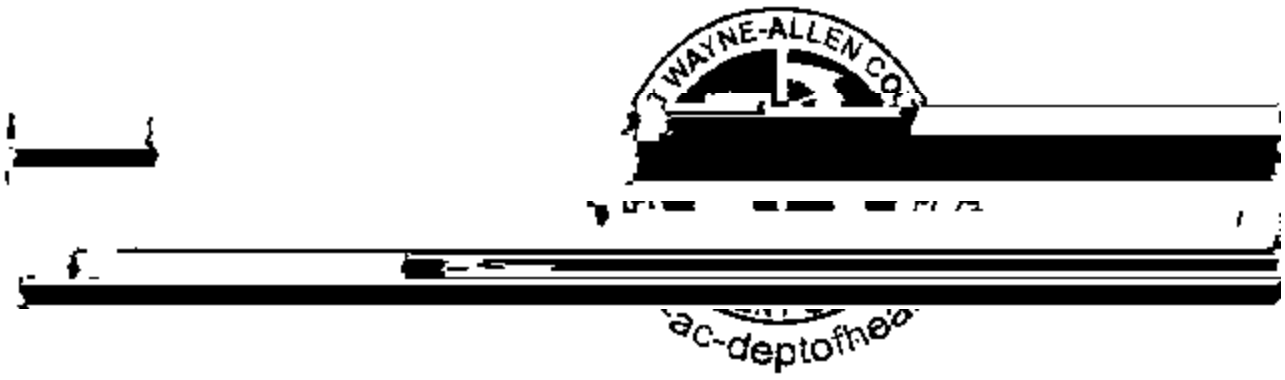
Fort Wayne – Allen County
Arboviral Surveillance and Control Plan



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Forward

The goal of the Fort Wayne – Allen County Arboviral Surveillance and Control Plan is to minimize the risk of arboviral diseases, including West Nile Virus, to residents of Fort Wayne – Allen County. The plan outlines a series of primary and secondary preventive interventions designed to minimize the risk of transmission of virus to human populations and to facilitate the rapid diagnosis and containment of the disease once it is introduced to our community. The most effective primary intervention is public participation in the removal of mosquito breeding sites, such as tires, containers, and abandoned swimming pools. Secondary interventions include larviciding (reduces the number of mosquito larvae before they turn into adults), healthcare provider education regarding the diagnosis of West Nile Virus or other arboviral diseases, community education about reducing the risk of acquiring an arboviral disease, and adulticiding (reduces the number of possible disease-carrying adult mosquitoes).

This protocol has been developed based on a variety of scientific methods including: best practices in communities where West Nile Virus has been established; guidelines from the Centers for Disease Control and Prevention; and, recommendations from our Indiana State Department of Health experts. However, the decision to move to aggressive secondary prevention methods, such as adulticiding, still requires a clinical judgment. The protocol outlines the criteria pertinent to this decision-making process and the representatives identified to interpret the data.

Background

Encephalitis is an inflammatory viral disease involving parts of the brain, spinal cord or meninges. One environmental source of this disease is the mosquito, which serves as the vector for arboviruses that carry diseases such as St. Louis Encephalitis, LaCrosse Encephalitis, and West Nile Virus. Encephalitis has a case fatality rate that varies from 5% to 30%, depending on the specific virus. Some types of encephalitis, such as LaCrosse, may have long-term neurologic consequences even in milder cases. Also, arboviral encephalitis often causes large numbers of in-apparent or undiagnosed cases, near the environmental source. Therefore, a definitive diagnosis needs to be established as quickly as possible, as effective environmental treatment of the source of encephalitis can decrease the probability of other members of the community from becoming infected.[i]

In 1999, a new arboviral disease, never observed in the Western Hemisphere, was identified in New York City. The infectious agent was identified as West Nile Virus and was associated with 44 cases and 4 fatalities. Within a 75-mile radius of New York City (including part of the states of New York, New Jersey and Connecticut) a total of 66 cases and 7 fatalities occurred. The virus spread to 12 states and Washington, D.C. in 2000. There were 20 cases and 2 deaths. In 2001, 27 states and Washington, D.C. reported cases of West Nile Virus infection in humans, birds, and horses. There were 149 total human cases, including 18 fatalities. The virus exploded across the United States in 2002. 44 states and the District of Columbia were affected. There were 4,071 human cases with 274 deaths.[ii]

West Nile Virus was found in Indiana in August 2001 in the northwest, southwest, and central portions of the state. No presumed or confirmed humans were identified in 2001. A total of 44 birds were positive for the virus, as reported by the Indiana State Department of Health. The Vector Control Division of the Fort

Wayne – Allen County Department of Health submitted 7 birds to the laboratory at Indiana State Department of Health for testing; none of which were positive for the virus.

