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MAINE CDC

State of Maine

Arboviral (Mosquito-Borne) Illness

Surveillance, Prevention and Response Plan

2014 Season

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INTRODUCTION

The 2014 Arboviral (Mosquito-borne) Illness Surveillance, Prevention and Response plan provides surveillance and phased response guidance for both Eastern Equine Encephalitis (EEE) virus and West Nile virus (WNV). The purpose of the plan is to provide guidance on operational aspects of surveillance, prevention and response by the State and local communities to control mosquito-borne disease and encourage proactive preparations for the 2014 season. This plan is the result of analysis and review of surveillance data and response plans for Maine, as well as from other State and federal entities. Maine CDC will continue to seek advice from its partners and collaborators and modify the plan, as appropriate.

The Maine Vector-borne Work Group was formed in 1986 in anticipation of the increased threat posed by the emergence of vector-borne diseases in Maine. The expertise provided by the group works to minimize the risk to Maine residents of being exposed to, and infected with, vector-borne diseases. The State Epidemiologist convenes this Work Group bimonthly to develop and collaborate on a statewide coordinated strategy to reduce the risk of vector-borne (mosquito and tick) diseases in Maine. The work group and its sub-groups meet more frequently as warranted with dialogue and updates continuing throughout the year. Information provided from the Maine Vector-borne Work Group meetings is contained herein and aims to guide proactive community planning and actions to reduce the risk of human disease from EEE virus and WNV. Key objectives contained in this plan include:

- Monitoring trends of EEE virus and WNV in Maine;
- Supporting locally-based mosquito plan development and response;
- Providing timely, detailed and summary information on the distribution and intensity of EEE and WNV virus in the environment;
- Laboratory diagnostic testing of EEE and WNV for humans, horses and other animals; and
- Communicating guidelines, advice and support on activities that effectively reduce the risk of disease.

This document will be reviewed at least annually.

I. DISEASE BACKGROUND

The two main mosquito-borne viruses (also known as arboviruses, for **arthropod-borne viruses**) recognized in Maine and known to cause human and animal disease are Eastern Equine Encephalitis (EEE) virus and West Nile virus (WNV). The first potentially Maine acquired human case of EEE was identified in 2008. The first case of indigenously acquired WNV occurred in 2012. Different types of mosquitoes, with species-specific feeding habits (birds and/or mammals) and habitats (environments where they are found) carry these diseases. These differences are important in developing strategies for controlling the mosquitoes involved.

Infected mammals (e.g., humans, horses) are considered “dead-end” hosts for EEE and WNV. This is because mosquitoes that bite humans or equines infected with EEE or WNV do not pick up enough virus particles to transmit the disease to the next human or animal they bite. Risk of disease in humans is directly related to the amount of exposure to infectious mosquitoes.

A. Eastern Equine Encephalitis Virus

EEE virus is an alphavirus, present in some passerine (perching song birds) bird species found in fresh-water swamp habitats. The virus is transmitted among wild birds in these areas primarily by *Culiseta melanura*, a mosquito species that prefers to feed on birds. EEE virus has a cycle of natural infection among wild bird populations with occasional infections of humans, non-human mammals (most often horses) and large domesticated birds (emus, ostriches, etc). Bridge vectors (i.e., a mosquito species that is indiscriminant and will feed on birds or mammals) are responsible for transferring the EEE virus to humans.

Some people infected with EEE may get only a mild flu-like illness with fever and headache. However, for people with infection of the central nervous system, a sudden high fever, severe headache, and stiff neck can be followed quickly by seizures, coma, and death. The cost of a single human case of EEE has been estimated to range from \$21,000 for mild, transient illness, to as much as \$3 million for individuals who suffer permanent neurologic damage. Human cases of EEE occur sporadically in the United States. Historically, clusters of human cases have occurred in sequential cycles of 2-3 years, with a hiatus of numerous years between outbreak and high-risk years. Between 1964 and 2013, 292 human cases of EEE were reported in the US, with an average of 6 cases per year. Most of the cases reported were from eastern states, primarily Florida (74 cases), Massachusetts (46 cases), Georgia (29 cases), and New Jersey (20 cases).

EEE activity documented in Maine in the last 5 years includes:

Table 1: EEE Activity in Maine, 2009-2013

	2009	2010	2011	2012	2013
Humans	0	0	0	0	0
Mosquito Pools	2	0	0	0	26
Horse	15	0	0	0	3
Birds	3*	1	0	1**	2***
Other animals	1 (llama)	0	0	0	0

*3 separate flocks diagnosed with EEE

**1 pheasant flock diagnosed with EEE

***1 pheasant flock and 1 emu diagnosed with EEE

Updated information on arboviral activity in Maine can be found at <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/arboviral-surveillance.shtml>.

The incidence of EEE infection in humans varies by geographic area. Human EEE disease is more common in areas that support dense populations of passerine birds and have favorable habitats for the larvae of the primary mosquito vector. In Maine, these areas consist mainly of large and mature white cedar and red maple swamps. EEE has never been reported in a Maine resident to date. However, in 2008 there was a fatal case of EEE diagnosed in a Massachusetts resident who may have acquired the infection while vacationing in Maine.

From 2001 to 2013, evidence of EEE infection was found all 16 counties in Maine. This evidence was obtained through a combination of EEE seroprevalence studies in animals and regular surveillance activities performed by Maine CDC. Seroprevalence indicates previous exposure to the virus, not active illness. Testing has been performed on samples from deer, moose, bear, wild and domestic turkeys, and a variety of songbirds in conjunction with federal CDC.

Additionally, the likelihood of mosquito exposure is a key factor in determining the risk of human EEE infection. The abundance of specific species of mosquitoes at critical periods during the transmission season, in part determined by groundwater levels and the timing of rainfall during the mosquito season, is important in determining the likelihood of mosquito exposure. The use of personal protective measures (avoidance of mosquitoes, use of repellent) by people reduces their risk of exposure and infection.

B. West Nile Virus

WNV is a flavivirus. Similar to EEE, WNV is also maintained in the environment in a cycle that involves birds, with indiscriminant feeding mosquitoes infecting humans and other mammals. WNV causes sporadic disease in humans, and occasionally results in significant outbreaks. In 2013, 1,267 human cases of WNV neuroinvasive disease (West Nile meningitis and West Nile encephalitis) and 1,202 human cases of WNV fever were reported nationwide to the federal Centers for Disease Control and Prevention (CDC).

WNV activity was first identified in Maine in September 2001. WNV activity documented in Maine in the last 5 years includes:

Table 2: WNV activity in Maine, 2009-2013

	2009	2010	2011	2012	2013
Human	0	0	0	1	0
Mosquito Pools	1	1	0	7	3
Birds*	0	0	0	0	0

*Routine testing for WNV in dead birds was discontinued in 2006

Updated information on arborviral activity in Maine can be found at <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/arboviral-surveillance.shtml>.

An estimated 80% of people who become infected with WNV never develop symptoms attributable to the infection. For those who do develop symptoms: severe symptoms can include high fever, headache, neck stiffness, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, and paralysis. These symptoms may last weeks, and neurological effects may be permanent. Up to 20 percent of the people who become infected will display symptoms of WNV fever, including fever, headache, body aches, and can include swollen lymph glands. Symptoms can last for days to months. People over 50 years of age are at a higher risk of developing serious symptoms of WNV.

