# A Plan for Surveillance, Prevention, and Control of West Nile Virus and Other Arboviruses in Ohio

## Recommendations of the Ohio Arbovirus Task Force

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## INTRODUCTION

Since it was first detected in Ohio in 2001, West Nile virus (WNV) has become enzootic and is present in every county in the state. A higher incidence of human disease has been experienced by certain regions of the state, particularly the western and northern counties (Fig 1, map on left). Disease incidence is known to fluctuate in response to the interaction of numerous environmental factors. Early and persistent warm temperatures, reduced precipitation, community drainage patterns and urban breeding habitats have been associated with outbreaks.

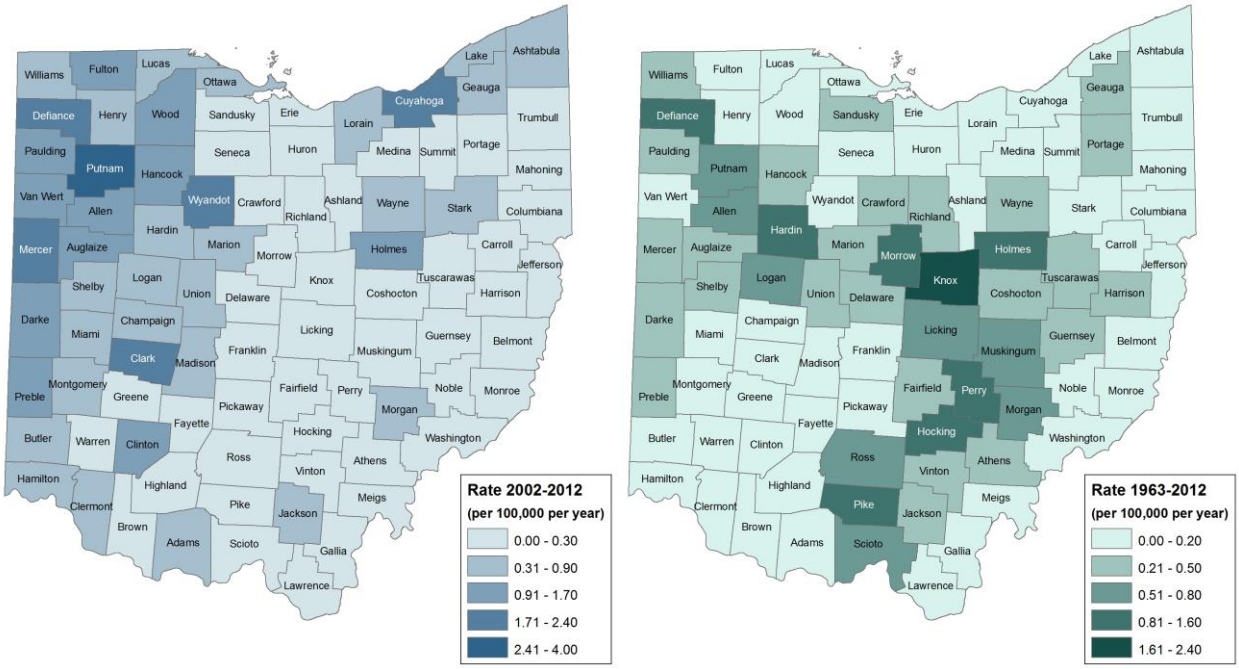


**Figure 1.** Average annual incidence (per 100,000 population) of clinical WNV cases reported by county in Ohio from 2002 – 2012 (blue map on left) and of clinical LAC cases reported by county in Ohio from 1963 – 2012 (green map on right).

WNV is not the only arbovirus of public health importance in Ohio. More cases of La Crosse encephalitis (LAC) have been reported in Ohio historically than in any other state, and an average of 17 cases in children and teenagers are reported annually (Berry et al. 1983). As is the case with WNV, certain regions of the state have experienced higher incidence of human disease due to LAC, especially in areas where abundant beech and maple forests provide habitat for the mosquito vector (Fig. 1, map on right). Other viruses, including St. Louis encephalitis and Eastern equine encephalitis (EEE) occur sporadically throughout Ohio. In 1975, Ohio suffered a large outbreak of St. Louis encephalitis (SLE), with 416 cases reported and many more suspected. While there has not been a human outbreak of EEE recorded in Ohio, a large equine outbreak of EEE involving 19 confirmed horse cases and dozens of suspect horse cases occurred in northeastern Ohio in 1991. There have been sporadic horse cases reported in Ohio since then which indicates ongoing activity.

