

# **The State of Vermont Arbovirus Surveillance and Response Plan**

**Final Working Plan June 2012**

**Based on Vermont's West Nile Surveillance Plan,  
written August 2001 and revised July 2003**

This plan is based upon CDC's "Epidemic/Epizootic West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control", the "2011 Massachusetts Arbovirus Surveillance and Response Plan", "New York State West Nile Virus Response Plan", "The State of Connecticut West Nile Virus Surveillance & Response Plan", and the "New Hampshire Arboviral Illness Surveillance, Prevention and Response Plan, 2008 Season" .

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## Introduction to 2012 Revision

The 2012 revision of the 2003 West Nile Virus Surveillance and Response Plan is being updated to reflect the latest information about West Nile virus (WNV) and to include expanded surveillance for another important arbovirus, Eastern equine encephalitis virus (EEE). In 2010, EEE virus was first detected in Vermont by a survey of deer blood collected during hunting season. In 2011, a flock of emus in Vermont became ill with EEE. This plan includes information about mosquito and veterinary surveillance for EEE. This plan also includes guidance about the response to a positive EEE finding. Federal funding for arbovirus surveillance has been cut significantly and may go away completely in 2013. Therefore, some of the recommended surveillance and response activities may not be possible.

## Background Information on West Nile Virus

West Nile virus (WNV) is a virus that can infect a wide range of vertebrates. It is closely related to the virus that causes St. Louis encephalitis (SLE). WNV was first isolated in the West Nile province of Uganda in 1937. The first recorded epidemic occurred in Israel during 1951-1954. WNV has a widespread distribution in Africa, West Asia, and the Middle East. Large human epidemics of WN encephalitis have been recorded in South Africa in 1974 and in Israel in 2000. Additional human epidemics occurred in southern France in 1962, in southeastern Romania in 1996, and in south central Russia in 1999. Equine outbreaks occurred recently in Italy in 1998 and in France in 2000.

In late summer 1999, the first domestically acquired human cases of WN encephalitis were documented in the United States in the New York City metropolitan area. During the outbreak WNV-infected birds, mosquitoes and horses were also documented. The discovery of overwintering adult *Culex* mosquitoes infected with WNV during the winter of 1999-2000 predicted renewed virus activity for the spring of 2000 (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4909a2.htm>). Since 2000, WNV infections have been documented in all 48 contiguous states with a peak in human cases in 2003. WNV is now endemic in the U.S. In Vermont, WNV activity peaked in 2002 and 2003 (see Tables 1 and 2).

The majority (approximately 80 percent) of individuals infected with WNV experience no symptoms. Approximately 20 percent of those infected develop a mild febrile illness. Less than one percent of those infected with WNV develop severe illness, such as encephalitis or meningitis, which can be fatal in a small percentage of cases. People over 50 years of age and those with weakened immune systems are at greatest risk for severe illness due to WNV infection. Among the patients in the 1999 New York outbreak, approximately 40 percent of those with encephalitis or meningitis also had severe muscle weakness.

While the vast majority of human infections with WNV are mosquito-borne, other mechanisms of transmission can occur. Of the 24,656 cases reported to CDC during 2003--2008, 11 (0.04%) were reported as having been acquired in a laboratory setting.

<b>Table 1: WNV Cases in Humans Reported to the Centers for Disease Control and Prevention</b>
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<u>Year</u>	<u>Total Cases Reported to CDC</u>	<u>Neuroinvasive Disease Cases</u>	<u>Presumptively viremic blood donors (PVDs)</u>
2011	690	474	130
2010	1,021	629	144
2009	720	373	116
2008	1,356	689	174
2007	3,630	1,227	352
2006	4,269	1,495	361
2005	3,000	1,309	417
2004	2,539	1,148	224
2003	9,862	2,866	714
2002	4,156	2,946	NA
2001	66	64	NA
2000	21	19	NA
1999	62	59	NA
<b>Total</b>	<b>30,680</b>	<b>12,930</b>	<b>2,521</b>