West Nile virus activity varies from year to year. When there are a high proportion of infected mosquitoes in a relatively small geographic area the risk of transmission of virus to humans will increase. West Nile virus activity in Maine in 2013 was moderate, with three mosquito pools testing positive for virus. Maine discontinued routine dead bird surveillance in 2006, based on the fact that this form of surveillance is no longer considered a useful indicator for WNV.

II. PROGRAM GOALS

Timely and accurate information provided by Maine CDC may offer an early warning of increased risk of EEE and WNV virus infection of humans or non-human mammals. Based on surveillance information, actions to reduce disease transmission can be implemented early when the impact can be lessened.

Maine CDC Specific Program Priorities

1. Active involvement in and maintenance of the Maine Vector-borne Work Group to provide expertise in proactively minimizing the risk to Maine residents of being exposed to and infected with mosquito-borne diseases.
2. Conducting surveillance including laboratory testing of human clinical specimens, and testing of mosquitoes, horses, and other animals to identify EEE virus and WNV.
3. Tracking trends in incidence and prevalence of EEE virus and WNV infections by geographic area.
4. Advising human providers and veterinarians on the appropriate procedures for detecting and identifying infections and disease caused by mosquito-borne viruses.
5. Providing information to the public on mosquito-borne disease and disease risk, and how to take precautions to reduce the risk of infection.
6. Providing timely information to communities to assist in developing and implementing local mosquito control and response plans.
7. Participating in the national Arbovirus surveillance network (ArboNet) coordinated by the federal CDC.

Maine CDC works cooperatively with other state agencies, federal agencies, local communities and selected interest groups to identify and support the use of risk reduction and disease prevention methods that are specific to the cause of the diseases, that use the least intrusive and most appropriate prevention methods, and that support planning and practices that minimize the use of pesticides.

III. PREVENTION AND CONTROL

Ultimately, the key to reducing the risk of arboviral disease is education and outreach to the public regarding the need for mosquito-bite prevention to protect against diseases such as EEE and WNV. The emergent public health threat posed by arboviral illness requires a vigilant outreach effort. As the state public health entity, Maine CDC will continue to take a lead role in providing public education efforts to promote prevention, by working with our partners to maximize the opportunity to alert our residents to the dangers posed by mosquito-borne illness.

This will include working with the media, local communities, businesses and special populations such as schools, the homeless and others who spend considerable time outdoors, such as those who hunt and fish.

Maine CDC provides information to the public and communities to guide planning and actions to reduce the risk of human disease from EEE virus and WNV. Individuals can take a number of simple steps that will greatly reduce the risk of mosquito-borne viruses to them, their families, and their communities. Choosing to wear protective clothing (e.g., long pants, long-sleeve shirts), using effective Environmental Protection Agency (EPA) approved repellants, and minimizing opportunities for mosquitoes to breed are all important ways individuals can help prevent the spread of EEE and WNV in Maine. Community efforts, such as public education, mosquito surveillance, and integrated pest management (IPM) measures aimed at mosquito larvae may be necessary to decrease the local risk of EEE virus and WNV.

A. Prevention Through Knowledge

The goal of all mosquito-borne virus public outreach activities is to provide Maine's residents with helpful, accurate and specific advice and information in order to approach this problem with the appropriate level of caution.

Maine CDC's website includes general background information and surveillance updates as well as links to other informational websites including other state and federal agency sites. Printed materials can be ordered through this website: <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/order-form-wn.shtml>.

Epidemiologists from Maine CDC are also willing to conduct trainings and give presentations on arboviral diseases and can be contacted by e-mail at disease.reporting@maine.gov or by phone at 1-800-821-5821.

B. Prevention Action Steps

1. Preventing Mosquito Breeding Opportunities: By reducing exposure to mosquitoes around their homes and by eliminating mosquito breeding grounds, Maine residents can greatly reduce their risk of mosquito-borne virus exposure. Many species of mosquitoes lay their eggs in standing water. Fresh water swamps and coastal areas provide larval habitat for the mosquito species commonly associated with EEE. Weeds, tall grass, and bushes may provide resting areas for the mosquitoes that are most often associated with WNV.

Maine CDC recommends residents take the following steps to reduce opportunities for mosquito breeding:

- Eliminate artificial sources of standing water around residential and commercial areas by discarding outdoor artificial containers such as tin cans, plastic containers, glass bottles, or similar water-holding containers.
- Remove all discarded tires from all property. The used tire is the most common site for mosquito breeding in the United States.

- Dispose of or drill holes in the bottom of containers left outdoors, such as recycling containers or flowerpots. Drainage holes on the sides of containers will still allow enough water for mosquitoes to breed. Do not overlook containers that have become overgrown by aquatic vegetation.
- Make sure roof gutters drain properly. Clean clogged gutters in the spring and fall and as often as necessary to eliminate standing water.
- Clean and chlorinate swimming pools, outdoor saunas, and hot tubs following disinfectant label directions. If not in use, keep them empty and covered. Do not allow these covers to collect standing water.
- Aerate ornamental pools or stock them with native fish. Water gardens become major mosquito producers if they are allowed to stagnate.
- Turn over wheelbarrows and plastic wading pools when not in use. Both provide breeding sites for domestic mosquitoes.
- Change water in birdbaths at least twice weekly.
- Remind or help neighbors to eliminate mosquito breeding sites on their property.
- Consult with local mosquito control companies licensed by the Maine Board of Pesticides Control (BPC) (go to <http://www.maine.gov/dacf/php/gotpests/bugs/tick-mosquito-companies.htm> to see an updated list of licensed companies) for additional solutions to decrease mosquito-breeding activity in nearby areas. Products are available that can be used to reduce mosquito populations (see Mosquito Control Activities below).
- The management of ponds, marshlands, and wetlands is regulated under existing state law and administrative rule. Alteration may require the approval of state and possibly federal agencies. Contact the Maine Department of Environmental Protection (DEP) for further information <http://www.maine.gov/dep/index.shtml>.

2. Personal Protective Measures: Residents can take simple steps to minimize mosquito bites. Such steps are critical in reducing the risk of EEE and WNV infections. Maine CDC recommends that residents take the following steps to protect themselves, particularly from June to October, when mosquitoes are most active:

- If outside during evening, nighttime and dawn hours, or at any time mosquitoes are actively biting, children and adults should wear protective clothing such as long pants, long-sleeved shirts, and socks, and consider the use of personal repellent.
- EPA approved repellents include: DEET, Picaridin (KBR3023), IR3535, and Oil of Lemon Eucalyptus. The length of time a repellent is effective varies with ingredient and concentration. Always follow the manufacturer's instructions on the label.
- Permethrin is an EPA approved repellent product that can be used on clothing or fabrics. This product should not be applied directly to the skin. Always follow the manufacturer's instructions on the label.
- Do not allow young children to apply repellent themselves and do not apply repellent directly to children. Apply to your own hands and then put it on the child's skin.
- Infants and children should be protected by placing mosquito nets over strollers in the evening, nighttime and dawn hours or at any time mosquitoes are actively biting.
- After returning indoors, wash treated skin with soap and water or bathe. Also, wash treated clothing before wearing again.

- Store repellent out of reach of children.
- For additional information about chemicals contained in repellents, visit the National Pesticide Information Center (NPIC) website at <http://npic.orst.edu/repel.html> or contact the Maine BPC at 207-287-2731.
- Make sure that doors and windows have tight-fitting screens. Repair or replace all screens in your home that have tears or holes.
- Vitamin B, ultrasonic devices, incense and bug zappers have not been shown to be effective in preventing mosquito bites.