### LIMITS TO PREDICTION – THE NEED FOR SURVEILLANCE

Despite the known associations with weather and the recognition that certain regions experience higher levels of disease risk, there are no models that provide long term predictions of when or where

arbovirus outbreaks will occur. In the case of WNV, its national epidemiology has been characterized by focal outbreaks that were not predicted, such as the 2012 outbreak in the Dallas-Ft. Worth region of Texas, which accounted for nearly 1/5 of the 5,674 U. S. cases that year. It is this unpredictable nature of WNV activity which underscores the need for a continual, active surveillance system in the state which is capable of detecting increases in WNV transmission activity in sentinel species. Sentinel surveillance is a proven method of predicting future human health risk which allows public health to respond with effective, disease-reducing interventions.

The Ohio Department of Health has historically served as the center of environmental and human arbovirus surveillance and testing in Ohio. Unfortunately, reductions in federal funds have eliminated testing, mosquito identification and other important components of this program. As a result of these and other challenges to arbovirus prevention, the Ohio Arbovirus Task Force (OATF) was formed to develop evidence-based recommendations for an effective surveillance, prevention and control plan to protect Ohioans.

In this document, the OATF outlines a plan for Ohio containing the elements of a surveillance system required to effectively 1) monitor arboviral enzootic and epizootic transmission activity as indicators of human risk; 2) maintain surveillance for human infections and disease to monitor trends in arboviral disease burden and clinical presentation; and 3) implement prevention and control programs that reduce community-level risk by managing vector mosquito populations and that reduce individual risk by promoting effective personal protection measures. Where relevant, multiple options for accomplishing this goal are provided.

## SURVEILLANCE

### OBJECTIVES OF SURVEILLANCE FOR WNV AND OTHER ARBOVIRUSES

Arbovirus surveillance consists of two distinct, but complementary activities; human epidemiological surveillance measures human arboviral disease after viral transmission to humans has occurred and environmental surveillance monitors local arbovirus activity in vectors and non-human vertebrate hosts in advance of viral transmission affecting humans.

Though human epidemiological surveillance is essential for understanding arboviral disease burden, it is insufficient for predicting arbovirus outbreaks, which can develop quickly, with the majority of human cases occurring over a few weeks during the peak of transmission. The time from human infection to onset of symptoms, to diagnosis and reporting can be several weeks or longer. As a result, human case reports lag well behind the transmission from mosquitoes that initiated the infection. By testing for WNV and other arboviral infections in mosquito vectors and animal hosts and comparing infection rates to historical environmental and epidemiological surveillance data, conditions associated with increasing human risk can be detected 2-4 weeks in advance of human cases. This provides additional lead-time for critical vector control interventions and public education programs to be put in place. Disseminating environmental surveillance information also alerts physicians to the increased risk, leading to faster and more effective diagnosis and treatment for those affected.

The following sections describe the elements of an effective surveillance plan suggested by the Ohio Arbovirus Task Force (OATF) utilizing both human epidemiological and environmental surveillance to effectively monitor and predict risk and to prompt timely and appropriate interventions. Significant

portions of this document were adapted from the CDC 2013 document, *West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control*, located on the CDC Website at: http://www.cdc.gov/westnile/resources/pdfs/wnvGuidelines.pdf. Readers wanting more background or detail information should refer to this document.

## HUMAN EPIDEMIOLOGICAL SURVEILLANCE

This section provides an overview of human arbovirus surveillance as it is currently implemented in Ohio. The CDC guidelines for human surveillance are generally followed in Ohio, except that the Ohio Department of Health Bureau of Public Health Laboratories (ODH Lab) does not test human samples for arboviral etiologies. Instead, testing is done in Ohio by hospital and other private laboratories. ODH Lab will provide support by shipping samples to CDC for confirmation as needed.

