of controlling this disease threat.[1]

The legal community, principally state and local legislators, has responded to the WNV threat

through a series of proposed and passed statutory laws. Many state laws on WNV provide monetary authorization for state and local departments of health, sanitation, environment, or transportation to conduct mosquito abatement programs under existing federal, state, and local laws (e.g., Connecticut, Delaware, Illinois, Maryland, New Jersey, Rhode Island). Other state legislative proposals:

- provide additional authorization to state or local agencies to conduct mosquito abatement measures specifically in response to WNV (e.g., Connecticut, New Jersey, Vermont);
- mandate that state agencies establish public awareness and education campaigns about WNV (e.g., California, New Jersey); and
- urge the federal government (Department of Agriculture) to rush development of an equine vaccine for WNV (New Jersey).

These statutory responses have been relatively noncontroversial. In many states, legislatures merely intend to abate an identified threat to the public's health through existing mosquito abatement programs.

While many of these statutory responses have been noncontroversial (e.g., appropriation requests), public and legal controversy has enveloped some state legislatures or public health agencies that have sought to address the spread of WNV through enhanced mosquito abatement efforts. The efforts may involve increased spraying of insecticides that can be environmentally harmful. Connecticut specifically authorizes aerial spraying of a "broad spectrum chemical pesticides to control vectors of human disease," including mosquitos carrying WNV. Vermont passed (as of June 3, 2001) a law that authorizes the state department of agriculture to issue permits for the use of insecticides without prior

public notice or comment (as required under existing state law) where the state commissioner of health has determined that "an imminent risk to public health exists as a result of a potential outbreak of WNV or other serious illness for which mosquitos are vectors."

New York state law requires forty-eight hour, advance, written public notice before certain insecticides can be sprayed, but excludes (1) the emergency application of a pesticide when "necessary to protect against an imminent threat to human health;" and (2) all uses of pesticides by cities (except when near a school or day-care operation). The widespread spraying of pesticides in New York City without advance notice in the summer of 2000 pursuant to this exclusion resulted in strong reactions from environmentalists and others concerned about the effects of these chemicals on human health and the environment. As discussed in Part III.F.,

limited public protests on City Hall erupted in midsummer, 2000. Opposition groups aligned to sue the City of New York to enjoin the use of pesticide spraying to abate the mosquito population. The groups argued that the spraying of pesticides by the City violated several federal and state environmental laws. In June 2001, however, a federal Court of Appeals ruled that the spraying was legal.

This case, and a series of similar decisions that may arise in other communities, highlight some of the most prominent legal and public health issues at the interplay of the spread of WNV. Where and under what conditions should public health authorities attempt to limit the spread of WNV through mosquito spraying? Do the public health and environmental harms of widespread pesticide spraying outweigh the risks of WNV to the public's health? Are communities required to be notified in advance

before pesticide spraying commences? Must public health authorities conduct pre- or post-spraying assessments of the environmental or public health impacts?

These issues center on the interests of the public health from the epidemiological and environmental perspectives. Public health officials assert the need to spray widely for mosquitos to eliminate the threat of WNV. Environmentalists fear that the widespread spraying of insecticides poses a much greater threat to the public's health than WNV itself. Accommodating these interests is difficult where mosquito abatement measures involving the spraying of insecticides are effective, but may also negatively impact environmental and human health.

The first phase of this assessment briefly describes the history and spread of WNV in the United States, and then reports on the legal communities' responses to the threat of the disease. This includes an overview of legislative, administrative, and judicial responses, particularly at the state level. In the second phase [*to be completed*], the effectiveness of this legal action in the context of the epidemiology and etiology of WNV is analyzed. Finally, recommendations are proposed for future legal action that will effectively combat the threat of WNV yet have minimal negative impact on environmental and human health.

## II. The Spread of West Nile Virus in the United States

### A. Transmission Cycle

WNV is an arbovirus (an arthropod-borne virus) of the genus *Flavivirus* that can infect birds, humans, horses, and other animals.[2] WNV is primarily transmitted by mosquitos from the natural bird reservoir hosts to other birds or animals. The U.S. Geological Survey's National Wildlife Health Center has reported that more than 80 bird species in the United States have shown evidence of the WNV.[3] The birds most affected by the virus are crows and blue jays.[4]

Female mosquitos may become infected with WNV when they ingest blood from an infected bird.[5] The virus replicates in the mosquito and can then be transmitted to birds, humans and other animals through the infected mosquito. The most common vectors of the virus are mosquitos of the *Culex* species.[6] Most species of *Culex* mosquitos are active at night and feed mostly on birds, but they will also bite people. WNV has also been detected in other mosquito species that are active during the day and prefer to feed on mammals, including humans.[7] Ticks may also carry the infection, but their roles as hosts and vectors are not clear.[8]

The primary mode of transmission of WNV is from an infected bird to a mosquito vector and then to a vulnerable bird or other mammal. Direct bird-to-bird transmission of WNV has also been documented,[9] although more research is needed to explain how and under what conditions direct bird-to-bird transmission may occur. Birds are an excellent reservoir host for WNV because they develop a substantial enough viral load in their blood to infect mosquitos that subsequently bite them.