In June 2002, the first dead bird positive for West Nile Virus was identified in Allen County. By the end of the summer the Indiana State Department of Health had confirmed 36 positive dead birds in Allen County. The first positive mosquito pool (group of 50 or more adult mosquitoes) was found in July. There were 28 total pools positive for West Nile Virus. The first human case of West Nile Virus occurred in August. Seventy-one humans were positive for the virus by the end of 2002. There were 3 deaths related to West Nile Virus.

In the spring of 2002, the Fort Wayne-Allen County Department of Health with assistance from the Communicable Infectious Disease Network of Allen County and Indiana State Department of Health established a protocol to address the environmental and medical issues associated with the presence of West Nile Virus and/or St. Louis Encephalitis in our community. This protocol was based on information obtained through sources at the Indiana State Department of Health, Centers for Disease Control and Prevention, Indiana Poison Control Center, Medline literature search and from the New York City Comprehensive Mosquito Surveillance and Control Plan for 2002.[1]

The 2002 Fort Wayne – Allen County Arboviral Surveillance and Control Plan has been revised to form the following protocol.

PUBLIC EDUCATION AND COMMUNITY RELATIONS

Objective

Increase public awareness regarding West Nile Virus and disease surveillance, as well as educate the community about proper prevention and control techniques

Background

In 2002, the Fort Wayne-Allen County Department of Health engaged in a public education campaign to raise awareness in the community about the spread of mosquito-borne diseases – specifically West Nile Virus. The campaign included the distribution of educational posters to multiple target audiences, numerous speaking engagements presented to community organizations, keeping the department website up to date on timely information, a public forum, and weekly media releases. During the summer, over 100 media interviews were conducted, 8 different posters were developed and distributed, and several fact sheets were made available on the department website (www.fw-ac-deptofhealth.com).

The Fort Wayne-Allen County Department of Health also established several West Nile Virus hotlines throughout the summer to keep the community informed, receive and respond to homeowners finding dead birds on their property, and allow the public to get answers to their questions regarding West Nile Virus. One line was an outgoing message that was updated daily with the targeted areas planned for adulticiding that week and allowed the public to add their names to the "No Spray" database, if desired. The other lines were telephones that were manned each day to field questions and gather addresses where dead birds were found.

Action Plan

In conjunction with other community groups and government agencies:

- Create and distribute flyers concerning personal protection and source reduction to targeted groups and associations (especially those participating in occupations and/or events held outside or for distribution upon request).
- Create and distribute flyers to area grocery/convenience stores for posting regarding the use of N,N-diethyl-m-toluamide (DEET).
- Create educational toolkits and distribute them to Fort Wayne and surrounding area neighborhood specialists to assist in public education about property source reduction techniques.
- Create and distribute flyers to all area parks for distribution upon patron entrance to the parks as well as at designated places within the parks.
- Continuously update the department website with information on personal protective measures, homeowner source reduction techniques, and current local events.

  Promote education through the *television and radio media* by promoting the use of public service announcements (PSA's) at regular intervals.

  Promote education through the *print media* by requesting space for repetitive printing of preventive information and homeowner source reduction techniques.

  Partner with area schools and offer in-school training on preventive measures each student can take.

  Partner with schools to promote the provision of DEET products at school-sponsored outdoor events.

  Create, distribute, and ask schools to post educational flyers regarding outdoor events and personal protection measures.

- Create and distribute flyers discussing family prevention measures to schools to provide to each student.

HUMAN SURVEILLANCE AND PROVIDER EDUCATION

Objective

Quickly identify Allen County residents infected with arboviral diseases, especially West Nile Virus.

Background

The rapid diagnosis of patients with an arboviral disease, especially West Nile Virus, allows healthcare providers to educate those infected regarding the possible clinical course of the disease and also to identify those high-risk patients who might require closer monitoring for potential severe adverse consequences of the infection. Furthermore, rapid identification of an arboviral case expedites the identification of potential mosquito breeding sites within a designated area surrounding the patient's residence or other potential high-risk areas frequented by two or more cases.

During the fourth transmission season of West Nile Virus, Allen County residents diagnosed with West Nile Virus were surveyed for signs and symptoms associated with infection. Several unusual symptoms were noted including rash, myalgias and focal neurologic deficits. This information was then relayed to clinicians to facilitate diagnosis of West Nile Virus infection in other patients who present with similar, albeit unusual symptoms.