### Passive Surveillance and Case Investigation

Arboviral diseases, including WNV, La Crosse encephalitis (LAC), St. Louis encephalitis (SLE) and Eastern Equine encephalitis (EEE), are nationally notifiable. The health care provider, hospital or laboratory is required to report all suspected cases of arbovirus by the end of the next business day (Class B reportable disease requirements) in the Ohio Disease Reporting System database (ODRS) or to the local health department (LHD) where the patient resides, according to the instructions in the ODH-Infectious Disease Control Manual (IDCM). The IDCM also provides laboratory criteria for appropriate sampling, testing and other disease control and reporting information.

LAC and WNV viruses occur each year in Ohio in mosquitoes and their vertebrate hosts. SLE and EEE viruses also occur occasionally in Ohio. Human infections with these viruses cannot be clinically differentiated. Therefore, an arbovirus panel which tests for these other diseases should be considered in addition to WNV testing.

The system for data flow and information sharing for human epidemiological surveillance is as follows:

1. Health care provider and/or laboratory will report all suspected cases of arboviral infections by the end of the next business day to ODRS or the LHD.

2. LHDs are responsible for obtaining and updating essential missing epidemiologic information and entering this data into ODRS.

3. The ODH Zoonotic Disease Program (ZDP) will review the data to look for errors, missing variables, duplications, etc., and update entries in the ODRS database.

4. ODH ZDP will report all cases that meet case definition to CDC via the national ArboNET surveillance system (CDC, 2013).

5. ODH ZDP will prepare and share weekly a bulletin of summarized activity to statewide local health departments and other arbovirus surveillance, prevention and control cooperators. This bulletin will further contain state level recommendations for communications and phased action response (Appendix 1) under the Prevention and Control chapter of this document.

### Enhanced Surveillance Activities

When environmental and/or human surveillance data demonstrates an increase in arbovirus activity or otherwise indicative of increases risk of an outbreak, the following actions are taken:

1. ODH personnel will post a health alert via the Ohio Public Health Communication System (OPHCS) to local health departments and infection preventionists (IP) regarding the importance of reporting, and the need to include WNV and other arbovirus testing in diagnostic differentials for viral meningitis and encephalitis. A note is added to LHDs requesting this information be forwarded to local hospitals, laboratories and physicians.

2. ODH personnel will monitor incoming morbidity reports of arboviral diseases and aseptic meningitis. Physicians, hospitals and labs are required to report these cases (both Class B) to the local health jurisdiction by the end of the next business day. Local health agencies report to ODH via the Ohio Disease Reporting System (ODRS). ODH or LHD personnel will contact the physician, hospital or lab to arrange confirmatory testing if needed.

**OATF Recommendations:** The state should continue its current human surveillance practices as described above, in accordance with CDC guidelines. Human testing capacity for arboviruses has increased dramatically in private labs in recent years, and the OATF recommends no changes. However, the group is concerned that Ohio might be unprepared for an emerging arboviral disease threat by relying solely on private labs for human disease testing. Expertise and the capacity for testing should be maintained at the Ohio Department of Health Laboratories. Confirmatory testing and testing for emerging and other arboviral diseases (e.g., Chikungunya, Powassan, Jamestown Canyon, Heartland, etc.) is not available commercially and should be developed either by ODH or through prearranged agreement with other states.

## ENVIRONMENTAL SURVEILLANCE

Environmental surveillance involves tracking WNV and other arbovirus activity in vectors and animal hosts in advance of epidemic activity affecting humans. By doing so, the conditions associated with human risk can be detected 2-4 weeks in advance of human disease cases, which provides critical lead-time for vector control interventions and public education programs to be put in place. Disseminating environmental surveillance information also alerts physicians to the increased risk, leading to faster and more effective diagnosis and treatment for those affected.