At least one study has shown that people infected with WNV are likely to have greater exposure to infected mosquitos than uninfected people.[10] Unlike birds, humans are considered an incidental or dead-end host because they do not develop adequate viral load in their blood to continue the transmission cycle if bitten by another mosquito.[11] There is no evidence that humans may become infected through contact with other infected humans, other infected mammals, or infected birds.[12] Yet, additional research is needed to determine exactly what role humans and other mammals may play in amplification and transmission of WNV.[13]

## B. Geographic Spread

WNV was first isolated in Uganda in 1937, but has since been found in Asia, Australia, and Europe. Israel experienced outbreaks of WNV from 1951 to 1957. South Africa experienced an epidemic with thousands of symptomatic infections in 1974. After nearly twenty years of little to no epidemic activity, outbreaks began occurring in parts of Africa and Europe in 1994. More recent outbreaks of WNV have occurred in Israel (2000), Russia (2000), and France (2000).

In 1999, the first case of WNV in North America was discovered in New York City. It remains unknown whether WNV was introduced through an infected bird, mosquito, human, or other vertebrate host.[14] Directly after the first cases were found in 1999, it was suggested that the introduction of WNV into the U.S. may have been an act of bioterrorism.[15] However, in 1999, the Central Intelligence Agency (CIA) dismissed this possibility, concluding that there was no evidence that a foreign government was involved.[16] During the first year of the outbreak, WNV was detected only in

human residents of New York State. Infected birds were detected in Connecticut, New Jersey, New York, and Maryland.

**WNV Detections Among the United States - 1999**

**Connecticut, Maryland, New Jersey, and New York**

In the proceeding summer mosquito season of 2000, fewer human cases were diagnosed (as discussed below), but the virus spread to a much larger geographic area. WNV activity was identified in 12 states and the District of Columbia, with human cases in New York, New Jersey, and Connecticut. The virus was found in birds or mosquitos as far north as Vermont and New Hampshire and as far south as North Carolina.

**WNV Detections Among the United States - 2000**

**Connecticut, Delaware, District of Columbia, Maryland, Massachusetts, New Hampshire, New Jersey , New York, North Carolina, Pennsylvania, Rhode Island, Vermont, and Virginia**

In 2001, WNV continued to spread through the continental United States. WNV was detected as far west as Wisconsin, Iowa, and Missouri. The virus had also spread south to the Florida Keys and Louisiana and north to Maine.

**WNV Detections Among the United States - 2001**

**Alabama, Arkansas, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Tennessee, Virginia, and Wisconsin**

WNV is expected to spread further into Midwestern and northern states in 2002 as birds return north after wintering in warmer climates. This prediction is based on evidence that previous intercontinental movement of WNV has been caused by migrating birds.[17] Now that WNV has been found in the Midwest and Lower Mississippi Valley, spring bird migrations are expected to carry the virus further north into the Great Plains and Canada.[18] In addition, WNV has been detected in the Cayman Islands[19] and is expected to reach Central America this year where birds from various regions of North American migrate. The intermingling of these birds combined with the considerably warmer climate may infect or re-infect migratory birds.[20]

## C. Trends in Morbidity and Mortality

In 1999, the first year WNV was detected in the United States, 62 infected humans were identified. Of these, 59 were hospitalized and seven died. However, estimates concerning the New

York City outbreak in 1999 suggest that approximately 8,200 WN viral infections occurred, including about 1,700 infections causing fever.[21]

During the summer of 2000, WNV spread to a much larger geographic area, but fewer human infections were diagnosed. In 2000, 21 human cases were found. Two people died from WNV infection.[22] In addition, equine and avian cases were detected.[23] Avian mortality surveillance conducted by the CDC identified over 4,000 infected birds.[24] As WNV spread geographically in 2001, the number of human cases rose. A total of 66 cases of WNV were detected and nine deaths were attributed to WNV infection.[25] Human illness was seen for the first time in Alabama, Florida, Georgia, Louisiana, Massachusetts, and Maryland.