3. Mosquito Control Activities: The objective of public health mosquito control is to prevent transmission of mosquito-borne disease to humans. Reduction of mosquito species is not carried out by Maine public health agencies. It is important to emphasize that in most circumstances local communities make the final decision regarding mosquito control activities. Communities are responsible for developing, maintaining and financing local mosquito control programs. Maine CDC, the Maine Department of Agriculture, Conservation, and Forestry, the Maine Board of Pesticides Control, and the Maine Department of Environmental Protection are available to provide guidance and recommendations to assist municipalities in plan development and when faced with response decisions.

All discussion regarding pesticide applications discussed in this plan will be in accordance with the principles of Integrated Pest Management (IPM). IPM is a sustainable approach to managing mosquitoes by combining biological, physical and chemical tools in a way that minimizes economic, health and environmental risks. IPM involves preventive control and suppressive control, including:

- Source reduction (remove, cover, drain, fill) of larval habitats that are not environmentally sensitive or protected
- Mechanical control (the use of barriers such as screens to prevent the movement of mosquitoes and the use of traps)
- Chemical / Biological Pesticide control (the use of registered pesticides, according to label directions that act against mosquitoes)

Chemical /Biological pesticide controls can be further divided into the application of products aimed at mosquito larvae (larvicide) and those aimed at adult mosquitoes (adulticide). Use of larvicides involves the application of chemicals or natural bacteria to surface waters (such as ponds or in storm drains) to kill mosquito larvae. Larviciding is a proactive measure that can be useful in reducing the risk of mosquito-borne disease throughout the season. The intent of a larvicide program is to control generations of targeted mosquito species before they reach the adult stage, when they are able to transmit diseases such as EEE and WNV. Larvicide programs typically begin in early spring and continue throughout the season, and may help reduce the potential for human exposure to pesticides. These applications require DEP permits when the “waters of the state” are involved (see DEP pesticide Rules section below).

Adulticides generally involve the application of fine “mists” of pesticide over a relatively broad area or barrier treatments around the edge of properties to bring about the rapid reduction of adult mosquitoes. Adulticiding occurs in response to current surveillance activity. Adulticiding

can quickly reduce existing, biting adult mosquitoes throughout a spray area, but its effects are relatively short lived, raising the possibility of repeat applications. In addition, adulticide spray sites are most likely to be areas of high human population density increasing the potential for human pesticide exposure. Comprehensive mosquito control programs may utilize both of the control methods, larviciding and adulticiding, if indicated by surveillance data.

Pesticides may pose their own risk to the health of humans, animals, plants, and the environment. Thus pesticides are only one component of a coordinated effort to control mosquitoes. Pesticide treatments and other IPM strategies may be appropriate in certain situations, while each strategy alone may not be adequate.

IPM dictates that control efforts should be tied to thresholds. This means simply that a certain defined risk needs to exist before particular control methods are recommended. Different responses may be made as different levels of risk are identified. These levels of risk are discussed under the Phased Response section of this plan. In an ideal IPM program, non-chemical methods should be employed to keep pest levels below the risk level that might trigger a pesticide response, meaning that pesticides are a last, rather than first response to a WNV or EEE problem.

Suggested Options for Mosquito Control Activities

Once a community has identified the need for an organized response to the risk of a mosquito-borne disease, it is necessary to decide on the type of response and the magnitude of the effort. These decisions will be impacted by a variety of considerations, such as the severity of the problem, the financial resources of the community, public perceptions and attitudes, and the availability of technical expertise. Listed below are suggested options for local mosquito control programs. It is important to remember mosquito control is a year-round activity; many of these activities can be performed during the “off season.” Communities interested in developing or enhancing their mosquito control programs should review the document “Public Health Confronts the Mosquito” available at <http://www.astho.org/WorkArea/DownloadAsset.aspx?id=2333>

- Institute a public information program emphasizing personal responsibility, ways in which people can prevent mosquito breeding, and how they can reduce the risk of being bitten by observing personal protection measures.
- Stay up-to-date on statewide and regional virus activity and recommendations by visiting <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/index.shtml>.
- Contact insect repellent manufacturers to determine the availability of community or municipal discounts for bulk purchases of repellent products.
- Encourage local reporting to town officials of suspected areas where mosquitoes may be breeding (larval habitats). Such areas may then be evaluated by mosquito control personnel.

- Institute community cleanup programs to eliminate larval habitats from backyards, commercial sites and abandoned premises. Efforts may be aimed at removing, covering, or draining such artificial habitats.
- If needed, develop provisions in the local ordinances to deal with public health nuisances (e.g., unmaintained swimming pools that may serve as mosquito breeding habitat).
- Define the scope of the mosquito control program.
 - Create a clearly defined statement of services or deliverables, and a clear performance evaluation document.
 - Establish what activities will be performed.
 - Determine what resources (equipment, staff, insecticides, etc.) will be needed and what is available.
 - Decide where, when, and how often activities are to occur.
 - Emphasize public education and source reduction, augmented by larval and adult mosquito control, if appropriate.
 - Ensure that all staff are appropriately trained and licensed (see commercial pesticide applicator licensing requirements at <http://www.maine.gov/agriculture/pesticides/cert/questions.htm#commercial> .)
 - Investigate training opportunities to develop local expertise, such as in mosquito trapping and identification and/or pesticide application.
- Institute basic mosquito population monitoring to define the problem. Monitoring species, abundance, and virus infection rates in adult mosquitoes provides critical early, predictive data for surveillance and control.
- Consider coordinating mosquito control efforts with neighboring jurisdictions.
- Once these decisions have been made, create a community-specific mosquito control plan.

C. Pesticide Control Board Regulations

The use of pesticides in Maine is governed by state law 22MRSA§1471 A-X and 7MRSA§ 601-625 and by the Administrative Rules of the Board of Pesticides Control, CMR01-026. Chapters 10 – 90. These statutes and rules require people applying pesticides, other than homeowners on their own property, to hold licenses issued by the Maine Board of Pesticides Control. Municipal employees must be licensed as a commercial pesticide applicator if the use of a pesticide is part of their official duties. Municipal entities needing licenses include municipal and quasi-municipal organizations like Parks and Recreation Departments, Public Works, Cemetery Maintenance, Water & Sewer Districts, Housing Authorities, etc.

The Board of Pesticides Control also requires licensing whenever pesticides are applied in areas open to the public. These areas could include parks, campgrounds, apartment or condominium grounds, common areas of apartment buildings and many other areas. If a municipality hires an outside company to do pest control, that municipality must be sure the applicator company has

the appropriate commercial pesticide applicator licenses. We recommend obtaining proof of licensure even before entertaining a bid from an outside pest control company.

Pesticides covered by these rules include insecticides to kill mosquito larvae like *Bacillus thuringiensis* (var. *israelensis*) (Bti), *Bacillus sphaericus* (Bs), methoprene, and temephos, and insecticides to kill adult mosquitoes like malathion, naled and the pyrethroids, or any other pest control products whether organic, natural or synthetic.

Pesticide applicator licenses are required to handle and apply even the over-the-counter product varieties, like mosquito dunks or natural and organic products, when applications are performed by government employees or in public areas because of the greater potential for public exposure and the added liabilities resulting from that use. **PERSONAL USE OF REPELLENTS DOES NOT REQUIRE A LICENSE**

D. Department of Environmental Protection Pesticide Rules

Although certain pesticide products are available for sale in the marketplace to control mosquito larvae, application of these products to any surface waters in Maine is governed through permits obtained from the Maine Department of Environmental Protection. Questions regarding how to apply for such special permits should be directed to the Maine Department of Environmental Protection at 207-287-7688 (<http://www.maine.gov/dep/>).