**Table 2: Positive WNV Indicators in VT: 2000 - 2011**

<b>Indicator</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>Horses</b>	0	0	5	4	0	2	0	0	0	0	0	0
<b>Birds</b>	1	0	125	116	9	4	9	3	1	4	1	16
<b>Mosquito pools</b>	0	0	11	0	7	2	0	0	1	12	9	3
<b>Humans</b>	0	0	1	3	0	0	0	0	0	0	0	2
<b>Total</b>	1	0	142	123	16	8	9	3	2	16	10	21

Although not confirmed as the source of infection in all cases, 36 (0.1%) patients with WNV disease had received a blood transfusion or organ transplant within 30 days of illness onset. Since 2003, 124 cases of WNV occurred in pregnant women, which resulted in two infants acquiring the infection in utero. Although nine cases were reported to have been in breastfed infants, the probable source of infection in most of these instances was considered to be

mosquitoes, not breastfeeding.\*

Like humans, horses infected with WNV can experience asymptomatic infection or illness that can be mild or severe. Approximately one third of horses that develop severe illness due to WNV infection die or are euthanized. However, the availability of a West Nile virus vaccine for horses has greatly reduced the number of cases.

WNV is maintained in nature in a mosquito-bird-mosquito transmission cycle primarily involving *Culex* species mosquitoes, particularly *Cx. pipiens*, *Cx. tarsalis*, and *Cx. quinquefasciatus*. Birds are the natural reservoir hosts for WNV. When infected with WNV, many avian species develop transient viremia levels that are high enough to infect feeding mosquitoes. Many species of birds commonly survive their infections and develop permanent immunity, but many other species become ill and die.† Birds in the family Corvidae (e.g., crows, blue jays) are particularly susceptible to the virus, with a mortality rate greater than 90 percent. For this reason, surveillance for dead birds (especially corvids) infected with the virus is the most sensitive method of detecting the presence of WNV in an area. In addition, dead bird surveillance is an economical method for conducting surveillance statewide.

West Nile virus is maintained in nature primarily by *Culex* mosquito species, which preferentially feed on birds. Numerous other mosquito species have been shown experimentally to be competent vectors for WNV. It is not clear which species play the most important role in human transmission. Different breeding (e.g., in small containers versus in floodwaters) and host-seeking (e.g., preference for birds versus mammals) behaviors of mosquito vector species have important implications for WNV prevention and control. The goal of mosquito surveillance is to determine the distribution, population dynamics, and larval breeding habits of mosquito vectors. Mapping and monitoring larval habitats provides the information required to eliminate mosquitoes at the source through targeted larviciding. Trapping and identifying adult mosquitoes provides information on the distribution and relative abundance of mosquito species that are potential vectors of WNV. However, resources for mosquito trapping and testing have diminished so that it is no longer possible to conduct adequate mosquito surveillance for WNV. Therefore, trapping and testing of WNV competent mosquito vectors will be limited. Resources will be focused on trapping and testing in response to the detection of virus in a mammal.

In November 1999, the CDC developed guidelines to direct West Nile virus surveillance, prevention, and control efforts in the eastern United States (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4902a1.htm>). Revised national guidelines were issued in 2001 and again in 2003 (<http://www.cdc.gov/ncidod/dvbid/westnile/resources/wnv-guidelines-apr-2001.pdf>). This State of Vermont Arbovirus Surveillance and Response Plan incorporates CDC's guidelines and the recommendations of the Vermont Agency of Agriculture and Department of Health to guide the state's disease prevention activities.

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\* Surveillance for Human West Nile Virus Disease --- United States, 1999—2008, MMWR Surveillance Summaries; 59(02);1-17

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† ibid

## Background Information on Eastern Equine Encephalitis Virus

Eastern equine encephalitis virus (EEE) is an alphavirus that, like WNV, is transmitted by mosquitoes. The virus has been found in many species of wild birds, including most passerine birds (perching song birds, such as jays, warblers, finches and sparrows). The virus is passed among wild birds by mosquitoes, especially of the species *Culiseta melanura*. This mosquito reproduces in freshwater hardwood swamps. *Cs. melanura* mostly bites birds and is not thought to be an important vector for human or equine infection. Mosquito species that bite both birds and mammals are considered “bridge” species and may be the source of transmission of EEE to mammals. *Aedes*, *Ochlerotatus*, *Coquillettidia* and *Culex* species are potential bridge vectors.