Infection with WNV produces relatively minor symptoms for a majority of persons but can result in severe neurological disease and death in an extreme minority of those infected.[26] Mild infection in humans can cause fever, malaise, enlargement of the lymph nodes, pain around the eyes,

## III. Legal Responses to West Nile Virus

Legal responses to the spread of WNV have varied among many state legislatures that have engaged legislative activity. Five states (Connecticut, New Jersey, New York, Rhode Island, and Vermont) have enacted multiple forms of legislation to combat the threat of WNV infection. Other states have unsuccessfully considered bills designed to prevent the spread of WNV. Many state public health or environmental health agencies have invoked their authority under existing mosquito control and nuisance laws to control the spread of WNV.[33] Some states have legislated to increase funding to improve surveillance of mosquito and bird populations or for mosquito control measures to decrease the number of potential vectors for WNV. Public education programs have been used to inform individuals about the personal use of pesticides and to encourage behaviors that reduce the risk of being bitten by mosquitoes. Finally, some states have passed resolutions requesting the federal government to fund development of and approve WNV vaccines for both humans and animals. On the local level, municipalities have reacted to the threat of WNV mostly through mosquito abatement and education campaigns.

### A. Funding for Improved Surveillance and Testing

In addition to federal programs implemented by the CDC to improve surveillance and increase testing of infected birds and mosquitos, some states have passed legislation to increase their own state agencies' capacity to identify WNV infections in birds and mosquitos. State legislatures in New York, Vermont, Connecticut, and New Jersey, for example, have sought to increase public health funding

related to limiting the spread of WNV. Such laws often seek to allocate a specified amount of money (e.g., $200,000 in Vermont, $3 million in Connecticut) to improve surveillance and diagnostic capabilities.

## B. Mosquito Vector Controls

In nearly every state that experienced cases of WNV in 2000, legislatures have considered or enacted measures to control mosquito populations. In addition to appropriation bills, these measures include provisions to (1) modify mosquito habitats and (2) decrease existing regulations concerning the application of insecticides.

In Vermont, procedural requirements for obtaining a permit to apply insecticides may be waived when the threat of a WNV outbreak is imminent.[34] The General Assembly passed a law that allows the Commissioner of Agriculture, Food, and Markets to issue permits for the use of larvacides and pupacides for mosquito control without prior public notice or comment when the Commissioner of Health determines that an imminent risk to public health exists due to a potential outbreak of WNV or another serious mosquito-borne illness.[35]

Rhode Island passed a resolution requesting the Department of Environmental Management to purchase new and innovative mosquito control devices.[36] The declared policy of the State of Rhode Island is that "the use of pesticides must be minimized, as unwarranted and sometimes excessive spraying can irreversibly harm the environment."[37] Therefore, the resolution requests the Department of Environment to purchase "fifty new and innovative mosquito control devices" and to make these

devices available to cities and towns for use at public events.[38]

The Rhode Island General Assembly also created a special house commission to review and report on the state's efforts to control WNV.[39] The commission is charged with analyzing efforts at "detection, surveillance, control, treatment, management, and emerging technologies associated with mosquito borne diseases."[40]

The New Jersey State Senate has considered a bill to minimize available habitats for mosquitos by directing certain county soil conservation districts to conduct hydrology studies for stormwater structures.[41] The bill declares that using the national average parameters for stormwater structures is inappropriate in some of the coastal and southern areas of the state. The use of these parameters may be overly expensive, contribute to increased nonpoint source pollution, and create habitats for mosquitos carrying the WNV to live and reproduce. The bill proposes to reduce the number of potential mosquito vectors by reducing mosquito habitats through mandated hydrology studies. The hydrology studies would determine the appropriate size of stormwater structures to eliminate unnecessary standing water.

The New York Assembly is considering a bill with a similar purpose of reducing mosquito habitats. The bill would amend current law concerning the management of scrap tires.[42] The bill states that scrap tire stockpiles contain optimal conditions for the reproduction of mosquitos carrying WNV. According to the legislative findings, mosquitos reproduce at a rate up to four thousand times greater in scrap tire stockpiles than in their natural environment. Therefore, the bill proposes to eliminate these

breeding grounds by eliminating current scrap tire stockpiles, forcing new tire retailers to accept old tires, encouraging recycling and reuse of old tires, and creating a state council to oversee scrap tire management. Alabama and Florida have also introduced bills aimed at reducing the accumulation of scrap tires.[43]

Another New York bill currently before the Senate proposes to reduce mosquito breeding by the use of biological controls. The bill refers to such control measures as deploying mosquito-eating fish and predatory insects such as dragonflies; modifying mosquito breeding habitats; and using larvacides, biopesticides, and alternative technologies (e.g., mosquito traps).