### Virus Detection and Biosafety Issues

Effectively tracking arbovirus activity in mosquitoes and other animal hosts requires virus detection. There are several assays commonly used to test samples for arboviruses, though they vary in cost, sensitivity and ease of use (Table 1). Real Time RT-PCR testing is the assay used by ODH and is considered to be among the most sensitive, specific and reliable assays for quickly detecting arbovirus. Local health jurisdictions which conduct their own tests or which use a vendor to provide testing may elect to use Vector Test® (http://www. vectortest. com/) or RAMP® (http://responsebio. com/) based on laboratory capabilities. Ideally, these results will be verified by RT-PCR.

**Table 1.** Characteristic sensitivity and time required for commonly used arbovirus testing assays capable of testing mosquito specimens.

| Test | Detects | Detection Level (pfu/ml) | Assay Time |
|---|---|---|---|
| **VectorTest®** | Viral antigen | 100,000 | 15 min |
| **Antigen Capture ELISA** | Viral antigen | 10,000 | 24 hours |
| **Rapid Analyte Measurement Platform (RAMP) ®** | Viral antigen | 1,500 | 90 min |
| **Standard RT-PCR** | Viral RNA | 5 | 8 hours |
| **TaqMan® (Real Time RT-PCR)** | Viral RNA | 0. 1 | 4 hours |

Regardless of the platform used, samples may contain WNV and other pathogenic viruses that may be aerosolized during processing. Therefore staff should take appropriate safety precautions including use of a Class II Type A biological safety cabinet, wearing appropriate personal protective equipment (PPE) and following published biosafety practices. Macerating and testing samples should be conducted under BSL-2 laboratory conditions. The lone exception is that bird necropsies required for sampling kidney, brain and other tissues should be practiced under BSL-3 conditions due to the high levels of virus expected in positive animals. More information about biosafety levels 2 and 3 laboratory practices can be found at: http://www. cdc. gov/biosafety/publications/bmbl5/ under Section IV – Laboratory Biosafety Level Criteria or pages 33-44 in the PDF document available at the above website.

**OATF Recommendations:** OATF recommends that arbovirus testing be centralized and carried out by ODH because of the available expertise, equipment and biosafety facilities and because ODH is the safest source for testing these potentially hazardous samples. Centralized testing would provide an economy of scale, a better quality control and better comparability across jurisdictions to more effectively predict statewide outbreak conditions. Also, having a centralized facility will allow broader screening capabilities – the ability to change primer/probe sets to look broadly for all alpha or flaviviruses, or to look very specifically for SLE vs WNV, or for potentially emerging pathogens like Jamestown Canyon, Powassan and Heartland (the latter two in ticks). OATF further recommends that ODH research a fee-based system for testing arbovirus samples to offset costs at the state level.

If ODH cannot provide any testing, then some alternatives for local health departments may include in-house testing, submission to an alternate government lab, contracting with a vendor or shared service agreements with other agencies. Any local health departments or vendors contracted to conduct arbovirus testing will need to provide appropriate biosafety equipment (see above), facilities and training to protect staff. Regardless of the testing source, it is important that a quick turnaround time is achievable to provide LHDs with information for public health decision making.

**Mosquito-Based Arbovirus Surveillance**

**Larval and pupal mosquito surveys** are an important ongoing component of effective mosquito surveillance and control programs and are the basis for larval control. It requires only minimal and inexpensive equipment though it also requires personnel training, practice and experience. These surveys provide (O'Malley, 1989):

1. a record of mosquito breeding sources as a basis for treatment.
2. a record of species distribution, density and seasonal occurrence.
3. a means for continuous evaluation of insecticide application and control results.

**Adult mosquito surveillance** should be the primary technique used by local health jurisdictions from mid-May until first autumn freeze in Ohio. It consists of the systematic collection of mosquito samples, identifying and testing vector species for WNV and/or other arboviruses. While mosquito abundance alone might be considered an indicator of increased disease risk, historical data shows that, in some cases, severe outbreaks in Ohio have occurred in years when total mosquito abundance was unusually low while the rate of infection in vector mosquito species was very high. Environmental conditions such as drought and high temperatures have also been associated with high infection rates. Testing of vector species is therefore necessary in order to quantify virus transmission and predict human risk.
In order to accurately determine infection rates, it is important to first identify which of the ~60 species of Ohio mosquitoes are in the sample and test vectors by species. Otherwise the infection rates will be underestimated and vector control interventions and other responses may be delayed. Also, knowing the species collected gives a clue as to where they are breeding. The ability to identify even a few species of mosquitoes requires entomological skill and specialized equipment for microscopic examination.