In the event an EEE or WNV threat has been identified, the Commissioner of Health and Human Services may declare a Public Health Emergency and instruct the Department of Environmental Protection to commence the expedited special permit process – that is, provide an application form and other pertinent information to the appropriate town official(s) through the local health officer. The special permit will be issued with the greatest possible speed, preferably within seventy-two (72) hours.

Pesticide Applicator Licenses

A listing of the current Maine licensed pesticide applicators certified to control mosquitoes can be requested from the Maine BPC (207-287-2731, pesticides@maine.gov or <http://www.maine.gov/dacf/php/gotpests/bugs/tick-mosquito-companies.htm>.) Successful applications require in-depth knowledge of the community's planned pesticide use for mosquito control. Communities may also decide to license their own staff to apply pesticides. The licensing process for commercial applicators is described on the BPC website at <http://www.maine.gov/dacf/php/pesticides/applicators/licensing.html#comm>.

IV. SURVEILLANCE

Arboviral testing available through Maine's Health and Environmental Testing Laboratory (HETL) is outlined below. All laboratory test results should be considered in conjunction with both clinical symptoms and epidemiologic findings. Human samples must meet a set of minimum requirements in order to be tested (submission form required).

Table 3: Testing services available through HETL

Sample	West Nile virus (WNV)	Eastern Equine (EEE)	St. Louis (SLE)	LaCrosse (LE)	Powassan virus
Human serology (IgM)	X	X	X	X*	X*
Human cerebrospinal fluid (IgM)	X	X	X	X*	
Bird tissue (PCR)	X	X			
Mosquitoes (PCR)	X	X			
Non-Human Mammal tissue (PCR)	X**	X**			
Horse serology (IgM)	***	***			

* = Testing is not performed at HETL, but can be forwarded on to the federal CDC upon request. Federal CDC is also able to perform IgG testing if warranted.

** = A rabies test must be performed on mammal specimens before PCR for WNV/EEE can be done. Animals testing positive for rabies will not be tested for WNV/EEE

*** = Testing is not performed at HETL, but is offered by private laboratories

PCR = polymerase chain reaction

Note: The USDA National Veterinary Services Laboratory (NVSL) or federal CDC Laboratory will be used as a confirmatory reference laboratory for results as needed.

A. Mosquito Surveillance for Eastern equine encephalitis and West Nile virus

Mosquitoes are the best early indicator of human risk for arboviral disease. The objective of a mosquito surveillance program is to determine the presence of arboviruses, including EEE and WNV, in mosquito species common to our area. An effective program begins by targeting mosquito species considered to be important in transmitting disease among birds (primary vector) and transmitting disease from birds to humans (bridge vectors). Monitoring mosquito abundance is accomplished through various surveillance methods including but not limited to measuring larvae (dip counts) and adult mosquitoes (use of light/CO2 baited traps, gravid traps and resting boxes). Results must be evaluated by mosquito species, as each species has unique biological characteristics that should be incorporated into control decisions (see Appendix I). Maine CDC uses a comprehensive and flexible strategy that modifies certain surveillance activities in response to trends in disease risk.

Based on historic and current epidemiology in Maine and the United States, Maine CDC may test only particular mosquito species for EEE virus and WNV. Testing decisions will be based on the most current knowledge and fiscal considerations. Such decisions will be announced to Town Officers and mosquito contractors well in advance. Regardless of testing decisions, communities financing mosquito surveillance are encouraged to utilize surveillance from July 1 through October 1 in order to evaluate the relative abundance of particular mosquito species. Mosquito larvae and adult abundance, arboviral testing results, and coverage of mosquito surveillance efforts play a critical decision-making role in overall need, scope, and method of control.

Activities for mosquito surveillance for the 2014 season will consist of routine and rapid response surveillance.

1. Routine Mosquito Surveillance: Maine CDC is the lead agency responsible for mosquito surveillance activities. Maine CDC will work with its partners in coordinating efforts for appropriate placement of traps, collection, packaging and transport of mosquito specimens.

Routine, fixed long-term trap sites provide the best baseline information for detecting trends in mosquito abundance, virus prevalence and estimating the risk of human infection from EEE and WNV. Maine CDC works together with contract employees to determine long term trap sites. If your town or community has interest in collecting mosquitoes locally for testing, please consult with Maine CDC for more information on collection requirements and testing ability.

2. Rapid Response Mosquito Surveillance: In the case of a positive test of an arbovirus in non-human mammals, mosquitoes, or humans, State sponsored activities may include:

- Notifying city and town municipal officials of positive virus isolation or a confirmed case of a mosquito-borne disease.
- Provide for short-term mosquito surveillance and laboratory specimen preparation in the absence of a local health department surveillance or local mosquito control program in predetermined selected areas.
- Coordinating training and lending expertise to local health officials and state personnel.
- Evaluating current trap locations based on criteria including habitats conducive to mosquito breeding and bridge vector collection, and level of human use (e.g., schools, parks, athletic fields).
- Reviewing and determining the need for expanding trapping in the area surrounding the positive identification.

B. Avian Surveillance for West Nile virus and Eastern Equine Encephalitis

National and local analysis suggests dead bird testing for WNV is becoming less useful for early detection and evaluation of WNV risk. Most birds infected with EEE do not succumb to severe disease and do not provide useful data for disease surveillance and response in Maine. For these reasons, Maine has discontinued wild bird testing. Wild bird surveillance is useful in understanding the ecology of arboviruses, and as such, other agency partners (i.e., MMCRI, Wildlife Services, etc.) may conduct surveillance among wild bird and mammal populations to address specific research questions.

In some circumstances, dead birds may be tested for EEE and WNV by the state if the situation warrants (e.g., unusual large die-offs without a known cause). It is the responsibility of the local community to arrange for the transportation of dead birds to the HETL. Birds must be approved for testing prior to delivery by calling Maine CDC's disease reporting line (1-800-821-5821).

Testing and surveillance of domestic birds (e.g., emus) will follow the procedures listed below for mammal (non-human) surveillance.

C. Mammal (Non-human) Surveillance for Eastern Equine Encephalitis (EEE) virus and West Nile virus (WNV)

Under the auspices of the State Veterinarian, Maine Department of Agriculture, Conservation, and Forestry, HETL may conduct testing of horses and other domestic animals (e.g., llamas, alpacas) that have severe neurological disease suspected of being caused by EEE virus or WNV infection. On an annual basis, a letter from the State Veterinarian (Maine Department of Agriculture) describing the case definition, clinical signs of disease, prevention measures, and reporting process will be sent to all licensed veterinarians in the state of Maine. This serves as a reminder to investigate and report neurological illness in animals. Parameters for the evaluation and testing of ill animals will include the following:

- Domestic animals with neurologic signs will initially be referred to private veterinarians for evaluation.
- Veterinarians wishing clinical consultation or information on encephalitic disease testing procedures should contact the State Veterinarian at the Maine Department of Agriculture, Conservation, and Forestry.
- Necropsy specimens, such as animal heads, must be sent to the Maine HETL for processing.
- The State Veterinarian will assure appropriate collection of specimens for diagnostic testing.

