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BACKGROUND

The Madison County Health Department conducts active mosquito surveillance every summer in the area of Black Creek Swamp in the Town of Sullivan. Madison County looks for evidence of viruses in mosquitoes that may transmit disease to people, like Eastern Equine Encephalitis (EEE) virus and West Nile Virus (WNV). EEE is a key mosquito-borne disease of concern to human health in Madison County.

EEE was first detected in Madison County in the 1970’s. Along with WNV, EEE has been shown to be established in the Central New York environment. The EEE virus is expected to continue to occur and be detected yearly in mosquitoes, maintained by a cycle of continuous spread between mosquitoes and birds.

EEE is a rare disease caused by a virus that can spread to people from an infected mosquito bite. Only about 4-5% of people infected with the virus develop EEE. EEE infection also may not always cause symptoms. If symptoms occur, they may include a sudden onset of chills, fever, joint pain, and muscle aches; however if encephalitis develops, inflammation and swelling of the brain may occur. Approximately 33% of those who develop EEE die, and many of those who live will have mild to severe brain damage. Although a vaccine is available for horses, there is no vaccine and no specific treatment for people who develop EEE infection.

Historically, the majority of EEE positive findings in mosquitoes, horses, and humans have occurred in the four county region of Central New York: Madison, Oneida, Onondaga, and Oswego Counties. Data collected and reviewed by New York State Department of Health, suggests that there are two large swamp complexes (Cicero Swamp and Toad Harbor Swamp) where EEE initiates and amplifies between mosquitoes and birds. Detection of the virus and the risk to humans increases when the virus is detected in a human biting mosquito.

Health Departments in the central New York region use surveillance data to determine if attempts should be made to control the EEE virus before infected mosquitoes spread geographically outward. Spraying (aerial or ground) is one method that may be used to help slow or control the spread of a virus, while at the same time temporarily decreasing mosquito populations in an area typically for a period from a few days up to about two weeks. Mosquitoes however are part of local habitats and cannot be eliminated completely.

The New York State (NYS) Public Health Law and the NYS Sanitary Code outline the roles, responsibilities, and authority of County Health Department’s regarding mosquito surveillance, response, and control.¹

While mosquito populations are significant in the Town of Sullivan fresh-water swamp and wetland habitats (particularly in the month of June), the risk of human exposure to EEE is further dependent on the presence of bridge vectors, that is, mosquitoes of a particular species that are more likely to feed on an infected bird and then bite humans. In addition to testing of mosquitoes for evidence of the virus, mosquito surveillance further tracks emerging mosquito species known to be the key bridge vectors whose presence enhances the risk of EEE being transmitted to humans.

The following section presents considerations for when mosquito control actions may be warranted due to a significant public health threat under the authority of the Madison County Health Department. Evidence of the EEE virus is required to trigger mosquito control actions such as aerial or ground truck spraying by Madison County Health Department. The New York State Department of Environmental Conservation (NYSDEC) requires evidence of EEE detection in an area before allowing spraying to occur. NYSDEC regulations, relative to freshwater wetlands, restrict the application of mosquito adulticide without evidence of positive EEE detection. New York is a home rule state and mosquito control decisions, such as spraying, are made by local authorities, such as Madison County Health Department, in consultation with the New York State Department of Health who provides technical assistance and advice on control measures. In order to conduct emergency spraying due to an imminent public health threat from the presence of EEE, the Madison County Health Department and Madison County Chairman of the Board of Supervisors must declare a State of Emergency for Madison County to secure assistance necessary, including but not limited to waiving county purchasing and procurement policy to enter immediately into a contract with a vendor to conduct spraying.

Considerations for Spraying
Many factors must be considered before aerial spraying for adult mosquito control would be contracted for by the Madison County Health Department. One of the most important criteria is actual evidence of virus being present within human biting mosquitoes, detected through mosquito surveillance.

Aerial pesticide spraying is a measure that may be used as a short-term strategy intended to temporarily reduce mosquito populations.