EEE virus is well-established in North America, and outbreaks in horses have been recorded as early as 1831. Human cases are relatively uncommon, with 270 reported between 1964 and 2010. Most of the EEE viral activity has occurred in the Atlantic and Gulf Coast states, and most human cases have occurred in Florida, Georgia, New Jersey and Massachusetts. Epizootics have also occurred in Michigan, Indiana and Ohio.

Vermont has never documented a human case of EEE, but evidence of exposure in deer was found in 2010. In 2011, an emu flock in Vermont was infected with this virus which is further evidence that EEE virus is present in the state. It was suspected that EEE virus could be in Vermont because it had recently been documented in New Hampshire, northeastern New York and Quebec. Two horses tested positive for EEE virus in Clinton County, New York in 2008, and the same year veterinary cases of the virus were documented in Quebec. In 2009, Maine had an outbreak in horses, with many cases occurring in the central part of the state in areas where EEE virus had never been detected before. Vermont has hardwood swamps that provide the proper habitat for the main mosquito vector, *Cs. melanura*, and this species has been found in several areas of the state.

In humans, EEE virus infection can vary from asymptomatic to severe illness with encephalitis. It is one of the deadliest mosquito-borne diseases in the US with a mortality rate of approximately 33%. In addition, about half of people who survive have some degree of permanent neurologic damage, which can be severe in some cases.

EEE virus causes a severe neurologic disease in horses and other equids. Mortality in unvaccinated horses approaches 90%. Signs and symptoms in horses include fever, depression, anorexia, ataxia, limb weakness or paralysis, blindness, irritability, and sudden death. Alpacas and llamas are also susceptible to EEE virus. EEE virus can also cause a serious disease in emus and other ratites. However, in these species, symptoms of hemorrhagic gastroenteritis predominate.

Surveillance for EEE virus will include trapping and testing of adult *Cs. melanura* and other competent vector species, testing of veterinary samples from symptomatic domestic animals, and surveillance for human illness.

## Plan of Action

The presence of West Nile virus in Vermont was first documented in October 2000, when a hermit thrush found dead in southern Vermont tested positive for the virus. In 2002, WNV activity was widespread in Vermont, with 11 of 14 Vermont counties documenting at least one positive surveillance indicator. Eastern equine encephalitis virus was first detected in Vermont in 2010.

*Culex* mosquito species and *Culiseta melanura* are known to occur in Vermont (Graham AC, Turmel JP, Darsie RF. New state mosquito records for Vermont including a checklist of the mosquito fauna. J Amer Mosquito Control Assoc 1991;7:502-503). Both of these genera are found throughout Vermont, wherever targeted trapping in the preferred habitat has been done. *Culex pipiens* and *Culex restuans* are well established and common in Vermont, taking advantage of any natural or artificial container for breeding. *Culiseta melanura* has been documented in 10 out of 14 counties, ranging from Franklin County to Bennington and Windham counties.

Information gathered from surveillance activities will inform local policy makers about the level of virus activity and the potential threat to human health. This plan allows the state and local government the flexibility to respond to local situations. The goal of the State of Vermont Arbovirus Surveillance and Response Plan is to protect public health from an outbreak of WNV or EEE virus. To accomplish this goal, emphasis will be placed on public education about the transmission of these viruses, elimination of mosquito breeding habitats, and personal preventive measures to prevent or reduce the risk of exposure.

Adult mosquito suppression programs will only be recommended to local officials as a last resort if surveillance data suggest an imminent risk to human health. Decisions for public health action will depend upon interpretation of the available surveillance data and a number of additional factors, including:

- a) Current weather;
- b) Season of the year (i.e., how long the transmission risk can be expected to persist until mosquito activity decreases);
- c) Feasibility of the planned activities;
- d) Public input on planned activities;
- e) Ecology of the area (e.g., key habitat types);
- f) The human population at risk (urban versus rural, community perception of the relative risk of pesticides versus arbovirus infection); and
- g) Vector species known or believed to be of importance in the area.

The anticipated benefits of using pesticides versus the risk of harm to people and the environment from their use, as well as the factors listed above, will be considered. If the use of pesticides to control arboviruses is anticipated, steps will be taken to inform the local community and to address community concerns.