Mammals Submitted for Rabies Testing

Unlike an arbovirus, rabies can be transmitted to humans through the bite of an infected animal. It is important that all mammals with neurological symptoms that have had contact with humans, pets, or domestic animals, and that meet guidelines for rabies testing, be submitted for testing in accordance with HETL guidelines. Animals testing positive for rabies will not be tested for EEE virus and WNV.

Large animals such as horses, llamas, and alpacas that are submitted for rabies testing and are negative from June to October will automatically be reflexed to arboviral testing at HETL.

D. Human Surveillance

1. Passive surveillance: Maine CDC is the lead agency for the conduct of human case surveillance for arboviral encephalitis, meningitis, and meningoencephalitis. Arboviral testing is available at HETL, and requires a “Human Arboviral Specimen Submission Form.” Instructions on submitting samples and the submission form can be found online at http://www.maine.gov/dhhs/mecdc/public-health-systems/health-and-environmental-testing/micro/submitting_samples.htm.

Health care providers who suspect arboviral disease should submit the following specimens for testing (when possible, serum and CSF should be submitted together) along with the Human Arboviral Specimen Submission Form:

- CSF for testing by IgM Multiplex Immunoassay (MIA). All spinal fluid submission must be accompanied by a corresponding serum sample.
- Sera, both acute and convalescent, for testing by IgM Multiplex Immunoassay (MIA).

Note: Severe neurological disease due to an arboviral infection has occurred in patients of all ages. Year-round transmission is possible in some areas of the country. Therefore, arboviral disease should be considered in persons with unexplained encephalitis and meningitis with consistent travel history.

HETL's normal viral testing protocol for arboviruses includes human serology and cerebrospinal fluid assays for WNV, EEE, and SLE (St. Louis Encephalitis). Testing for LAC (LaCrosse Encephalitis) and Powassan virus is referred to the federal CDC for testing if requested.

Maine CDC promotes human surveillance activities by:

- Alerting Maine hospitals and clinicians about the importance, criteria, and requirements for reporting, along with instructions for submission of appropriate laboratory specimens (CSF, acute and convalescent sera for arboviral encephalitis).
- Providing Maine hospitals, neurologists and infectious disease physicians with clinical and epidemiologic information about human cases of WNV and EEE and criteria for reporting and laboratory testing.

All suspect human cases should be reported to Maine CDC at 1-800-821-5821.

2. Enhanced surveillance: If surveillance data indicate an increased risk of human disease, active surveillance or enhanced passive surveillance may be instituted in high-risk areas. This consists of contacting health care providers and facilities surveying for potential cases. Additionally, death records and other available surveillance systems will be utilized to screen for possible human cases of arboviral encephalitis, meningitis, or meningoencephalitis.

E. Communication of Surveillance Information

1. Routine Information: Arboviral information will be available on Maine CDC's website at <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/index.shtml>.

2. Positive EEE Virus & WNV Findings: Maine CDC ensures the rapid and accurate dissemination of positive test results. Following an EEE or WNV positive mosquito pool, bird, non-human mammal or human, an investigation will be initiated and an epidemiologist will notify the Town Manager or Selectman as well as the district liaison for that area. The Town Manager or Selectman should notify all pertinent local officials, including high-level elected and appointed officials and, as warranted, the municipal Emergency Management Director and Animal Control Officer. Weekly reports are posted to the website during the arboviral season (<http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/arboviral-surveillance.shtml>).

Information about positive findings on the weekly report will include:

- Human positives – county of residence, date of symptom onset, age range, agent
- Non-human positives – species, date of collection, town, county, agent

3. Press Releases/ Health Alerts: Maine CDC may issue press releases or health alerts to inform the public of conditions that may warrant additional precautions to reduce the risk of disease. The Health Alert Network (HAN) will be utilized by Maine CDC to disseminate information to health care providers in the State. All HANs are posted to <http://www.maine.gov/dhhs/mecdc/>.

V. RECOMMENDATIONS FOR A PHASED RESPONSE TO EEE VIRUS AND WNV SURVEILLANCE DATA

The recommendations provided here are based on current knowledge of risk and appropriateness of available interventions to reduce the risk for human disease. Multiple factors contribute to the risk of mosquito-transmitted human disease. Decisions on risk reduction measures should be made after consideration of all surveillance information for that area at that time.

Recommendations regarding the EEE and WNV phased response plan (Table 4) incorporate several components presented in the CDC document “West Nile virus in the United States: Guidelines for Surveillance, Prevention, and Control”, 4th Revision, 2013, as well as results of analyses of surveillance data collected in Maine and throughout the northeastern United States.

Public awareness of what can be done to reduce risk of infection is of utmost importance. The level of EEE virus and WNV activity may occasionally present a potential for increased virus transmission to humans. Typically, risk is expected to be relatively low, and the routine precautions taken by individuals may be sufficient to avoid infection. These guidelines take into consideration the complexity of reducing risk of human disease from EEE virus and WNV infection and form a framework for decision-making. They are not a set of specific prescriptions.

1. Phased Response: General guidelines are provided for an array of situations that are noted in the Surveillance and Response Plan Table ([Table 4](#)) that follows. Specific situations must be evaluated and options discussed before final decisions on particular actions are made. The assessment of risk from mosquito-borne disease is complex and many factors modify specific risk factors. Maine CDC works with public health districts, community administrators, health officers, and mosquito control contractors to develop the most appropriate prevention activities to reduce the risk of human disease. There is no single indicator that can provide a precise measure of risk, and no single action that can assure prevention of infection.

When recommending the use of mosquito larvicides or adulticides, Maine CDC works to identify and support the use of risk reduction and disease prevention methods that are specific to the cause of disease, that use the least intrusive and most appropriate prevention methods, and that support planning and practices that reduce the use of pesticides. Technical support from the Board of Pesticides Control will be provided upon request. Ultimately, the decision to apply

pesticides is left to the community. Communities that would like to consider pesticide use should identify licensed personnel or locate licensed contractors and consult with the Maine Board of Pesticides Control to determine that the pesticide chosen is properly registered for use in Maine.

Historical local surveillance data is critical in making informed decisions regarding risk and appropriate actions. Communities are urged to review and enhance local surveillance activities to aid in decision-making and early detection of arboviral activity.

2. Maine CDC Guidance: Throughout the arboviral season, Maine CDC will monitor activity in an attempt to ascertain risk levels as outlined in the phased response tables of this plan. Risk levels are defined for focal areas. “Focal Areas” may incorporate multiple communities, towns, or cities. Factors considered in the determination of human risk in a focal area include: mosquito habitat, mosquito abundance, current and historic virus activity, timing of recent isolations of virus in mosquitoes, current and predicted weather and seasonal conditions needed to present risk of human disease. Known/suspected location of exposure is used for human and non-human animal cases and not necessarily town of residence.

3. Arboviral Public Health Emergency (Critical Risk). Information about how a public health emergency is declared, and what happens after it is declared is available in [Appendix II](#).