Aerial spraying may be triggered by a variety of factors, not limited to:

- The most recent mosquito, horse and human disease surveillance data.
- The numbers and species of positive mosquito populations (some species are more likely to bite humans, others more likely to bite birds).
- Whether disease positive results are geographically concentrated or widespread.
- Prevalence or other trends in mosquito disease rates in Madison County or neighboring counties.
- The density and proximity of human populations to disease positive mosquitoes.
- The time of year that positive results are found relative to historical trends.
- The geography of and accessibility to the area where mosquitoes are located.
- Forecasted weather conditions (precipitation, wind, temperature) and the impact on mosquito populations and/or control measures.

Aerial spraying is only effective on adult mosquitoes and understanding where in the lifecycle most mosquito populations are at the time is also an important consideration for the effectiveness of spraying. Lastly, the decision to spray or conduct other mosquito-control actions is made jointly between Madison County Health Department, the New York State Department of Health and the Madison County Board of Supervisors.

Madison County recognizes that mosquitoes cross borders and counties. Currently a comprehensive regional mosquito control program does not exist in New York State. Each individual county is responsible for managing, implementing, and coordinating local mosquito control programs. Madison County continues to advocate for regional efforts, including changes in state aid, to more effectively conduct mosquito control programs. However, in the absence of a comprehensive regional program, Madison County Health Department continues to communicate and coordinate regularly with Central New York Counties to address mosquito issues.
INTRODUCTION

In late July of 2014, Madison County reported its earliest EEE positive detection in a mosquito pool collected in the Town of Sullivan. Detection of EEE in mosquitoes continued weekly. By mid-August of 2014, EEE was detected in a total of 5 mosquito pools and among known animal biting species of mosquitoes. In 2014, Madison County and neighboring Onondaga and Oswego Counties consistently detected EEE in mosquito pools tested.

Taking into consideration the early and persistent detection of EEE in the environment, actual evidence of EEE in human biting mosquitoes in Madison, or other central New York counties, the Madison County Chairman of the Board and the New York State Commissioner of Health declared a significant threat to Public Health. This declaration allowed the County to contract with a company to conduct aerial pesticide spraying to protect human health. Aerial spraying occurred on August 26, 2014 in Madison County in the Black Creek Swamp in the Town of Sullivan. This was the first time since 2004 that Madison County Health Department conducted aerial pesticide spraying due to the threat of mosquito borne disease.

Following aerial spraying in 2014, the Health Department decided to seek feedback to understand community concerns around mosquitoes in the areas of the Town of Sullivan where the EEE virus has been detected, which is also the area of the county most affected by mosquitoes that transmit EEE. In June of 2015, Madison County Health Department surveyed residents living in this area to about their understanding and concerns about mosquitoes and mosquito control activities, and their preferred method for receiving notifications of spraying events.

Residents in the Town of Sullivan, living within the approximate 11,300 acre area of Black Creek Swamp, where aerial pesticide spraying occurred in 2014, were surveyed. *(The Black Creek Swamp spray area is roughly described by Route 31 to the North, Fyler Road to the South, Bridgeport/Kirkville Road to the West and Lakeport Road to the east, outlined by the purple area in the following map, Figure A.)* Tax property data was used to generate a survey mailing list of residential units within the targeted geographic area (Figure A). Surveys were sent out in the mail and included a pre-paid self-addressed return envelope. 311 out of 898 surveys were returned for an estimated response rate of 35%.

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2 A mosquito pool is a collection of up to 60 mosquitoes of similar species taken from a dedicated sampling site for testing.
The objectives of the survey were:

Awareness and Concern
- Identify the awareness of and concerns about mosquitoes in the community.
- Identify personal protection actions currently used to reduce risk of mosquito bites.

Communications and Notifications
- Identify preferred sources for health information and communications during a public health emergency.

Mosquito Reduction Measures
- Identify concerns about the use of pesticides to control mosquitoes,
- Understand under what circumstances it is felt that pesticide spraying should be used as a mosquito-control measure, and
- Determine how much respondents would consider paying annually to support mosquito reduction activities in their neighborhood.

This report provides the results of the survey and recommendations for next steps.
SURVEY RESULTS

Awareness and Concern

Respondents were well aware that mosquitoes in their community may carry and transmit disease.