An Arboviral Task Force was convened in August 2000 to assign individuals and agencies responsible for the activities detailed in this plan. Members of the task force included the Secretary of Agriculture, the Commissioner of Health, the State Epidemiologist, the State

Public Health Veterinarian, the State Entomologist, the State Agricultural Veterinarian, epidemiologists from the Department of Health, and representatives from the State Public Health Laboratory, the Public Affairs Office at the Department of Health, and the Pesticide Advisory Council.

This plan is designed to be part of an overall plan for vectorborne disease management in Vermont. According to the CDC, every state should have, at a minimum, a functional arbovirus surveillance and response capability. Vector surveillance data are critical for determining the appropriate response to a vectorborne outbreak, and also for targeting vector suppression efforts (<http://www.gao.gov/new.items/he00180.pdf>). However, a decrease in federal funding through CDC has limited the scope of vector surveillance in Vermont. Recent reductions in funding mean that vector surveillance will be limited even more, so efforts will be focused on detecting EEE virus, which was only recently documented in Vermont.

The plan is based upon the most up-to-date scientific information available. Knowledge gained from subsequent surveillance and research data, both nationally and in Vermont, may result in revisions to this plan. This current revision of the plan was reviewed by the State Epidemiologist, the State Public Health Veterinarian, the State Entomologist and the State Veterinarian.

# Components of the Plan

## A. Education:

Education of healthcare providers, veterinarians and the general public about arboviruses is a key focus of this plan. Each spring and early summer a set of core educational materials will be updated and distributed as appropriate. Education outreach will consist of press releases, VT-Health Alert Network (HAN) alerts, posted information on VDH's website, published information in the Infectious Disease Bulletin, emails, and other appropriate methods. Additional educational efforts should be done in response to positive surveillance indicators.

Routine core educational activities:

1. Develop educational messages with emphasis on personal protective measures for groups at highest risk for serious illness (i.e., individuals over 50 years of age) and on the importance of eliminating mosquito breeding sites. (Vermont Department of Health (VDH), Vermont Agency of Agriculture, Food and Markets (VAAF))
2. Update the Department of Health's West Nile Virus and Eastern Equine Encephalitis Fact Sheets as indicated. (VDH)
  - a. Keep VDH's WNV and EEE web pages up to date.
  - b. Communicate information to the public as needed, including
    1. minimizing exposure to arbovirus vectors,
    2. the importance of public cooperation in reducing mosquito breeding sites,
    3. integrated pest management for controlling mosquito populations,
    4. the proper use of insect repellants,
    5. the agencies responsible for suppression project activities,
    6. how to protect susceptible pets and livestock from illness
  - c. Respond to public inquiries. (VDH, VAAF, USDA Wildlife Services(WLS))
  - d. Educate healthcare providers about testing and reporting of arboviral diseases.
  - e. Educate veterinarians about testing and reporting of arboviral diseases in animals.

## B. Surveillance

### 1. **Avian mortality associated with WNV infection.**

- a. Avian mortality reports and dead bird testing have proven to be a sensitive way to determine if WNV is present in a geographic area. Vermont has detected WNV in dead birds in most years since surveillance began. However, due to a decrease in federal support, the dead bird surveillance program will be discontinued in 2012.

### 2. **Passive human surveillance for arboviral illness.**

- a. Disseminate information about the arbovirus surveillance system to health care

- providers around the state. (VDH)
- b. Maintain surveillance data on reportable suspect cases. (VDH)
  - c. Coordinate the testing of specimens for arboviruses as appropriate. This may include obtaining samples for confirmatory testing by a public health laboratory. (VDH)
  - d. Provide information on the number of human cases to the public and local officials. (VDH)
  - e. Report human surveillance data to the CDC. (VDH)
  - f. Active surveillance for human cases will be considered if surveillance data indicate increased risk for human illness, or if a human case is identified.

#### Who should be tested for arboviral illness

Hospitalized patients with encephalitis, meningitis of suspected viral origin, or Guillain-Barré syndrome should be tested. Patients meeting these criteria can be tested through the Vermont Department of Health Laboratory. Testing is not recommended for persons with mild illness, such as fever or headache, because levels of West Nile virus activity in the community would have to be very high for such symptoms to likely be due to WNV infection. Knowledge of the etiology is not required for establishing a care plan for mild illness. These persons should be advised to seek medical attention if more severe symptoms develop such as confusion, severe muscle weakness, lethargy, severe headache, stiff neck, or photophobia.