**OATF Recommendations:** Mosquito trapping cannot economically be centralized and should be carried out locally by the local health department or mosquito abatement district. Where local agencies lack this capability, shared service agreements between agencies and use of summer interns may be an effective alternative. This is especially important in areas with higher incidence of arboviral diseases (Figs. 1 & 2). ODH should provide regular trainings and evaluations for local cooperators on surveillance procedures and mosquito biology to ensure optimal sample collection.

ODH should maintain the capacity to conduct environmental field investigations of arbovirus activity to assist local health departments with investigations of unusual cases and emerging infections.

OATF further recommends that mosquitoes be sent to ODH for species identification by qualified entomologists because of the expertise required. Not only would this ensure that tests are performed and results confirmed on the appropriate vector species, but given the appropriate data from the local agencies, ODH could standardize calculation of risk indices (such as the Vector Index) and distribute the indices, summaries and interpretations back to the local agencies.

**Bird-Based Arbovirus Surveillance**

Birds are reservoir hosts for a number of arboviruses and can therefore be useful to environmental surveillance efforts. This generally involves capturing birds, taking blood samples for testing and then releasing them. For arboviruses like WNV that cause higher mortality in some bird species, dead bird surveillance can be a useful risk indicator.

*Live Bird Surveillance*

Wild birds are the natural vertebrate reservoir hosts of EEE, SLE and WNV. As such, they can serve as sentinels for virus activity. Blood samples, cloacal or oral swabs or feather pulp samples can be collected from live birds for testing.

This surveillance activity is labor intensive and is not as effective in quantifying human risk as mosquito surveillance, but live bird surveillance does provide valuable information. It is, however, an essential tool to have available when disease epidemiology is changing, an outbreak is occurring or a newly introduced virus is being investigated.

**OATF Recommendations:** While live bird surveillance is not critical to carry out routinely, it is an important tool to have available in Ohio, particularly when investigating new arboviruses or when monitoring those that occur sporadically, such as EEE. Though not recommended as a routine activity, it is recommended that ODH maintain the capability to carry out this surveillance, including maintaining appropriate state and federal scientific collecting permits and the necessary equipment.

*Dead Bird Reporting & Testing for WNV*

Historically, a high priority for WNV surveillance has been placed on sightings of dead crows and blue jays because these species are highly susceptible to WNV and more likely to suffer fatal infections.

**Reporting of dead crows and blue jays:** At a minimum, collecting information about the temporal and spatial patterns of bird deaths in an area can provide information about WNV activity since increased mosquito infection rates have been associated with increased mortality in susceptible birds. Local health departments can compile information from reports of dead crows and blue jays to help in identifying locations where WNV may be active. These areas can then be prioritized for mosquito surveillance and control efforts.

**Testing dead crows and blue jays:** Testing dead bird tissues can provide early detection of WNV activity in an area. In addition to kidney or brain tissue, it may also be possible to collect and test oral swabs or immature feather pulp. Though affected by other variables making it less sensitive than mosquito testing, dead bird testing can serve as a qualitative indicator of human risk.

**OATF Recommendations:** LHD should encourage and accept reports of dead crows/blue jays in order to detect the location of potential WNV activity and aid in the direction of mosquito surveillance and control efforts. ODH should develop a web-based dead bird reporting system as a tool to aid LHD in this effort. Dead bird testing can be used to confirm WNV as the source of bird die-offs as needed, but is not recommended as the primary environmental surveillance method except for those jurisdictions that otherwise lack active environmental surveillance for WNV. As with mosquito testing, OATF recommends that any dead bird testing be centralized (see pg. 8). Alternatively, any local health departments or vendors contracted to conduct dead bird testing will need to provide appropriate biosafety equipment (see Virus Detection and Biosafety Issues, pg. 7-8), facilities and training to protect staff.