### C. Public Education Programs

Many state programs focus on education of the human population as part of a comprehensive plan to decrease human exposure to WNV infected mosquitos. When legislatures have addressed education about WNV, the language used is generally vague, citing "public education"[44] or actions to "educate the general public"[45] as part of the state's plan to combat WNV. New Jersey passed a resolution that calls for public education.[46] Other states are currently considering legislation that would require public education programs to be part of the state's response to WNV.[47]

Even though California has not yet experienced a case of WNV, lawmakers identified the potential threat and sought to increase public awareness and knowledge. The California legislature adopted a resolution that directly addressed public education and declared May 21 through 28, 2001, Mosquito and Vector Control Awareness Week. The resolution supports public awareness as a way

to reduce mosquito populations on private, commercial, and public lands. The resolution also finds that education can help people avoid potentially dangerous mosquito bites. In other states (e.g., Connecticut, Florida), public health agencies have drafted response plans that include public education as a major component of the state's disease prevention program.[48]

## D. Quarantine and Vaccination Development

The New Jersey Senate adopted a resolution that urges the United States Secretary of Agriculture to "expedite the development of a conditionally-approved equine vaccine" for WNV to be available by June 2001.[49] The resolution further urges the New Jersey Departments of Agriculture, Environmental Protection, and Health and Senior Services to continue their research on WNV control methods. In July 2001, the FDA approved a WNV vaccine for horses, and a limited amount of the vaccine has been distributed. However, its effectiveness and safety must still be determined.

Legislators in Hawaii have introduced a bill designed to prevent the spread of WNV from the continental U.S. or other places to the Hawaiian islands by imposing quarantine on imported birds until they test negative for WNV.[50]

## E. Judicial Responses to Governmental Actions

Although judicial activity concerning WNV has been limited, existing decisions (and others that are expected to follow) concern the potential environmental hazards of campaigns involving mass spraying of insecticides. One notable court case stemmed from opposition to the widespread insecticide spraying in New York during the summer of 2000 (for additional discussion surrounding the

case, see Part III.F., below). In *No Spray Coalition, Inc. v. City of New York*,[51] a coalition of concerned citizens challenged New York City's mass spraying of insecticides to control mosquito populations under state and federal law. Although a New York state law requires forty-eight hour, advance, written public notice before certain insecticides can be sprayed, it excludes (1) cases where the emergency application of a pesticide is "necessary to protect against an imminent threat to human health;" and (2) all uses of pesticides by cities (except when near a school or day-care operation). Widespread spraying of pesticides in New York City in the summer of 2000 led to public protests by environmentalists and others who were concerned about the effects of these chemicals on human health and the environment.

Opposition groups formed the No Spray Coalition, Inc. ("Coalition") and then sued the City of New York in federal district court to enjoin the use of pesticide spraying to abate the mosquito population. The Coalition argued that the spraying of pesticides by the City violated federal environmental laws, specifically the Federal Insecticide, Fungicide, and Rodenticide Act ("FIFRA"). FIFRA regulates pesticide use and prohibits the use of certain agents that cause unreasonable adverse effects on the environment. However, this federal law offers no method for civil enforcement. FIFRA is enforced solely by the federal government, largely through the Department of Agriculture. For this reason, the Coalition's argument under FIFRA was dismissed. In June, 2001, the Second Circuit federal Court of Appeals affirmed this conclusion.[52]

Additional arguments that the spraying violated the federal Clean Water Act and the Resource

Conservation and Recovery Act were also summarily rejected by the lower federal court. The Coalition's final argument to stop the spraying of pesticides centered on a state law requirement that a state or local government prepare an environmental assessment before engaging in any activity that may have a negative impact on the environment. New York City did not prepare such an assessment prior to commencing its WNV mosquito abatement measures. However, this state law excepts from this environmental assessment requirement measures taken when necessary to protect or preserve life, health, property, or natural resources. The lower court agreed with New York City that the spread of WNV resulting in several deaths in the City constituted the sort of circumstances that justify widespread pesticide spraying without first

conducting an environmental impact assessment. A subsequent assessment by New York City of the environmental impacts of widespread pesticide spraying followed.