Specimens should be submitted through local laboratory providers.

#### Arbovirus Specimen Collection and Transport

##### *Acute and convalescent serum:*

Collect 7–10 ml of blood in a red-top or tiger-top collection tube. Acute phase serum should be collected on day 10 of illness, as most cases have detectable serum IgM antibody by the eighth day of illness. Convalescent serum should be collected on day 21 of illness; most infected individuals demonstrate long-lived serum IgG antibody by three weeks post infection. Any patient whose acute phase serum tests negative for IgM antibody needs to have a convalescent phase specimen submitted for testing. Specimens should be centrifuged and 1–2 ml of serum submitted at refrigerated temperature to the Vermont Department of Health Laboratory.

##### *Cerebrospinal fluid:*

Collect 1-2 ml of cerebrospinal fluid (CSF) as early as possible. IgM antibody is detectable in CSF in most (99%) patients by the onset of symptoms, but is relatively short-lived in CSF compared with serum. Detection of IgM in CSF confirms recent infection with West Nile virus, although infection cannot be definitively ruled out if IgM is not detected. IgG antibody in CSF often does not reach detectable levels and is therefore not a sensitive indicator of infection. Specimens should be submitted frozen to the Vermont Department of Health Laboratory.

All specimens should be accompanied by a completed form VDHL's Clinical Test Request Form. Date of onset must be included

The form and serology mailers can be obtained by contacting the VDHL at (800) 660-9997, extension 7560.

### **3. Passive veterinary surveillance for arbovirus infection**

- a. Disseminate information on veterinary surveillance activities to veterinarians throughout the state. (VDH, VAAFAM)
  - b. Facilitate testing of suspect veterinary cases. (VDH, VAAFAM)
  - c. Maintain surveillance data on arbovirus-infected domestic animals in Vermont. (VAAFAM, VDH)
  - d. Provide veterinary surveillance data to the public and local officials. (VDH, VAAFAM)
  - e. Report veterinary surveillance data to the CDC. (VDH)
  - f. Disseminate information about the WNV and EEE virus equine vaccines to veterinarians and horse owners throughout the state. (VAAFAM, VDH)
4. **Adult mosquito surveillance** - Due to decreased funding for this effort over the years, the number of trap sites has been reduced, and trap sites have been clustered together in areas that can be reached frequently by existing staff. In addition, routine trapping will be focused on EEEV-vector species.
- a. Determine likely sites for mosquito collection depending on target species. (VAAFAM)
  - b. Identify mosquitoes to species and separate into pools. (VAAFAM)
  - c. Test mosquito pools for EEE virus as appropriate. (VAAFAM)
  - d. Store untested mosquito pools in the event that viral testing is later indicated. (VAAFAM)
  - e. Maintain records of mosquito trap sites, the number and species of mosquitoes collected by location and date, and arbovirus test results. (VAAFAM)
  - f. Provide mosquito surveillance data to the public and local officials. (VDH, VAAFAM)
  - g. Report mosquito surveillance data to the CDC. (VAAFAM)
  - h. Conduct enhanced mosquito surveillance in areas where virus has been detected in a human or domestic animal. (VAAFAM)

#### Adult Mosquito Surveillance Methods

Monitoring mosquitoes in a consistent fashion provides information about species present and seasonal population trends among species. Mosquito surveillance will start in the spring when air temperatures warm to greater than or equal to 50° F. Surveillance will likely end in September or October, unless extended surveillance is indicated due to warm air temperatures or evidence of virus. Ideally data from consecutive seasons would provide the most thorough baseline data, but limited funding has made consistent collection of mosquito data difficult.

A combination of carbon dioxide-baited CDC light traps, gravid traps and resting

boxes will be used to collect mosquitoes. However, there will be an emphasis on the use of resting boxes to increase the numbers EEEV-competent species. Carbon dioxide-baited CDC light traps primarily collect host-seeking, non-blooded female mosquitoes. Traps will be set in the late afternoon or early evening and retrieved the following morning. Traps will be set and attended on a regular basis, as resources permit. Once productive trapping sites are located, traps will be operated consistently at the same sites, as resources permit. Samples will be identified to species and sorted into pools. A mosquito 'pool' is defined as a group of ten to fifty mosquitoes of the same species that were trapped at the same location on the same night. All samples will be stored on dry ice, in the event that viral testing is later indicated. Global positioning system (GPS) units will be used as resources permit to map survey areas.