Table 4: Guidelines for Phased Response to EEE and WNV Surveillance Data

Risk Category	Probability of Human Outbreak	Definition for a Focal Area*	Recommended Response
1	Remote	<p>All of the following conditions must be met:</p> <p><u>Prior Year</u> No activity detected in a community or focal area.</p> <p>AND</p> <p><u>Current Year</u> No current surveillance findings indicating EEE or WNV activity in the focal area.</p>	<ol style="list-style-type: none"> 1. Educational efforts directed to the general public on personal protection, such as use of repellents, and source reduction. 2. Routine human and non-human mammal surveillance; 3. Assess local ecology for mosquito abundance. 4. Consider larval and adult mosquito monitoring with routine collection and testing of mosquitoes.
2	Low	<p><u>Prior Year (WNV)</u> Virus activity detected in mosquitoes.</p> <p><u>Prior 2 Years (EEE)</u> Virus activity detected in mosquitoes during either of both of the past two years.</p> <p>OR</p> <p><u>Current Year</u> EEE or WNV identified in a single mosquito trap location</p> <p>AND</p> <p>No non-human mammal or human cases</p>	<p>Incorporates previous category response, plus:</p> <ol style="list-style-type: none"> 1. Expand community outreach and public education programs focused on risk potential and personal protection, emphasizing source reduction. 2. Assess mosquito populations, monitor larval and adult mosquito abundance, submit samples to HETL for virus testing. 3. Use larvicides at specific sources identified by entomologic survey and targeted at vector species. If appropriate, consider source reduction techniques. 4. Enhance surveillance of human and non-human mammal surveillance.
3	Moderate	<p><u>Prior Year</u> Confirmation of human and/or non-human mammal case(s)</p> <p>OR</p> <p>Sustained EEE or WNV activity in mosquitoes.</p> <p>OR</p> <p><u>Current Year</u> Multiple EEE or WNV mosquito isolates</p>	<p>Incorporates previous category response, plus:</p> <ol style="list-style-type: none"> 1. Increase larval control, source reduction, and public education emphasizing personal protection measures. 2. Actions to prevent disease may include targeted larviciding at likely vectors, and if current year activity, possibly ground adulticiding targeted at likely bridge vector species. 3. Enhance human surveillance and activities to further quantify epizootic activity.

* Focal area: May incorporate multiple towns or cities. Designation based on factors including mosquito habitat, current and historic virus activity, timing of current virus activity, current weather and seasonal conditions. Known/suspected location of exposure is used for human and non-human animal cases and not necessarily town of residence.

		<p>AND</p> <p>No non-human mammal or human cases.</p>	
4	High	<p><u>Current Year</u> Surveillance of increasing EEE or WNV activity in mosquitoes</p> <p>OR</p> <p>A single confirmed non-human mammal case of EEE or WNV</p> <p>OR</p> <p>A single confirmed human case of WNV.</p>	<p>Incorporates previous category response, plus:</p> <ol style="list-style-type: none"> 1. Intensify public education on personal protection measures <ol style="list-style-type: none"> a. Utilize multimedia messages including press releases, local newspaper articles, cable channel interviews, etc. b. Actively seek out high-risk populations (nursing homes, schools, etc.) and educate them on personal protection. c. Issue advisory information on adulticide spraying. 2. Consider intensifying larviciding and/or adulticiding control measures as indicated by surveillance. 3. Maine CDC will confer with local health officials to determine if the risk of disease transmission threatens to cause multiple human cases. If surveillance indicates a continuing risk of human disease and potential for an outbreak, intensified ground-based adult mosquito control may be recommended.
5	Critical	<p><u>Current Year</u></p> <p>A single confirmed case of EEE, or more than 1 confirmed human case of WNV in a community or focal area</p> <p>OR</p> <p>Multiple confirmed EEE or WNV non-human mammal cases.</p>	<p>Incorporates previous category response, plus:</p> <ol style="list-style-type: none"> 1. Continued highly intensified public outreach messages through community leaders and the media emphasizing the urgency of personal protection. 2. If risk of outbreak is widespread and covers multiple jurisdictions, Maine CDC will confer with local health officials and Vectorborne Work Group to discuss the use of intensive mosquito control methods. A State of Emergency may be declared pursuant to Title 37-B Chapter 13 Subchapter 2 §742. <p>The declaration of an emergency may trigger application of mosquito adulticide. Maine CDC may define targeted treatment areas for vector control following the declaration of an emergency.</p> <ol style="list-style-type: none"> 3. Ground-based adulticide applications may be repeated as necessary to achieve adequate control.

APPENDIX I: BIOLOGY, ARBOVIRAL ACTIVITY, AND CONTROL CONCERNS OF SELECTED MAINE MOSQUITO SPECIES

Below is a review of the main products used for mosquito control and descriptions of the principle mosquito species likely responsible for Eastern Equine Encephalitis (EEE) virus and West Nile virus (WNV) transmission in Maine. Information was obtained from federal, state, and local publications (see reference list below) and results from the Maine and other New England state arboviral testing programs.

Control of Mosquitoes in Maine

Deciding which product and method of application to use will depend on environmental conditions, targeted species, and state/local regulations. For information regarding pesticide rules and regulations, contact the Maine BPC at 207-287-2731. For legal use, larvicide and adulticide products must be registered in the State of Maine. To check registration status, please contact the Maine BPC at 207-287-2731 or go to http://npirspublic.ceris.purdue.edu/state/state_menu.aspx?state=ME. To gauge the relative risk of larvicides or adulticides go to the BPC web site at http://www.maine.gov/dacf/php/pesticides/documents2/technical_resources/BPC_FINAL_3-7-14_Mosq_Adulticide_Review_small.pdf

Larviciding. Larviciding is a proactive measure that can be useful in reducing the risk of mosquito-borne disease throughout the season and tends to be more effective at reducing mosquito populations than adulticiding. Larviciding occurs in response to larval mosquito surveillance and habitat identification. The intent of a larvicide program is to control generations of targeted mosquito species before they reach the adult stage, when they are able to transmit diseases such as EEE and WNV. Several materials in various formulations are labeled for mosquito larviciding. Items can be classified as bacteriologic, insect growth regulators, surface films, and organophosphates. Most are effective during particular stages of mosquito development, thus timing of application is important. Permits from Maine DEP may be necessary prior to use of these products (<http://www.maine.gov/dep/permits/>).

(1) Bacteriologic Control: *Bacillus thuringiensis israelensis* (*Bti*) and *Bacillus sphaericus* (*Bs*) are naturally occurring bacteria used as larvicides. When ingested by mosquito larvae, they alter gut permeability killing the larvae. They are believed to pose a minimal risk to non-target species.

(2) Insect Growth Regulators: Methoprene (e.g., Altosid) mimics the action of a mosquito growth-regulating hormone and prevents the larvae from maturing into adults. It has low toxicity to birds and fish.

(3) Surface Films: Petroleum derivatives (e.g., Golden Bear Oil) produce a thin film on the surface of the water that prevents the transfer of oxygen causing the mosquito larvae/pupae to drown. Ethoxylated Alcohols (e.g., Agnique) produce a thin surface film, making it difficult for mosquito larvae, pupae, and emerging adult to attach to the water's surface, causing them to drown. The window of opportunity for use of these agents is limited by the mosquito life cycle, especially when dealing with species that require little or no surface contact for breathing. These

agents also prevent the natural transfer of oxygen into the water body. There are potential impacts to non-target species that rest on the water surface.

(4) Organophosphates: Temephos is the only organophosphate with larvicidal use and inhibits nerve signal transmission. Although it presents relatively low risk to birds and terrestrial species, available information suggests that it is more toxic to aquatic invertebrates than alternative larvicides.

Adulticiding. Adulticide involves the application of fine “mists” of pesticide over a relatively broad area to bring about the rapid knockdown of adult mosquitoes. Adulticiding occurs in response to current adult mosquito surveillance activity. Adulticiding can quickly reduce existing, biting adult mosquitoes throughout a spray area, but its effects are relatively short lived, raising the possibility of repeat applications. In addition, adulticide spray sites are most likely to be areas of high human population density.

