

STATE OF RHODE ISLAND

RESPONSE PROTOCOL FOR MOSQUITO-BORNE DISEASES (Amended March, 2001)

INTRODUCTION

1. **Scope:** Our target is mosquito-borne diseases that have the potential to cause disease and death in humans. Two such diseases, both encephalitic viruses, have been identified. Those are Eastern equine encephalitis (EEE) and West Nile Virus (WNV). A third virus, Highlands J (HJ) does not affect humans, but its presence is an indicator of EEE.
2. **Indicators:** Indicators are the means by which we identify the presence of and assess the human health risk associated with any of the above diseases. These include, for EEE, infected mosquitoes, horses and exotic birds such as emus; and for WNV, all of the above plus very dramatic levels of infection/mortality in native birds, especially crows and blue jays.
3. **Human Symptomology:** Both EEE and WNV cause encephalitis, or brain fever, in humans. Symptoms can include headaches, confusion, delirium and coma leading to death. EEE is the more serious of the two diseases, but appears to be contracted by far fewer humans during an outbreak. While greater numbers of humans may contract WNV as a consequence of being bitten by infected mosquitoes, most will experience only mild flu-like symptoms or none at all. Both diseases disproportionately target those with impaired or undeveloped immune systems or the elderly.
4. **Purpose:** The objective of this protocol is twofold; one, to reduce the production of mosquitoes available to contract and then transmit disease, and two, to minimize the opportunities for infected mosquitoes to transmit disease to humans. Strategies which minimize human health and environmental impacts are emphasized.

FOUNDATIONS OF AN EFFECTIVE RESPONSE

1. **Education/Outreach:** Keeping the public informed is a key objective of this response protocol. This information includes: (1) scientific information about the disease; (2) the results of various disease surveillance activities in RI; (3) state plans and responses to the disease; (4) actions the public can take to reduce exposure to WNV-infected mosquitoes; and (5) other important information. A public information campaign (pamphlets, posters, media coverage, etc.) will focus on eliminating mosquito-breeding environments (stagnant water) and using personal protection (clothing, screens, repellent).

DEM and HEALTH plan to issue regular, once weekly public information reports to the public and the media.

Responsibility: DEM/HEALTH/Municipalities

2. **Prevention:** Our objective is to eliminate mosquito breeding habitat and otherwise reduce populations of adult biting (female) mosquitoes by killing them at the larval development state, when they are most concentrated and least mobile. For WNV this involves removal of old tires, cleaning gutters and other such housekeeping measures to eliminate habitat, and larvaciding catch basins, roadside ditches, retention basins, and, where practical, natural breeding habitats such as swampy areas. For EEE, larvaciding of known breeding habitats is recommended. Saltmarsh water management projects are encouraged to suppress mosquito species that can be involved with both diseases.

Responsibility: DEM has purchased and will distribute the larvacide Altosid for treating all catch basins once every 30 days and Bti biscuits and pellets for treating roadside ditches, retention basins, and other breeding areas. Municipalities, RIDOT, and other governmental units will distribute this material. Homeowners will be urged to eliminate breeding habitat through good housekeeping practices.

3. **Detection:** DEM routinely monitors larval production and traps adult mosquitoes at numerous sites across the state weekly beginning in early June. These are cultured for the presence of any of the viral diseases of concern. There is an approximate nine-day lag between collection and reporting of results. In mid-May, DEM will begin collecting dead or dying birds whose symptoms match the profile for WNV. Turn-around between collection and results is approximately three days. Bird and mosquito testing will be divided between URI (counties: Washington, Newport, Bristol) and the State HEALTH Laboratories (counties: Providence, Kent). HEALTH is also responsible for reviewing all potential human cases to confirm the presence of the disease and determine its cause.

Responsibility: DEM/HEALTH/URI

THE RESPONSE CONTINUUM

1. **What Is A Response Continuum?** A response continuum presupposes that the human health risks we are attempting to mitigate increase gradually as the level of WNV or EEE in populations of human biting mosquitoes increases. This in turn dictates a graduated response to the various indicators of virus in mosquito species of concern. These indicators include, for example:

- Concentrations of dead birds (in space and time) particularly crows and blue jays;
- Increasing levels of infection in trapped mosquitoes, again in space and time, and particularly in human biting species, although to varying degrees all species are of concern;
- Horse deaths/disease.
- Human disease/deaths

Determining the appropriate type of response at any point in the continuum also requires that real world opportunities for disease transmission to humans be weighed. This, in turn, requires sensitivity to such demographic factors as where people live and at what density. Once disease is detected in the mosquito population, the risk of disease transmission to humans is higher in densely populated urban neighborhoods than in sparsely populated rural environments.

Finally, determining the appropriate level and type of response requires awareness of the response tool in our "inventory" and the ability to focus and/or increase/decrease our reliance on any of those tools. By response tools, we mean such things as:

- Public education and outreach;
- Bird surveillance (collection and testing for virus);
- Mosquito surveillance (larval abundance; adult trapping and testing for virus)
- Prevention via source reduction; elimination of breeding habitat and larvaciding;
- Application of mosquito adulticides, typically by ultra low volume sprayers and by backpack, truck or aerially (plane or helicopter).