Following blood feeding, mosquitoes seek sheltered areas in which to rest and digest the bloodmeal into eggs. Once eggs have formed, the gravid female seeks a site to lay (oviposit) her eggs. The gravid trap is specifically designed to collect mosquitoes seeking oviposition sites. Gravid traps will be set in the late afternoon or early evening and retrieved the following morning. Collections from each trap will be identified to species and sorted into pools. All samples will be stored on dry ice, in the event that viral testing is later indicated.

Resting box traps will be set out in areas conducive to finding the main vector species for EEE virus, *Culiseta melanura*. Ground surveys may also be used to detect resting populations. Live, fresh specimens will be collected from resting areas and used to determine population densities. Both natural (bridges, porches, culverts, vegetation) and artificial (red boxes, black boxes, nail-keg shelters) resting sites may be used for this purpose.

Areas targeted for mosquito surveillance will be selected based upon perceived risk (e.g., more densely populated areas, known flooding tendencies), geographic location, and convenience.

#### Adult Mosquito Arboviral Testing

To detect EEE virus, *Culiseta melanura* and other *Culiseta* sp will be prioritized for testing. Other suspected bridge vectors may also be tested including *Aedes* spp., *Ochlerotatus* spp. and *Cocquillittidia perturbans*.

When the goal is to detect WNV, trapping and testing will focus on *Culex* (e.g., *Cx. pipiens*, *Cx. restuans*, *Cx. salinarius*), and the suspected secondary vectors of the genus *Aedes* and *Ochlerotatus* (e.g., *japonicus*, *triseriatus*, *trivittatus*, *candensis* and *vexans*).

Following sorting and identification of mosquito specimens, female mosquitoes of the same species from each trap will be pooled. Pools may be tested with the VecTest™ assay and/or tested for WNV by PCR at the VAAFM laboratory. If a mosquito pool tests positive for EEE virus with the VecTest, future testing of mosquito pools from the same trap site will be sent to an outside lab for testing by PCR. Alternatively, arrangements may be made for all mosquito testing to be done by one of the neighboring public health laboratories, such as the Wadsworth Laboratory in NYS or

the NH or MA Department of Health laboratories.

5. **Larval mosquito surveillance** - Because of limited staff, larval mosquito surveillance has been limited to areas that are part of one of the three Mosquito Control Districts in the state.
  - a. Map and characterize aquatic mosquito breeding habitats. (VAAFMM)
  - b. Sample mosquito larvae utilizing standard dipping techniques. (VAAFMM)
  - c. Identify larvae to species. (VAAFMM)
  - d. Maintain records of the number and species of larvae sampled by location and date. (VAAFMM,)

#### Larval Mosquito Surveillance Methods

Surveillance activities for immature (larvae and pupae) mosquitoes involve the mapping and characterization of aquatic habitats where mosquitoes breed. Mosquito breeding can occur anywhere where there is standing water available. Examples include tires, pails, garbage cans, plant pots, clogged rain gutters, bird baths, storm drains, unchlorinated swimming pools, and swimming pool covers. Mosquito breeding can also occur in natural water-filled areas, such as wetlands, temporarily flooded areas, or stream edges.

The standard one-pint dipper will be used for sampling (dipping) for mosquito larvae. Recommendations for successful dipping include:

- Larvae at or under the water surface are sensitive to water movement and shadows; try to minimize both.
- The dipper cup should be directed at making a quick but gentle sweep at the water surface.
- Enter the water at an angle, so that surface water begins entering the cup. Continue sweeping across the water surface until the cup is one-half to three-quarters full. Avoid filling the cup all the way, as larvae can escape before the dipper is righted and removed from the water.
- Larvae that are disturbed from the water surface will escape to deeper water, resurfacing only when air is needed. Pausing between dips or changing dipping locations will allow enough time for larvae to resurface.
- If there is vegetation in the water, try dipping where the water meets the leaves or stems.