In *Fox v. Cheminova, Inc.*,[53] commercial lobstermen from New York and Connecticut filed a class action lawsuit against the manufacturers of the pesticides that were sprayed around New York to control WNV. More than 1,000 lobstermen are parties to the suit seeking damages for the alleged "dramatic and severe" decline in the number of live lobsters in Long Island Sound after the insecticides were sprayed and subsequent rains.[54] The complaint alleges that the heavy rains washed the insecticides into Long Island Sound, killing numerous live and healthy lobsters.[55] The lobstermen argue that the manufacturers of the insecticides are strictly liable and negligent for preparing insecticides that could lead to the destruction of the lobster fishery in Long Island Sound.

## F. The Foundations of West Nile Virus: A Case Study in New York City

[*The following case study is based on the experience of Wilfredo Lopez, J.D., General Counsel of the New York City Department of Health, concerning New York City's response to initial detections of WNV. The Center thanks Mr. Lopez for sharing these experiences for the purposes of this Assessment. Please note that the views expressed are not necessarily those of the City of New York, its Department of Health, or the Center*].

In late August of 1999 a cluster of encephalitis cases was detected in Queens County, New York City, through early notification efforts to the City Health Department by a treating physician and amazing detective work on the part of city epidemiologists.[56] Quick consultations ensued between the city Department of Health (CDOH), the state Department of Health (SDOH), and the CDC. Human specimens were submitted to CDC for laboratory analysis. Within days, additional entities involved in response to WNV included the Mayor's Office of Emergency Management (OEM), the state Department of Environmental Conservation (DEC), and the federal Environmental Protection Agency (EPA).

By September 3, 1999, SDOH and the CDC had reported the affliction was most likely St. Louis encephalitis, a mosquito-borne disease. The city immediately began applying larvicide to standing bodies of water and spraying pesticides in northern Queens by helicopter to control adult mosquitoes. After a few weeks, the causative agent of the illnesses was determined to be West Nile Virus (WNV).

While New York City had not regularly sprayed pesticides to control adult mosquitoes since

the early 1980s, it was able to respond quickly without the mayor or state governor declaring a state of emergency. Although the health commissioner was not authorized to declare a public health emergency, local law allowed for a declaration of emergency to expedite the purchase of goods and services.[57] The OEM and the city's purchasing agency declared a state of emergency, and the chemicals and services of licensed applicators were immediately acquired. After a case of WNV was found in the Bronx on September 16, 1999, spraying was expanded to that area. When another case was detected in Brooklyn, the spraying became citywide. By the end of October, the entire city, except Manhattan, had been aerially sprayed twice with the pesticide Malathion. Manhattan was treated on the ground by truck with a synthetic pyrethoid.

New York's State Environmental Quality Review Act (SEQRA) requires that a government entity obtain an environmental review before applying pesticides except when "emergency actions . . . are immediately necessary" to protect life and health.[58] Thus, although the City did not conduct a prior environmental review, it did not violate state law under this exemption by applying pesticides when WNV threatened the citizens of New York City.

Nonetheless, a quick decision to spray was not made lightly. It followed discussions with interested governmental agencies and was recommended by CDC. Spraying seemed to effectively reduce the risk of WNV infection in humans. No human WNV infections were found in New York City in 1999 after completion of the citywide spraying, while cases continued to occur in nearby counties that chose not to spray.[59]

In November of 1999, when most mosquito breeding ceased due to cold weather, planning began for the ensuing warm seasons. In February 2000, overwintering mosquitoes, surviving in sheltered underground areas of the city, tested positive for the virus. Drafts of the state and city plans for the 2000 season were soon issued. Those plans contemplated the extensive application of larvicides to standing bodies of water and to all catch basins in the city (approximately 135,000). The plans also provided for the possibility of spraying adulticides to kill mosquitoes.

Pursuant to the requirements of SEQRA, the city health commissioner declared that larviciding presented no significant risk to the environment, which meant that larviciding could proceed with no further environmental review. Making this "health-health" tradeoff was more difficult concerning adulticiding. While the risk of viral infection was relatively clear, the commissioner could not declare that the danger to the environment (including human populations) from pesticide application was insignificant without further study. As a result, a long and protracted process was undertaken to study the effects of adulticides on humans and on natural resources.