In 2002, five new modes of West Nile Virus transmission were identified including organ transplant and blood transfusion. To date, an effective blood product-screening tool has not been identified. The current recommendation for minimizing transfusion-associated transmission this year includes rapid identification and testing of potentially infected blood products, with subsequent quarantine of the infected blood products.

Rapidly identify and quarantine potentially infected blood products.

- The survey instrument that will be administered to all Allen County residents with West Nile Virus contains specific questions regarding recent blood transfusions and organ transplant (see Appendix I and J).
- The American Red Cross and Centers for Disease Control and Prevention will be immediately notified of any positive response to the survey question regarding transfusion. The American Red Cross will quarantine all blood products related to the initial blood donor. Further case investigation of potential-transfusion related infections will be at the direction of the Centers for Disease Control and Prevention.

Action Plan

Facilitate rapid identification of patients with West Nile Virus that present to emergency rooms, urgent care centers and outpatient healthcare providers.

- Medical education will be provided to healthcare providers in emergency rooms and urgent care and outpatient centers at the onset of the arboviral season and periodically throughout the season.

  Arboviral serum samples will be collected in local healthcare laboratories and analyzed at local reference laboratories in addition to the Indiana State Department of Health laboratory (see Appendix H).

  Positive results will be provided to the Fort Wayne Allen County Department of Health and forwarded to the Indiana State Department of Health.

  All patients that have a serum sample drawn for West Nile Virus antibody titers will also be provided an order to have a convalescent titer drawn.

  Positive results will be entered into a database.

Record clinical signs and symptoms associated with West Nile Virus infections in Allen County residents.

A case investigation will be performed for every patient diagnosed with West Nile Virus infection in Allen County (see Appendix I and J). The data will be entered into an SPSS database and forwarded to the Indiana State Department of Health.

The case investigation data will be analyzed periodically and at the end of the year to determine clinical trends.

Results will be collated at the end of the transmission season and provided in tabular form to local healthcare providers and public officials.

LARVAL MOSQUITO CONTROL

Objective

Reduce the abundance of adult mosquitoes through the use of Integrated Mosquito Management practices

Background

The life cycle of a mosquito begins in the water. Some mosquitoes prefer to lay their eggs in slow-moving or stagnant water rich in organic material. These breeding sites consist of discarded tires, poorly maintained bird baths, clogged rain gutters, unused swimming and plastic wading pools, pots and pans with standing water, and puddles lasting for a week or more. The mosquito population can be greatly reduced by eliminating potential water sources (source reduction) for breeding and treating permanent water sites with biological or chemical agents (see Appendix A) to prevent mosquito development (larviciding). Businesses and the public should regularly inspect their property to determine if conditions are present for mosquito breeding and eliminate the conditions.

Catch basins provide a perfect breeding source for mosquitoes. There is a well in the storm drain that catches debris and silt. If there is no rain during the summer, water will sit in the well. Some female mosquitoes will lay their eggs on the water, due to the available organic material. The Vector Control Division, along with other municipal agencies, will treat the catch basins with approved larvicides.

Action Plan

Utilize the City of Fort Wayne's Water Pollution Division's map of catch basins to identify treatment areas.

Develop Geographical Information System map of catch basins located near the previous year's human cases of West Nile Virus utilizing the City of Fort Wayne data.

Treat the identified catch basins with appropriate larvicides.

- The general public will be informed about residential practices to reduce breeding sites (tires, containers, gutters, etc.) via the department website (www.fw-ac-deptofhealth) and educational forums.

  Seasonal technicians inspect over 1,000 known natural and artificial breeding sites, collect larval samples for identification, and treat the water with larvicides based on the environmental conditions surrounding the sites.

- The Vector Control Division will respond to public complaints of mosquitoes through inspection of the complainant's property, collect larval samples if available, and treat the water accordingly. These sites will be added to the breeding site list.

  A letter will be sent to people responsible for city or town parks and school or university property asking them to locate any bodies of water that may breed mosquitoes (see Appendix D).

  Technicians will access areas where dead bird clusters occur and will identify new breeding sites, collect samples, and treat the water. Known breeding sites will also be inspected and treated as needed.

  Technicians will access areas where positive adult mosquitoes are found and will identify new breeding sites, collect samples, and treat the water. Known breeding sites will also be inspected and treated as needed.