Mosquito adulticides are dispersed either by truck-mounted equipment, backpack, or from aircraft. Barrier treatments, using compounds with residual characteristics, may also be used. Adulticides labeled for mosquito control include natural pyrethrins, synthetic pyrethroids, and organophosphates. These compounds affect the nervous system. The organophosphates have the potential to affect mammals and birds at lower doses than the pyrethrins and pyrethroids. There is high potential for acute and chronic risks to fish and invertebrates with the use of any insecticides within these three classes for adult mosquito control. To reduce the risks and to assure a legal application the pesticide labels must be followed. Insecticide selection and timing of application should be based on the distribution and behavior of the target mosquito species, and the availability and cost of the materials.

(1) Pyrethrins and synthetic pyrethroids: Pyrethrins are derivatives from chrysanthemum flowers that have a relatively low mammalian and non-target vertebrate toxicity. Products containing pyrethrins may be designated “organic” if all of the components are derived from natural sources. Synthetic pyrethroids (e.g. permethrin, permethrin and Sumithrin[®] aka d-phenothrin) are chemically similar to pyrethrins with greater toxicity to the mosquitoes and have greater residual effects. Pyrethroids are relatively low in toxicity to mammals and non-target vertebrates. *NOTE: Pyrethrins and pyrethroids used in mosquito control are typically mixed with a synergist compound, such as piperonyl butoxide, which enhances the effectiveness of the active ingredient to kill adult mosquitoes on contact.*

(2) Organophosphates: Compounds (e.g., Malathion and Naled) comprise another group of mosquito adulticides. While their risk from exposure for humans, birds, and mammals are higher than the pyrethrins and pyrethroids, the risks are within the EPA’s level of concern.

Pesticides may pose their own risk to the health of humans, animals, plants, and the environment. Thus pesticides are only one component of a coordinated effort to control mosquitoes.

MAINE MOSQUITO SPECIES OF CONCERN FOR EEE AND WNV

There are 45 mosquito species present in Maine, however less than half of these are considered to be likely vectors for EEE and WNV. Given the short history of arboviral surveillance in Maine, it is difficult to know the specific role each mosquito species plays in EEE and WNV

disease transmission. In general, species are identified as vectors based on their local abundance, demonstrated vector competence in the laboratory, and frequent infection with the virus as documented by arboviral surveillance programs. Based on these criteria, the following species are considered to be vectors of concern for EEE and/or WNV in Maine or the surrounding region:

Maine Mosquito Species of Concern for EEE and WNV

Species	Larval habitat	Multiple generations	Overwinter stage	Host preference	Biting times	Flight Range	EEE	WNV
<i>Aedes cinerus</i>	Wooded snowmelt pools, semi-permanent bogs and swamps	Yes	Egg	Mammals	Dusk to dawn	100 - 1000 feet	Yes	Yes
<i>Aedes vexans</i>	Floodwater species	Yes	Egg	Mammals, birds	Dusk to dawn	1 - 5 miles	Yes	Yes
<i>Anopheles punctipennis</i>	Confined bodies of water with aquatic vegetative edges and artificial containers	Yes	Adult	Birds and mammals	Dusk to dawn	1 - 2 miles		Yes
<i>Anopheles walkeri</i>	Confined bodies of water with aquatic vegetative edges	Yes	Egg	Mammals	Dusk to dawn	1 - 2 miles		Yes
<i>Coquillettidia perturbans</i>	Permanent bodies of water with muddy substrates and abundant emergent vegetation (eg cattails)	No	Larvae	Birds and mammals	Early morning, dusk, evening	1 - 5 miles	Yes	Yes
<i>Culex pipiens</i>	Artificial containers	Yes	Adults	Birds and occasionally mammals	Dusk to dawn	1/4 - 1/2 mile	Yes	Yes
<i>Culex restuans</i>	Natural and artificial containers	Yes	Adults	Birds and occasionally mammals	Dusk to dawn	1 - 2 miles	Yes	Yes
<i>Culex salinarius</i>	Brackish salt marshes and freshwater wetlands, artificial containers	Yes	Adults	Birds, mammals, reptiles, and amphibians	Dusk to dawn	1/4 - 5 miles	Yes	Yes
<i>Culiseta inornata</i>	Wooded snowmelt pools, semi-permanent bogs and swamps	Yes	Adult	Mammals	Dusk to dawn		Yes	Yes

<i>Culiseta melanura</i>	Underground aquatic crypts or sheltered bodies of water among tree roots in acidic red maple and white cedar swamps	Yes	Larvae	Birds	Dusk to dawn	1/2 - 5 miles	Yes	Yes
Species	Larval habitat	Multiple generations	Overwinter stage	Host preference	Biting times	Flight Range	EEE	WNV
<i>Culiseta morsitans</i>	Permanent and semi-permanent bogs, swamps, tree root cavities, and boggy margins or lakes	No	Egg	Birds			Yes	Yes
<i>Ochlerotatus canadensis</i>	Temporary leaf-lined woodland pools, drainage ditches, and freshwater swamps	Yes	Egg	Birds, mammals, reptiles, and amphibians	Dusk to dawn	1/4 mile	Yes	Yes
<i>Ochlerotatus cantator</i>	Temporary saline and brackish pools in coastal salt marshes	Yes	Egg	Mammals, birds	All day	5 - 40 miles	Yes	Yes
<i>Ochlerotatus japonicus</i>	Natural and artificial containers	Yes	Egg	Mammals, birds	All day	<1 mile	Yes	Yes
<i>Ochlerotatus sollicitans</i>	Temporary saline and brackish pools in coastal salt marshes	Yes	Egg	Mammals, birds	All day	5 - 40 miles		Yes
<i>Ochlerotatus triseriatus</i>	Natural and artificial containers	No	Egg	Mammals, birds and reptiles	Dusk to dawn	1/2 - 1 mile	Yes	Yes
<i>Psorophora ferox</i>	Wooded temporary ground pools, flood-water areas	No	Egg	Mammals	Dusk to dawn	<1 mile	Yes	Yes

Appendix II - Arboviral Public Health Emergency

Purpose: A public health emergency declared in response to an arboviral threat will allow local jurisdictions the option to rapidly receive permits, help provide authority for Integrated Pest Management, and otherwise implement interventions to reduce the risk of human illness from mosquitoes. An arboviral Public Health emergency may be declared at the county or state level.

To get an Arboviral Public Health Emergency Declared:

Any local, county, or state official may request consideration of an arboviral Public Health Emergency. Requests should be made by phone at 800-821-5821 or in writing to disease.reporting@maine.gov.

Maine CDC will consider recommending an Arboviral Public Health Emergency if any of the following conditions exist:

- Any human case of EEE or WNV
- Three or more non-human mammal cases of EEE or WNV within a defined area (city, county etc)
- Ten percent of bridge vector mosquito pools test positive for EEE or WNV within a single week

If any of these conditions exist, or if an official requests consideration a panel will be convened to determine if Maine CDC will recommend the governor declare an Arboviral Public Health Emergency. This panel will consist of at least:

- State Epidemiologist
- Vectorborne disease epidemiologist
- State veterinarian
- Representative from Board of Pesticides
- Biologist (or contracted mosquito collection agency)
- Local representative from affected area?

If the panel decides to recommend an Arboviral Public Health Emergency, the State Epidemiologist will submit the recommendation to the Director of Maine CDC, who will submit to the commissioner's office to be considered by the Governor. Only the Governor can declare a Public Health Emergency.