**Horses and Other Mammals**

Horses and camelids are susceptible to encephalitis due to arbovirus infections; thus, veterinary cases serve a passive sentinel function. For WNV and EEE, horses are dead end hosts like humans. Cases in these animals often occur concurrently with human cases.

**OATF Recommendations:** Mammal surveillance is not recommended as a primary form of environmental surveillance; however, the information is a useful adjunct for tracking WNV and EEE activity. As animal cases are confirmed by the Ohio Department of Agriculture (ODA) or the National Veterinary Services Laboratory (NVSL), information will be shared by ODA or the United States Department of Agriculture to ODH, including travel history, date of onset and case status. ODH will then share this information with the LHD who may use it for vector control and educational interventions.

### DISEASE TRACKING AND DATA SHARING

ArboNET is an electronic surveillance system administered by CDC's Division of Vector-Borne Diseases (DVBD). Data on human arboviral disease, asymptomatic human viremic blood donors, mosquito, avian and veterinary arboviral cases are uploaded to ArboNET weekly by ODH.

## PREVENTION AND CONTROL

### INTEGRATED VECTOR MANAGEMENT

There is no one program that can apply to all of Ohio. Local ecology, community attitudes and local resources will ultimately define the mosquito abatement program. Any such program should use integrated vector management (IVM) practices based on sustained surveillance that focuses on vector species. IVM is adaptable to a wide variety of situations and would include:

- Trained inspectors or technicians to 1) identify larval mosquito production sites, 2) collect larval specimens on a regular basis from known larval habitats and 3) perform ongoing and consistent surveillance for new sources.

- Standardized and consistent adult mosquito surveillance efforts to provide data appropriate for monitoring vector activity, for setting action thresholds and evaluating control efforts.

- Seasonal monitoring of arboviral transmission activity in the environment so that appropriate actions can be taken to prevent human cases.

Guided by the surveillance elements of the program, local integrated control efforts should be implemented to keep vector populations below thresholds that would allow virus amplification and increase human risk:

- Source reduction or elimination of mosquito breeding sites where possible is an important control measure that does not rely on pesticide use.

- Larval and pupal mosquito control will reduce mosquito populations before they emerge as adults. Efficacy of larvicides should be monitored to ensure control.
  NOTE: Larval control alone is not enough to prevent a disease outbreak and should be used to complement, but not replace, control of adult mosquito populations.

- Adult mosquito control will reduce the abundance of infected biting adult mosquitoes below threshold levels in order to prevent human cases and break the enzootic transmission cycle. Efficacy of adulticides should be monitored to ensure control.
  NOTE: Adult control programs must use pesticides registered by US EPA for this purpose.

- Implement regular insecticide resistance monitoring in mosquitoes and options for managing resistance. Local programs can conduct this monitoring using easy-to-obtain materials and instructions provided in the CDC manual, *Guidelines for Evaluating Insecticide Resistance in Vectors Using the CDC Bottle Bioassay*, available online at: http://www. cdc. gov/malaria/features/bioassay. html.

- Provide continuing education for operational vector control staff to instill or refresh knowledge related to practical mosquito control. Training must focus on:
    - Safety and applied technology.
    - Ohio Department of Agriculture's Pesticide and Fertilizer Regulation requirements for commercial applicator license or trained service person.
    - Identification of mosquito species, their behavior, ecology, and appropriate methods of control.

- Provide public education and community involvement to share information about mosquito biology, mosquito-borne disease prevention and control, including breeding source reduction and personal protective measures.

As evidence of sustained or intensified virus transmission in a region increases, emergency vector control efforts to reduce the abundance of infected, biting adult mosquitoes must be implemented. Delaying adulticide applications until human cases occur negates the value and purpose of a surveillance system. Timely application of adulticides interrupts arbovirus transmission and prevents human cases.