  Technicians will access areas where there are positive human cases and will identify new breeding sites, collect samples, and treat the water. Known breeding sites will also be inspected and treated as needed.

  The Vector Control Division will provide mosquito larvae eating fish (*Gambusia affinis*) to homeowners or neighborhood associations with ornamental water gardens and/or storm water retention ponds that do not drain into the Indiana waterways (rivers, lakes, creeks, ditches, etc.)

HOST AND MOSQUITO SURVEILLANCE

Objective

Monitor non-human populations as a means of detection of West Nile Virus activity in Allen County in order to predict the spread of the disease before the onset of human illness

Background

According to the Cornell University Center for the Environment, "birds are far more likely to become infected than people or other mammals."[iv] The types of birds most likely to serve as hosts to the West Nile Virus include crows, blue jays and raptors (owls, falcons, hawks, and eagles).

Mammals are not as sensitive to West Nile Virus as birds. The Fort Wayne-Allen County Department of Health will ask veterinarians and other animal specialists to monitor for unusual illness and death among mammals and exotic birds.

The number of mosquitoes capable of transmitting West Nile Virus and the prevalence of the virus in the mosquito population are both measures of the risk of transmission of the virus to humans in the same area. Nationally, several species of mosquitoes are known to carry West Nile Virus. Furthermore, infected mosquitoes are usually found several weeks before human transmission.

The Vector Control Division will begin surveying the adult mosquito population in the early spring using New Jersey light traps and continuing through the season with gravid traps. *Aedes* and *Ochlerotatus* species gravitate towards light traps, while *Culex* species are prevalent in gravid traps.

Viral testing of mosquitoes provides the best warning of an impending human outbreak. In 2002, the Fort Wayne-Allen County Department of Health laboratory obtained the training and materials necessary to perform viral testing for West Nile Virus and St. Louis Encephalitis in mosquito samples obtained locally. The testing methodology is both sensitive and specific.

Action Plan

The public will be asked to report dead birds to the Vector Control Division. Citizens will be asked the date the bird was found, address where bird was located, and bird species.

The public will be asked to properly dispose of the birds (see Appendix G).

The locations of dead birds will be plotted on a map using the Geographical Information System.

Indiana State Department of Health personnel will catch five feral birds weekly at various locations. Blood samples will be taken and tested at the Indiana State Department of Health laboratory in Indianapolis.

Adult mosquito traps will be placed in several locations around Fort Wayne and Allen County; including parks, areas where concentrations of dead birds have fallen and in response to public complaints. Samples will be collected and separated according to species.

Vector species will be tested by the staff of the Fort Wayne-Allen County Department of Health in a Level 2 Biosafety cabinet utilizing Level 3 Biosafety practices in a Parkview Health System laboratory.

Maps will be created using the Geographical Information System to identify the areas with positive mosquitoes.

Area veterinarians and other animal specialists will be contacted asking their help in identifying encephalitis and other mosquito-borne diseases in vertebrates and reporting suspected infections to the Vector Control Division.

ADULT MOSQUITO CONTROL

Objective

Reduce the abundance of adult vector mosquitoes in targeted areas through the judicious use of EPA registered pesticides

Background

The Fort Wayne-Allen County Department of Health 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 vector mosquitoes by considering habitat; time of year; weather conditions; the level of documented virus; the distribution, density, age, infection rate, and flight path of the vector population; and the density and proximity of human populations. The response of the Fort Wayne Allen County Department of Health will depend upon, but not be limited to: the intensity and persistence of virus activity, proximity of virus activity to human populations, time of year, mosquito population density and flight paths, 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 Fort Wayne-Allen County Department of Health can be grouped into three broad categories or levels of risk (see Appendix C).

Adulticiding, when necessary, will occur in the evening. West Nile Virus is prevalent in the *Culex* species, which are evening biters and have a flight path of ½ to 1 mile from the breeding site. West Nile Virus has been identified in *Aedes* and *Ochlerotatus* species, but in limited numbers. These species are daytime biters and have flight paths up to 10 miles. If positive *Aedes* and/or *Ochlerotatus* species are found, additional surveillance measures will be instituted and aggressive larviciding will occur in the targeted areas.

The following people will make the decision to adulticide: Health Commissioner, president of the Executive Board of Health or a designee, Administrator, and the Vector Control Division Director.

Action Plan

Level 1 – No Arboviral Detection

Surveillance and control programs continue as outlined in the 2003 Arboviral Surveillance and Control Plan.

Level 2 – Sporadic Evidence of Arboviral Activity

Three positive mosquito traps per week or three human cases will result in a move to Level 2 responses.