2. **How is This Different From Last Year's Strategy and Why?**

Since the end of the 2000 WNV transmission season, the scientific community has had an opportunity to review a much more comprehensive data base generated by the dozen or more states who responded to WNV last summer. This extensive information contrasts with data from only three affected states (two with only limited responses) in 1999. This review concluded that WNV mortality in native birds (crows and bluejays) shows little correlation with disease in humans. Birds

appear to be so sensitive to WNV that they begin to die off in large numbers well before risk to humans escalates. For this reason, we now recognize disease in birds as an effective and useful early warning of the presence of WNV in the environment, but not a meaningful indicator of actual risk to humans. Bird deaths, in and of themselves, are therefore, no longer recognized in the scientific community as an appropriate trigger for use of adulticides, which can also have undesirable effects on non-target insect species and persons with breathing impairments. Consistent with CDC recommendations, adulticiding will, therefore, only be considered where high populations of infected human-biting mosquitoes or other indicators of elevated risk to humans are identified, and then only when all other control options have been exhausted.

Spraying: The response protocol in effect during the summer of 2000 reflected the Center for Disease Control's then current recommendation that ground spraying of adulticides undertaken within a two-mile radius of the collection locus of any bird confirmed to have died from WNV. With varying degrees of aggressiveness, this recommendation was implemented by most of the states along the Eastern Seaboard impacted by WNV during the summer/fall of 2000. The CDC recommendation to spray in response to bird deaths, and Rhode Island's implementation of that recommendation, reflected the recognition of scientists at the time that bird mortality was an indicator of WNV in the mosquito population, a recognition that was untempered by any real experience as to just how sensitive an indicator. Given this ambiguity, the prudent course of action from a human health perspective, was to assume a worse case, or in this instance a relatively direct correlation between bird mortality and increased risk to humans, a risk that could be and was mitigated by adulticiding. Again, however, expensive and new science argues for a more conservative response.

Human Surveillance:

In 2000, WNV testing was confined to surveillance testing on reported cases of encephalitis. Four persons who met the case definition were tested and all were negative. In 2001, laboratory capacity permitting, testing will be expanded beyond encephalitis to include the testing of appropriately collected specimens on selected cases of aseptic meningitis and cases of Guillan Barre' Syndrome, reported from May through October. WNV, in its severest form, causes aseptic meningitis, encephalitis, and Guillan Barre Syndrome – an illness characterized by muscle weakness, a common feature of WNV infections.” Epidemiological evidence from New York City supports the notion that the testing of seriously ill hospitalized patients is likely to be the most sensitive and efficient method for detecting human disease. All human testing will be conducted or coordinated through the HEALTH laboratory. Surveillance protocols for active surveillance and communication of any positive findings to HEALTH and environmental officials be coordinated by the Office of Communicable Disease.

How Will the Response Continuum Work In Practice?

Based on last year's experience and the growing body of scientific knowledge about WNV derived from that experience, we can anticipate that the following "milestones" will be useful indicators of increasing human health risk which should, in turn, inform and direct our response efforts:

- 1) No signs of WNV or EEE in birds, mosquitoes, horses or humans (lowest risk level);
- 2) Confirmation of disease in single birds;
- 3) Confirmation of disease in numerous birds in a concentrated area over a short period of time;
- 4) Confirmation of disease in single pools (groups collected from a single trap) of mosquitoes; confirmation in mammal biting species of greater concern than in bird biters;
- 5) Confirmation of disease in a horse or horses;
- 6) Confirmation of disease in multiple pools of mosquitoes in a concentrated area over a short period of time; identification of high levels of infection in mammal biting mosquitoes; confirmation of disease in multiple species of mammal biting mosquitoes;
- 7) Confirmation of a human case with a likely Rhode Island infection source as determined by HEALTH;
- 8) Multiple human and/or horse cases in a concentrated area with likely Rhode Island infection sources (highest risk level).

Again, and as previously noted, risk indicators and appropriate response must always be evaluated in the context of demographics, particularly (human) population density.

It is proposed that at each "milestone" in the response continuum, mixes of the following measures will be considered in developing and/or modifying the response strategy:

- 1) Intensified or geographically targeted public education and outreach regarding personal protection and individual source reduction/housekeeping measures;
- 2) Intensified or geographically targeted larval abundance monitoring and/or adult mosquito trapping; shifting of testing effort away from birds and into mosquitoes, as appropriate;
- 3) Intensified or geographically targeted larvaciding, particularly identification and treatment of hard to reach breeding habitat not already being treated;
- 4) Intensified local initiatives to encourage and, to the extent authorized by housing code ordinances, require yard clean-ups, removal of junk tires, pool maintenance and other such home and/or business owner "house keeping" initiatives;

- 5) Intensified or geographically targeted monitoring of human populations for evidence of exposure to mosquito borne viruses by HEALTH, local and school based officials, and private health providers;
- 6) As a last resort, and where other measures are not deemed sufficient in themselves, geographically targeted application of adulticides by the least intrusive method possible, including back pack, truck mounted and/or aerial spraying (state).

4. **Who Will Determine How and When To Escalate Response? How Will They Do So?**

A tested and proven model for adjusting mosquito disease response strategies to rapidly changing circumstances exists in the Mosquito Disease Advisory Group. This ad hoc twelve-member group of mosquito control experts, environmental and public health professionals was established in 1992 and has guided the state through numerous EEE outbreaks including the major event in Westerly in the late summer of 1996. It was also deeply involved in developing and overseeing the implementation of last summer's WNV protocol. Agencies represented include DEM, HEALTH, the Governor's Office, URI and the U.S. Geological Survey. The Advisory Group plans to meet or teleconference every other week beginning in June, more frequently if necessary.

The Advisory Group forwards its recommendations to the Director of HEALTH and DEM, in whom routine decision-making authority is vested. Authorization to conduct aerial spraying of adulticides requires concurrence of the Governor. Actions requiring municipal participation such as application of larvacides and/or ground spraying of adulticides will be recommended and/or authorized by DEM and HEALTH, but will only proceed with municipal concurrence.