Samples will be recorded as the number of larvae per dip on the Mosquito Breeding Site Survey Form. Larvae will be identified to species through the use of larval mosquito identification keys.

## **C. Response**

The key to reducing the risk of EEE and WNV infection is educating the public about measures they can take to protect themselves against mosquitoes. VDH will continue outreach and education efforts to the general public.

The response to positive surveillance indicators will depend upon the virus detected. In most cases, the response will be educational and include information on preventing mosquito bites, reducing peridomestic exposure, seeking appropriate medical care, and protecting susceptible animals. Increased surveillance may also be recommended. Vector management to suppress mosquito populations may be considered if the risk of human infection appears to be high.

### 1. Notification and communication in response to detection of WNV or EEE

- a. First positive indicator: A press release will be issued in response to the first positive indicator.
- b. Positive mosquito: Whenever virus is detected in a mosquito pool in a town, at a minimum, the VDH District Office and the Town Health Officer will be notified. This can be an opportunity for the dissemination of information about prevention measures. Additional press releases will be done if there is an increased risk to human and animal health. The risk depends on such factors as the species of mosquito found to be positive (ie. bird biter vs. mammal biter), the infection rate and the overall number of positive surveillance indicators.
- c. Positive domestic animal finding: The State Veterinarian will be notified, who will in turn notify the attending veterinarian. After those notifications have been done, the Town Health Officer and the District Office for the district will also be notified. The Communications Offices of both VDH and VAAFM will be notified.

Active surveillance for additional veterinary cases may be considered. Enhanced mosquito surveillance in the area of likely exposure will also be considered.

- d. Positive human case: The Commissioner of Health will be notified, followed by the Communications offices of VDH and VAAFM. After verifying that the healthcare provider and patient are aware of the diagnosis, the Town Health Officer and the District Office will be notified.

A press release will be considered.

Enhanced mosquito surveillance will be considered.

Enhanced passive or active human surveillance will be considered. In most cases, a reminder for physicians to consider arboviral illness will be sent out using VT-HAN.

### 2. Vector Management

Larval source reduction in defined areas is the most effective way to prevent transmission of WNV. Adulticiding may be indicated if large numbers of adult mosquitoes are present. Individual situations will be evaluated, and the appropriate

suppression method used.

- a. Meet with local officials regarding proceeding with a suppression project. (VDH, VAAFM)
- b. Assist local officials in conducting informational meetings on proposed mosquito suppression programs. Make public notice at least 24 hours prior to any ground-level or aerial spraying of adulticides. (VDH, VAAFM)
- c. Secure all permits necessary to conduct the appropriate mosquito suppression program. (VAAFM)
- d. Notify State Apiculturist of adulticiding. State Apiculturist will notify beekeepers in the area. (VAAFM)
- e. Notify the Vermont chapter of the Northeast Organic Farming Association of Vermont. (VAAFM)
- f. Secure pesticide(s), aerial applicator, and ground-based ULV machinery and enlist certified pesticide applicators to conduct suppression programs. (VAAFM)
- g. Assemble a ground monitoring crew to deal with environmental issues (e.g., weather, water, wildlife, livestock, non-target and ecosystem effects, organic farms and other crop lands). (VAAFM)
- h. Apply mosquito larvicide or adulticide. (VAAFM)
- i. Implement surveillance for possible health effects of exposure to pesticides.
  1. Prospectively collect data on reports of possible health effects related to pesticide exposure. (VDH)
  2. Retrospectively examine data on health outcomes potentially associated with pesticide use. (VDH)

#### Surveillance for possible health effects of pesticide exposure

Data will be collected prospectively on reports to the poison control center of possible health effects of pesticide exposure if adult mosquito suppression for arbovirus is conducted. Information collected may include name of caller, county of residence, age and gender of exposed or affected individual, location of exposure, mode of exposure, symptoms or complaints, and involvement of a health care provider. This information will be used to identify:

- 1) Serious, unusual, or repeated acute health effects that show a pattern of association with local or aerial spraying that might warrant further evaluation. More intensive evaluation might include collection of detailed case histories for a subset of reports, or review of emergency department records.
- 2) Unexpected routes of exposure that might warrant investigation.
- 3) Frequent problems in responding to concerns and inquiries about pesticide health effects, including knowledge gaps.