- Increased larviciding will occur in positive areas.
- Public education will increase in positive areas.
- Seek assistance of identified community partners (see Appendix C) to aggressively survey areas of high viral activity in neighborhoods to locate and eliminate probable breeding sources and educate homeowners about mosquito prevention.
- Ground application of an EPA-registered adulticide (see Appendix A) to immediate areas of concern (1/2 mile radius around positive trap or human).
- The public will be notified of adulticide schedules in advance, which will allow sufficient time to take any necessary precautions to reduce pesticide exposure.
    - A press release will be sent to the media with the times and locations where the trucks will be spraying.

- The times and locations will be placed on the Fort Wayne-Allen County Department of Health's website, www.fw-ac-deptofhealth.com.
- Emergency room providers will also receive notification of the intent to adulticide in the targeted area.

- The Fort Wayne-Allen County Department of Health maintains a list of no-spray addresses. The trucks will stop spraying one house before and begin one house after.
- If not already present, adult mosquito traps (if available) will be placed in areas where adulticiding has been conducted to monitor the effectiveness of the treatment.

Level 3 – Epidemic Evidence of Arboviral Activity

Four or more positive mosquito traps per week and/or four or more human cases will result in a move to Level 3 responses.

- Increased larviciding will occur in positive areas.
- Public education will increase in positive areas.
- Seek assistance of identified community partners (see Appendix C) to aggressively survey areas of high viral activity in neighborhoods to locate and eliminate probable breeding sources and educate homeowners about mosquito prevention.
- Ground application of an EPA-registered adulticide (see Appendix A) to immediate areas of concern (1/2 mile radius around positive trap or human).
- The public will be notified of adulticide schedules in advance, which will allow sufficient time to take any necessary precautions to reduce pesticide exposure.
    - A press release will be sent to the media with the times and locations where the trucks will be spraying.

- The dates and locations will be placed on the Fort Wayne-Allen County Department of Health's website, www.fw-ac-deptofhealth.com.
- Emergency room providers will also receive notification of the intent to adulticide in the targeted area.

- The Fort Wayne-Allen County Department of Health maintains a list of no-spray addresses. The trucks will stop spraying one house before and begin one house after.
- If not already present, adult mosquito traps (if available) will be placed in areas where adulticiding has been conducted to monitor the effectiveness of the treatment.

MONITORING ADVERSE EVENTS FROM PESTICIDE EXPOSURE

Objective

Assess the number of adverse events resulting from adult mosquito control activities

Background

Since exposure to any pesticide has the potential to cause adverse reactions, particularly among those with pesticide sensitivity or respiratory conditions, the Fort Wayne-Allen County Department of Health provides advance notification of spraying times and locations through the media and on the department website (www.fw-ac-deptofhealth.com). Prior to the beginning of the mosquito season, information on the adulticide to be used by the Vector Control Division is sent to all hospital emergency departments, which includes product information on the adulticide, Material Safety Data Sheets, and other information relevant to identifying possible exposures to the adulticide.

Action Plan

During each week adulticiding is performed, local emergency departments will be queried about patients presenting with physical complaints potentially related to adulticiding (see Appendix E).

A Public Health Nurse will contact all patients identified in the emergency room survey for further investigation (see Appendix F).

RESEARCH AND EVALUATION

Objective

Understand the transmission and pathogenicity of mosquito-borne diseases and to assess the effectiveness of Fort Wayne Allen County Department of Health surveillance, prevention and control methods

Background

It is important for public health professionals to study the potential impact of a disease on a population and to create safe and effective methods for reducing the risk of disease transmission. The Fort Wayne-Allen County Department of Health, in collaboration with the Centers for Disease Control and Prevention and Indiana State Department of Health, has investigated the risk factors of West Nile Virus. Many questions remain though about how the virus circulates in nature.

Action Plan

The Fort Wayne-Allen County Department of Health will continue to work closely with Federal, State, and Local partners to conduct research that will identify the most effective predictors of human illness from West Nile Virus and other arboviral diseases in Fort Wayne and Allen County, including the use of dead bird cluster models.

The Fort Wayne-Allen County Department of Health will continue to update the response to mosquito-borne disease outbreaks based on the ongoing analyses of bird, mosquito, mammalian and human surveillance data.

The Fort Wayne-Allen County Department of Health will evaluate the most cost-effective methods of surveillance and control.

- The Fort Wayne Allen County Department of Health will evaluate the potential public health and environmental impact of the application of pesticides for adult mosquito control.