- **99%** of survey respondents indicated knowing that mosquitoes in the area may carry diseases like EEE that can cause illness or death in people

The majority of respondents indicated a high level of concern due to the presence of mosquitoes.

- **81%** of respondents were either greatly (32%) or extremely concerned (49%) about the presence of mosquitoes in their community
- **16%** indicated feeling only somewhat concerned about mosquitoes in their community
- **3%** indicated being hardly or not at all concerned about mosquitoes

Personal protection represents the most important step to reduce the chance of getting a mosquito-borne disease. The majority of respondents surveyed are taking one or more recommended steps to deal with mosquitoes in their yard.

- **77%** reported insect repellent use as the most common step taken, followed by **67%** staying inside or in a screened in area and/or **53%** wearing clothes to cover exposed skin when outdoors
- **15%** of respondents indicated that they contract with a service provider to apply pesticides in their yard
- **Only 2%** reported taking no protective steps to deal with mosquitoes
Respondents were asked about their top three concerns about mosquitoes in their community. Health, being able to enjoy the outdoors, and pet or other animal health represented the top three concerns residents had about mosquitoes.

- **66%** indicated concern about health of themselves or a family member (older adults, child, or grandchild)
- **46%** indicated concern about not being able to enjoy the outdoors as mosquitoes were considered a nuisance
- **8%** indicated concern about mosquitoes posing a threat to the health of their pet or other animal
- **6%** also indicated concern about areas of stagnant water serving as mosquito breeding sites
- Of those responding, only **6%** indicated having no concerns about mosquitoes in their community
Communications and Notifications

In 2014, Madison County Health Department conducted a large and extensive education and outreach campaign. EEE was detected in multiple mosquito pools that year in July and August. A variety of methods, including press releases, were used to communicate the early detection of EEE in mosquitoes and the increased risk of EEE infection to people in affected areas.

On August 22, 2016 Madison County Health Department provided public notice of plans to conduct aerial pesticide spraying on August 26th. Media releases were distributed to local television stations, newspapers, and radio stations. Individual phone calls were made to the Town of Sullivan Office, area horse farms, bee keepers, the Town of Sullivan Department of Recreation, and others to alert them of the spraying event. The Health Department, County, and Town websites were also used to communicate public notice of the spraying event. The ability to provide as much notice as possible in advance of spraying was a key goal, although changing and uncertain weather and wind patterns made confirming a day and time for spraying a challenge.

In addition, Madison County Health Department partnered with Madison County Emergency Management to send out a targeted, automated phone alert message 24-hours before spraying, using the New York State All-Hazards Alert and Notification (NY-Alert) System. The NY-Alert notification went to landlines and cell phones that were either signed up to receive the alerts or were included in the most current available database of phone numbers. The geographical area targeted for the alert (see Figure A, page 6) provided roughly 1500 phone numbers in the NY-Alert database. Of the approximate 1500 calls made, over half (620) were estimated to have been received. 210 were answered by a person, 410 went to voicemail, and the rest were either not answered, were incorrect numbers, or were non-voice lines (such as a fax line).

- The local area for the NY-Alert system test was estimated to have successfully notified 41% (620 out of 1,500) of the phone numbers dialed in the targeted spray area, however only 5% of those surveyed over nine months later recalled receiving the automated NY-Alert Phone call/message.
The survey asked respondents how they learned about the aerial pesticide spraying. 12% indicated they were not aware spraying occurred in 2014. The top four ways in which respondents recalled learning about the spray event were:

- 68% TV
- 31% newspaper or online media
- 25% word of mouth
- 17% radio

68% of respondents learned about aerial spraying in 2014 by watching TV

The survey asked where respondents received health information on how to protect themselves and their family from mosquito borne-disease in the past year. The top responses were:

- 64% TV
- 41% newspapers or online media
- 29% word of mouth
- 19% did not get information
- 18% radio

64% of respondents received mosquito education in the past year from watching TV
The survey asked respondents to rank their preferred method for notification of a health emergency such as flooding or another EEE spray event. The top five choices ranked were:

1. 44% TV
2. 27% cell phone
3. 20% landline phone
4. 4% newspaper
5. 4% radio

Websites were ranked low, with similar rankings for both the Madison County and Madison County Health Department websites as sources for information. Although social media (Facebook and Twitter) was not ranked as a first preferred source for receiving health emergency notifications, Facebook was ranked 6th as a second preferred source. Although social media was ranked low, it does represent a viable and growing means for notifications.
Mosquito Reduction Measures

Respondents were asked as to when aerial pesticide spraying should be used as a mosquito control measure. The majority of those surveyed felt aerial pesticide spraying should occur as soon as mosquito numbers are high regardless of disease detection in mosquitoes.

- **69%** responded when mosquito numbers are high, even if EEE or West Nile Virus is NOT found
- **55%** responded when summer weather conditions favor outdoor activities and outdoor living
- **24%** responded only when proof of EEE or West Nile Virus is found in mosquitoes locally
- **6%** of those surveyed indicated being opposed to any aerial pesticide spraying

### Top 3 Reasons for Aerial Spraying

- **69%** Spray when mosquito numbers are high
- **55%** Spray when weather brings people outdoors
- **24%** Spray if disease is detected
Respondents were asked if they had any concerns about the application of pesticides to control mosquitoes.

- The majority of respondents, 64% indicated having no concerns about the use of pesticides
- 24% of responses indicated concerns about the use of pesticides
- 12% were unsure about whether they had concerns about the use of pesticides to control mosquitoes

Among the 24% of respondents with concerns about the use of pesticides, the top five categories of concern about pesticide use were:

- 34% were concerned about effects to human health
- 15% were concerned about receiving advanced notice of pesticide spraying
- 12% were concerned for pet health
- 11% were concerned for bees and other insects
- 10% were concerned for plants and gardens

![Top 5 Concerns about Pesticide Use](image)

Additionally, respondents indicated concern for the use of pesticides effecting water, the environment, other animals (such as livestock), as well as a general concern for wide area use of a pesticide.
The survey asked how much respondents would consider paying annually to support mosquito population reduction activities in their neighborhood.

**64%** indicated willingness to pay *some* amount, ranging between $1 to $600 annually.

- 48% indicated they would consider paying $1-100 dollars annually to support mosquito population control activities; another 2% indicated they would be willing to pay $1-50 dollars annually
- 14% indicated they would consider paying an amount greater than $100 dollars annually
- 2% indicated they would only consider financially supporting a non-pesticide control measure
- 5% were unsure; and 29% wrote in a comment that they would not consider paying any amount for various reasons.

Among the written comments from respondents, 14.5% wrote that they felt mosquito control should be covered in the taxes they are already paying. In addition, although not a specific question in the survey, 15% of respondents self-disclosed that they already hire a service to apply pesticides in their yard.
NEXT STEPS

Education and Awareness

☐ Respondents indicated a high level of awareness that mosquitoes locally carry and can transmit disease to people, indicating that educational efforts aimed at communities of concern were effective. Annual educational efforts will continue to ensure awareness is maintained and information is provided through a variety of communication channels.

☐ To address respondents concerns about the use of pesticides to reduce mosquito populations, improvements to education and communication efforts should include:

  - Health risk and impacts, especially among vulnerable populations (children, elderly, those with weakened immune systems or pre-existing medical conditions like asthma)
  - Environmental impacts (water, bees and other insects, plants)
  - Animal health impacts (pets, livestock, birds, horses, wildlife)
  - Garden safety concerns (safe to consume vegetables from garden)
  - How those in an affected area may limit exposure to pesticides during wide-area spraying.

☐ Clarify the Health Department’s role to conduct spraying to reduce mosquito populations to protect public health from a specific disease threat (non-nuisance spraying).

☐ Continue to educate and seek community feedback on mosquito control methods that would be supported, such as pesticide applications (aerial or ground truck spraying) or non-pesticide mosquito reduction measures.

☐ Educate the public on mosquito response activities as they evolve and change to protect health.