**OATF Recommendations:** OATF recommends that local health departments and mosquito abatement districts use integrated vector management (IVM) practices as outlined above. ODH and all local health jurisdictions in Ohio should follow the CDC Guidelines for phased response to arbovirus surveillance data in Appendix 1.

## INDIVIDUAL AND COMMUNITY–BASED PREVENTION EDUCATION

It is essential that state and local health departments, other agencies and university extensions deliver consistent prevention messaging and education. The information must be accurate and should reassure the public that state and local resources are being directed towards dealing with the risks.

Beginning in 2000, the Ohio West Nile Virus Workgroup (OWNVWG), predecessor to the OATF, which consisted of federal, state and local agencies, worked together to develop the information available for member constituencies. In recent years, the coordination of this information has diminished and much of it is in need of updating. Currently, differing versions of OWNVWG fact sheets are housed at various agencies.

**OATF Recommendations:** OATF recommends that ODH serve as repository for official documents which would ensure a single source for most updated information. Other agencies developing WNV education and prevention messaging should ensure that their information is consistent with these documents. OATF further recommends that state and local agencies follow a consistent community outreach and public education strategy to respond to increasing risk of human infections as demonstrated by surveillance findings (Appendix 2). Messaging will vary slightly depending on the audience, the arbovirus and the season.

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## APPENDIX 1: Recommendations for a phased response to WNV surveillance data.

| Risk category | Probability of human outbreak | Definition | Recommended activities and responses |
|---|---|---|---|
| 0 | None | • No adult mosquito biting activity (vector species) | • Develop and review WNV response plan<br>• Review mosquito control program<br>• Maintain source reduction projects<br>• Secure surveillance and control resources necessary to enable emergency response<br>• Review and update community outreach and public education programs |
| 1 | Low | • Biting adult mosquitoes active (vector species)<br>-or-<br>• Epizootic activity expected based on onset of transmission in prior years<br>-or-<br>• Limited or sporadic epizootic activity in birds or mosquitoes | Response as in category 0, plus:<br>• Conduct Integrated Vector Management program to monitor and reduce vector mosquito abundance<br>• Conduct environmental surveillance to monitor virus activity<br>• Initiate community outreach and public education programs focused on personal protection and residential source reduction |
| 2 | High | • Sustained transmission activity in mosquitoes or birds<br>-or-<br>• Horse cases reported<br>-or-<br>• Human case or viremic blood donor reported | Response as in category 1 plus:<br>• Intensify and expand adult mosquito control in areas using ground and/or aerial applications where surveillance indicates human risk<br>• Intensify visible activities in community to increase attention to WNV transmission risk and personal protection measures<br>• Work with collaborators to address high risk populations<br>• Intensify and expand surveillance for human cases |
| 3 | Outbreak in progress | • Conditions favor continued transmission to humans (i. e. , persistent high infection rate in mosquitoes, continued avian mortality, seasonal mosquito population decreases not anticipated for weeks)<br>-or-<br>• Multiple confirmed human cases or viremic blood donors | Response as in category 2 plus:<br>• Intensify emergency adult mosquito control program repeating applications as necessary to achieve adequate control<br>• Consider aerial spraying in severe conditions (consult with ODH, CDC, FEMA)<br>NOTE: FEMA support for mosquito control after flooding or other disaster will require ongoing mosquito infection rate data to support need for spraying<br>• Monitor effectiveness of vector control efforts<br>• Emphasize urgency of personal protection, including use of repellents, through community leaders and media |