When an Arboviral Public Health Emergency is declared:

- Maine CDC will stand up an Emergency Operations Center (EOC)
- The EOC will identify a public information officer (PIO)
 - The PIO will be responsible for all public information releases as well as all press inquiries
- The vectorborne disease epidemiologist will be the point of contact for the vectorborne disease workgroup (VBWG) as well as serve as a subject matter expert for the EOC
- Any member of the VBWG may be asked to participate in the EOC and provide expertise in their subject areas
- The EOC will be deactivated when:
 - Public demand decreases to a manageable level
 - The Emergency is declared over
 - Two weeks after the second hard frost

Appendix III

Mosquito Testing at Maine Department of Health and Human Services, 2014

Please find below information pertaining to mosquito testing through Maine's Health and Environmental Testing Laboratory (HETL) during 2014. Mosquitoes will be tested for Eastern Equine Encephalitis (EEE) virus and West Nile virus (WNV).

1. Mosquito pools may contain a maximum of 50 mosquitoes. Please be careful not to exceed the 50-mosquito pool size, as there may not be remaining space for adding the necessary reagents. HETL will REJECT for testing any pools that they cannot process due to excessive pool size. These pools will be held at HETL.

2. Please be sure to include detailed information on trap location. Trap location may be used for GIS mapping as well as analyzing location-specific changes over time. Both uses require detailed address information to ensure consistent results and tracking.

3. The mosquito season will begin on July 1, 2014 and go through October 1, 2014. Testing will be performed in the following manner:

a. Phase I - July 1 through August 15, 2014 or first Maine or New Hampshire EEE or WNV detection (dates pertain to date of collection):

i. *Cs. melanura*, *Cs. morsitans*, *Cx. pipiens*, *Cx. restuans*, and *Cx. pipiens/restuans*: Only these species will be tested. Any pool size may be submitted for testing but pool size cannot exceed 50 mosquitoes. As soon as EEE or WNV is detected in Maine or New Hampshire, mosquito submissions will follow phase II.

ii. Other mosquito species: During the mosquito season, please discard (or hold internally if interested) any mosquitoes that are not *Cs. melanura*, *Cx. pipiens*, *Cx. restuans*, or *Cx. pipiens/restuans*. Other mosquito species may be tested on a case by case basis, as resources and time allow. As soon as EEE or WNV is detected in Maine, mosquito submissions will follow phase II.

b. Phase II – August 15 or first Maine or New Hampshire EEE or WNV detection through October 1, 2013 (dates pertain to date of collection):

i. *Ae. cinereus*, *Ae. vexans*, *Cq perturbans*, *Cs. melanura*, *Cs. morsitans*, *Cx. pipiens*, *Cx. restuans*, and *Cx. pipiens/restuan*, *Cx. salinarius*, *Oc candensis* and *Oc. sollicitans*

ii. Other mosquito pools not meeting the above criteria: Other mosquito species may be tested on a case by case basis, as resources and time allow. Otherwise, please discard (or hold internally if interested) any mosquitoes that do not meet the above criteria.

APPENDIX IV: Resources

Andreadis, TG, et al. 2005. Identification Guide to the Mosquitoes of Connecticut, available at:
<http://www.ct.gov/caes/lib/caes/documents/publications/bulletins/b966b996.pdf>

Association of State and Territorial Health Officials. Feb 2005. “Public Health Confronts the Mosquito: Developing Sustainable State and Local Mosquito Control Programs.” Available through:
<http://www.astho.org>

Centers for Disease Control and Prevention. 2013. West Nile virus in the United States: Guidelines for Surveillance, Prevention, and Control, available at:
<http://www.cdc.gov/westnile/resources/pdfs/wnvGuidelines.pdf>

The Commonwealth of Massachusetts Department of Food and Agriculture. 1998. Generic Environmental Impact Report (GEIR) for the Massachusetts Mosquito Control Projects, available at:
http://www.mass.gov/agr/mosquito/geir_docs/GEIR_FULL_TEXT.pdf

Maine Board of Pesticides Control. Mosquito Control – A Citizen’s Guide. Available at:
<http://www.maine.gov/agriculture/pesticides/public/mosquito-control-home.htm>

New Hampshire Department of Health and Human Services
<http://www.dhhs.nh.gov/>

Slater, J.D., and Pritchard G. 1979. A stepwise computer program for estimating development time and survival of *Aedes vexans* (Diptera: Culicidae) larvae and pupae in field populations in Southern Alberta. Canadian Entomologist. 111: 1241-1253

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Turell, M.J., Dohm, D.J., Sardelis, M.R., O’Guinn, M.L., Andreadis, T.G., and Blow, J.A. 2005. An Update on the potential of North American mosquitoes (Diptera: Culicidae) to transmit West Nile virus. Journal of Medical Entomology. 42: 57-62

U.S. Environmental Protection Agency. 2007. Mosquito Control Methods, available at:
<http://www.epa.gov/pesticides/health/mosquitoes/control.htm>

U.S. Environmental Protection Agency. 2010. Insect Repellents: Use and Effectiveness, available at:
<http://cfpub.epa.gov/oppref/insect/index.cfm>

Appendix V: Maine Vector-borne Work Group

Chair: Stephen Sears, Maine Center for Disease Control and Prevention (Maine CDC)

Adams, Justin	Municipal Pest Management
Andrews, Wayne	Atlantic Pest Control
Bills, Anne	Maine Board of Pesticides Control
DiFedele, Lisa	Maine CDC
Dill, Jim	Maine Cooperative Extension
Donahue, Charlene	Maine Forest Service
Dube, Nancy	Maine Department of Education
Elias, Susan	Maine Medical Center Research Institute
Fish, Gary	Maine Board of Pesticides Control
Foss, Kimberly	Municipal Pest Management
Green, Katy	MOFGA
Groden, Ellie	University of Maine Orono
Hicks, Lebel	Maine Board of Pesticides Control
Jennings, Henry	Maine Board of Pesticides Control
Kantar, Lee	Maine Department of Inland Fisheries and Wildlife
Keenan, Patrick	Biodiversity Research Institute
Kirby, Clay	Maine Cooperative Extension
Lacombe, Eleanor	Maine Medical Center Research Institute
Lichtenwalner, Anne	University of Maine, Animal Health Laboratory
Lubelczyk, Charles	Maine Medical Center Research Institute
McCutchan, Thomas	Maine Insectary Services
McEvoy, Elizabeth O.	Maine Department of Agriculture, Conservation, and Forestry
Morrison, Mike	Municipal Pest Management
Murray, Kathy	Maine Department of Agriculture, Conservation, and Forestry
Rand, Peter	Maine Medical Center Research Institute
Ravana, Kyle	Maine Department of Inland Fisheries and Wildlife
Ridky, Chip	United States Department of Agriculture
Robinson, Sara	Maine CDC
Spaulding, Heather	MOFGA
St. Amand, Ted	Atlantic Pest Solutions
Smith, Rob	Maine Medical Center Research Institute
Storch, Dick	University of Maine, Environmental Services
Stratton, Robert D.	Maine Department of Inland Fisheries and Wildlife
Struble, Dave	Maine Forest Service
Sullivan, Kelsey	Maine Department of Inland Fisheries and Wildlife
Szantyr, Beatrice	Physician, Lincoln, Maine
Tsomides, Leon	Maine Department of Environmental Protection
Walsh, Michele	Maine Department of Agriculture, Conservation, and Forestry
Webber, Lori	Maine CDC