Communications and Notifications

☐ Improve education and communication about wide-area pesticide spraying events, providing as much advance notice as possible.

☐ Utilize social media to push out information to community members.

☐ Promote and encourage residents to sign up for NY-Alert to receive automated emergency notifications to their phone or email. The NY-Alert system is the only system currently available to notify residents by phone. NY-Alert has the potential to serve as an effective method to quickly notify residents of pesticide spraying in advance and direct people where to go for more information.
Mosquito Reduction Measures

☐ Explore and evaluate options and financial strategies to support mosquito control activities (such as a regional approach) to reduce mosquito-borne disease as a public health threat in the Black Creek Swamp area in the Town of Sullivan.

☐ Evaluate and pursue more effective spraying strategies to reduce the number of disease carrying mosquitoes in the Black Creek Swamp area in the Town of Sullivan.

☐ Work with town and municipal leaders to mitigate potential mosquito breeding areas, i.e., storm drains, retention ponds, etc.
Madison County Health Department’s Yearly Mosquito Surveillance and Response Activities

Mosquito Surveillance

- Mosquito surveillance is conducted in the key habitat of Black Creek Swamp area in the Town of Sullivan, Madison County. Beginning in early summer, mosquitoes are trapped weekly, identified by species, and grouped by species for testing.
- Mosquitoes collected by Madison County Health Department are submitted for testing to NYSDOH Wadsworth Laboratory weekly.
- The information collected on the type of mosquito-biting species is used by Madison County Health Department to decide on appropriate prevention and/or control measures.
- Staying current on situations in neighboring counties; communicating and sharing surveillance results with neighboring counties and the New York State Department of Health.
- Enhanced adult mosquito surveillance occurs when either Madison County or a neighboring county detects positive EEE in mosquitoes through weekly surveillance activity.

Animal Surveillance

- Outreaches to veterinarians encouraging surveillance for encephalitis in animals (including horses and captive birds) and reporting to Madison County Health Department as further testing may be recommended.
- Encourage vaccination of horses to protect from EEE.
Human Surveillance

- Viral encephalitis and meningitis are reportable in NYS. Madison County Health Department conducts active surveillance by regularly calling medical providers for reports of illnesses. Suspect cases are reported to Madison County Health Department and may be submitted for state laboratory testing.

- If positive EEE is found in people, horses, or human-biting mosquito species in Madison County or in a neighboring county, active surveillance of viral encephalitis and/or meningitis occurs to canvas for suspect cases and healthcare providers and veterinarians are encouraged to report cases.

Education

- Release a monthly disease surveillance report providing mosquito surveillance results and/or activity updates from Madison and neighboring Onondaga, Oswego, and Oneida counties. Reports may be subscribed to and are available on the Madison County Health Department website at www.healthymadisoncounty.org.

- Produce and/or distribute educational materials, press releases, and health advisories that are provided to the media to highlight personal protective measures the community may take to reduce the risk of disease with the detection of any positive EEE detection.

- Participate in regional outreach opportunities.

- Keep informed of regional surveillance results through conference calls and review of weekly statewide mosquito-borne disease activity reports.

- Technical, diagnostic, and surveillance information is also provided to healthcare providers with a positive EEE detection.
Tables of Survey Results by Question

n= number of responses per question

**Question 1**

Did you know mosquitoes in Central New York may carry viruses (e.g. EEE or West Nile Virus) that can cause illness and even death in people? (n=310)

![Bar Chart](image)

**Question 2**

How concerned are you about the presence of mosquitoes in your community? (n=310)

![Bar Chart](image)
**Question 3**

What, if any concerns, do you have about mosquitoes in your community? (n=263)

<table>
<thead>
<tr>
<th>Concern</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sick - Individual, Family, Child, or Grandchild</td>
<td>66%</td>
</tr>
<tr>
<td>Nuisance (many mosquitoes) and/or unable to enjoy the outdoors</td>
<td>46%</td>
</tr>
<tr>
<td>Sick - Pet or other Animal</td>
<td>8%</td>
</tr>
<tr>
<td>Stagnant Water</td>
<td>6%</td>
</tr>
<tr>
<td>No concerns</td>
<td>6%</td>
</tr>
<tr>
<td>Property Value or Home Sale</td>
<td>Less than 1%</td>
</tr>
</tbody>
</table>