## APPENDIX 2: General messaging for WNV prompted by various levels of virus activity.

| Activity | Prompt | Messages |
|---|---|---|
| NO VIRUS FOUND | Early Season (April-May) | • State and local agencies are implementing a surveillance and control program to try to prevent a disease outbreak<br>• Mosquitoes carry disease<br>• You can find and eliminate mosquito breeding sites to prevent mosquitoes<br>• You can protect yourself<br>• Dead crows and blue jays could be a sign of West Nile virus. Be sure to report them to your local health department |
| | Mid-Season (May-June) | • Mosquitoes are active<br>• Continue to find and eliminate mosquito breeding sites<br>• State and local agencies are working to prevent a disease outbreak<br>• Continue to report dead crows and blue jays to your local health department<br>• You can protect yourself<br>• Recognize the signs and symptoms of encephalitis and seek medical care if needed |
| | Peak Season (July-September) | • Mosquitoes are at their greatest numbers during this season<br>• You can prevent mosquitoes. Continue to find and eliminate mosquito breeding sites<br>• State and local agencies are working to try to prevent a disease outbreak<br>• You can protect yourself<br>• Dead crows and blue jays could be a sign of West Nile virus. Be sure to report them to your local health department |
| | Late Season (October-November) | • Mosquitoes will be active until freezing weather<br>• Continue to find and eliminate mosquito breeding sites<br>• You can protect yourself |
| VIRUS ACTIVITY IN MOSQUITOES, BIRDS, HORSES, AND/OR HUMANS | Environmental Virus Detected But Low Infection Rates | To above messages, add:<br>• Virus has been detected in mosquitoes, birds, horses, etc.<br>• Stress personal protection and source reduction<br>• Notify healthcare providers of environmental transmission, the need for enhanced arboviral surveillance among patients and reporting requirements |
| | Human Cases and/or Sustained or Increasing Infection Rates | Intensify above messages, including media releases and public health alerts, and add:<br>• Recognize the signs and symptoms of encephalitis and seek care as needed<br>• Stress need to take personal protective action<br>• State and local agencies are working to better define the severity and extent of WNV in the area, and to identify and implement measures to prevent the disease from spreading<br>• Horses in the area are at risk and should be vaccinated |

## APPENDIX 3: Summary of Ohio Arbovirus Task Force Recommendations.

Human Epidemiological Surveillance

1. The state should continue its current human surveillance practices as described above, in accordance with CDC guidelines.
2. Expertise and the capacity for testing should be maintained at the Ohio Department of Health Laboratories to test for emerging and other arboviruses.

Environmental Surveillance

3. Arbovirus testing (RT-PCR) should be centralized and carried out by ODH due to available expertise, equipment and facilities. If necessary, ODH should research a fee-based system for testing arbovirus samples to offset costs at state level.
    a. If ODH cannot provide RT-PCR testing, then some alternatives for local health departments may include in-house testing, submission to an alternate government lab, contracting with a vendor or shared service agreements with other agencies.
4. Local health departments or vendors contracted to conduct arbovirus testing will need to provide appropriate biosafety equipment, facilities and training to protect staff.
5. Mosquito trapping cannot economically be centralized and should be carried out locally by the local health department or mosquito abatement district or through shared service agreements between agencies.
6. ODH should provide regular trainings and evaluations for local cooperators on surveillance procedures and mosquito biology to ensure optimal sample collection.
7. ODH should maintain the capacity to conduct environmental field investigations of arbovirus activity to assist local health departments with investigations of unusual cases and emerging infections.
8. Mosquitoes should be sent to ODH for species identification by qualified entomologists.
9. ODH should maintain the capability to carry out live bird surveillance and testing for arboviruses such as WNV, SLE and EEE. This will require maintaining appropriate state and federal scientific collecting permits and the necessary equipment.
10. LHDs should encourage and accept dead crow/blue jay reports in order to detect the location of potential WNV activity and aid in the direction of mosquito surveillance and control efforts.
11. Dead bird testing should be encouraged for those jurisdictions that otherwise lack active environmental surveillance for WNV (see recommendations 3 and 4, above).
12. Mammal surveillance is not recommended as a primary form of environmental surveillance; however the information is a useful adjunct for tracking WNV and EEE activity.

Prevention and Control

13. Local health departments and mosquito abatement districts should use integrated vector management (IVM) practices.
14. ODH and all local health jurisdictions in Ohio should follow the CDC Guidelines for phased response to arbovirus surveillance data.
15. ODH should serve as repository for official documents to ensure a single source for most updated information.
16. Other agencies developing WNV education and prevention messaging should ensure that their information is consistent with these documents.
17. State and local agencies follow a consistent community outreach and public education strategy to respond to increasing risk of human infections as demonstrated by surveillance findings.