This process was intended to produce an environmental impact statement (EIS). This was a complex undertaking. An EIS analyzing the widespread use of adulticiding in a large urban setting had never been done. New York City is a rich and varied natural habitat with miles of shoreline, wetlands, and sensitive areas. Multiple public hearings in the various affected areas of the city would have to be undertaken. The city health department declared a procurement emergency, approved by the city's Corporation Counsel and Comptroller, and contracted with an environmental consulting firm to assist

the department with the EIS. The process, begun in March of 2000, was concluded in the early summer of 2001 and produced the most elaborate analysis of this issue to date.

The EIS concluded that the use of pesticide to control adult mosquitoes in the manner applied by the city did not present a significant risk to the natural resources of the environment or to the public health. However, because of the time it took to reach this conclusion, the emergency exception in the SEQRA regulations was invoked again to support the adulticide spraying that took place in the summer of 2000.

In addition to spraying, control efforts were aimed at reducing mosquito breeding grounds. Since the breeding cycle of a mosquito, from larvae to adult, occurs in water in approximately four to five days, authorities needed to be able to quickly eliminate water accumulations and underlying conditions. Therefore, in a demonstration of its extraordinary police powers, the New York City Board of Health adopted on April 18, 2000, a resolution that: (1) declared water accumulations to constitute a public health nuisance; (2) determined that such conditions exist citywide; (3) ordered all owners or other persons in control of property to immediately eliminate all water accumulations and the conditions that create them; and (4) authorized and directed the Department of Health to take all steps necessary to abate the nuisances directly in the event that responsible individuals failed to comply with the Board's order within five days after notice (via publication for three consecutive days in newspapers of general circulation).[60]

Together with an extensive public education campaign urging the elimination of stagnant water,

the city established a telephone hotline for citizens could call to file stagnant water complaints. Depending on the gravity of the reported condition, a warning letter would be sent to the owner or an inspector would be dispatched to the site.

Despite these efforts to minimize the mosquito population during the 2000 season, mosquito traps throughout the city detected mosquito pools that were positive for WNV. WNV-positive dead birds were also found. On July 18th, 2000, the first human case of WNV in the summer season in New York City was confirmed. Again, following CDC recommendations, the City decided to apply pesticide (pyrethroid) to control adult mosquitoes. The protocol called for spraying within a two-mile radius of a positive bird or mosquito pool, or the residence of a human case. The City already had a contract in place with a major pesticide manufacturer and applicator that covered both larviciding and adulticiding. The method of application of the ultra-low volume of pesticide was by backpack, truck or all-terrain vehicle, or, in inaccessible areas, by helicopter.

Immediately upon announcing its decision to spray adulticides, the City was sued in federal court by a coalition of organizations and individuals, represented by an environmental law clinic of a local law school, seeking to enjoin the City from spraying. (See the *No Spray Coalition v. New York City* discussion above.) Despite the litigation, the City was allowed to spray on schedule.

Throughout the summer, the City took extraordinary steps to minimize the public's exposure to pesticides, including: (1) notice of the time and place of spraying, and other useful information such as precautions within 48 hours of the event; (2) limiting most spraying to the hours between 10:00 p.m.

and 5:00 a.m.; (3) police cars would accompany the spray trucks and use loudspeakers to warn pedestrians to go indoors.

Despite these safety measures, it was impossible to totally avoid exposing a portion of the population to the fine, ULV pesticide mist. Telephone hotline operators took reports of pesticide exposure and provided advice to callers. Individuals complaining of scratchy throats, itchy eyes, or other sensitivities to chemicals, was a source of great concern. However, the city had to balance these harms against the serious and long-term effects, including the possibility of death, of exposure to WNV.

The lessons of WNV are manifold. It has been a reminder of the importance of maintaining a sound public health infrastructure. Mosquito control is one of the oldest public health activities, both for disease prevention and nuisance control, requiring both government and the citizenry to constantly work at the removal of water accumulations and the conditions that are conducive to water accumulation or mosquitos, such as the inappropriate disposal of tires. WNV has shown the direct link between nuisance abatement and disease prevention, and has demonstrated the need to exercise the police power against an individual, such as an irresponsible property owner, in order to protect the general public. It has required the cooperation and coordination of many public and private partners, including governmental agencies that may not otherwise have interacted on a regular basis.

## IV. The Effectiveness of Legal Responses in the Context of the Epidemiology of West Nile Virus [*Forthcoming - Year 2*]

A. Effectiveness of Mosquito Abatement in Promoting Public Health

B. Necessary Tradeoff Between Environmental Health and Mosquito Abatement

C. Recommendations for Reforms of Existing and Future Legal Responses

*- To be provided -*

## V. Conclusion

*- To be provided -*

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