**Question 4**

How do your currently deal with mosquitoes in your yard? (n=310)

<table>
<thead>
<tr>
<th>Method</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply insect repellent</td>
<td>77%</td>
</tr>
<tr>
<td>Stay indoors or stay in a screened-in area outside (screened-in gazebo)</td>
<td>67%</td>
</tr>
<tr>
<td>Wear long sleeve shirts and long pants</td>
<td>53%</td>
</tr>
<tr>
<td>Contract with a service to apply pesticides</td>
<td>15%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
</tr>
<tr>
<td>I do none of the above</td>
<td>2%</td>
</tr>
</tbody>
</table>
**Question 5**

When do you feel aerial pesticide spraying should be used as a mosquito-control measure? (n=306)

- 69% when mosquito numbers are high, even if EEE or WNV is not found
- 55% when summer weather conditions favor outdoor activities
- 24% only when EEE or WNV is detected in local mosquitoes
- 6% no spraying ever

**Question 6a**

Do you have any concerns about the application of pesticides to control mosquitoes in your neighborhood? (n=309)

- Yes 24%
- No 64%
- Not sure 12%
**Question 6b**

Categorized comments provided about concerns about the application of pesticides to control mosquitoes: (n=84)

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide Area Pesticide Use</td>
<td>8%</td>
</tr>
<tr>
<td>Other Animal Health</td>
<td>9%</td>
</tr>
<tr>
<td>Water or environment</td>
<td>9%</td>
</tr>
<tr>
<td>Plants/Garden</td>
<td>10%</td>
</tr>
<tr>
<td>Bees or other Insects</td>
<td>11%</td>
</tr>
<tr>
<td>Pet Health</td>
<td>12%</td>
</tr>
<tr>
<td>Advance Notification</td>
<td>15%</td>
</tr>
<tr>
<td>Human Health</td>
<td>34%</td>
</tr>
</tbody>
</table>
Question 7

In August 2014, Madison County conducted airplane (aerial) spraying for mosquitoes in the Town of Sullivan after detecting EEE in mosquitoes. How did you learn about this spraying event? (n=309)
**Question 8**

Where have you received information on how to protect yourself and your family from mosquito-borne disease in the past year? (n=307)
**Question 9a**

If a health emergency were to occur tomorrow (such as EEE in mosquitoes, an illness outbreak, or flooding) rank the choices below in order of how you would like to be notified? (n=294)

![Bar chart showing ranked first choice notification methods]

- TV: 44%
- Cell phone: 27%
- Landline phone: 20%
- Newspaper: 4%
- Radio: 4%
- Other (example: door to door): 1%
- County Health Department website: Less than 1%

**Question 9b**

Ranked Second Choice (n=271)

- TV: 25%
- Landline phone: 21%
- Radio: 21%
- Cell phone: 16%
- Newspaper: 10%
- Facebook: 4%
- Other (example: door to door): 3%
- County Health Department website: Less than 1%
- Madison County website: Less than 1%

**Question 9c**

Ranked Third Choice (n=220)

- Radio: 29%
- TV: 21%
- Newspaper: 18%
- Landline phone: 13%
- Cell phone: 10%
- Facebook: 6%
- Other (example: door to door): 2%
- County Health Department website: 1%
- Madison County website: Less than 1%
**Question 10**

How much would you consider paying annually to support mosquito population reduction activities in your neighborhood? (n=297)

- **$0 dollars annually**: 29%
- **$1-50 dollars annually**: 2%
- **$1-$100 dollars annually**: 48%
- **$100-$200 dollars annually**: 9%
- **$200-$450 dollars annually**: 3%
- **$450-$600 dollars annually**: 2%
- **Non-pesticide option**: 2%
- **Other (unsure or already pay privately)**: 5%
For more information on mosquito-borne diseases of concern and their symptoms, contact Madison County Health Department at 315.366.2526 or go online to http://bit.ly/EEEvWNV.