



STATE OF NEW HAMPSHIRE ZIKA VIRUS RESPONSE PLAN

July 16, 2018

New Hampshire Department of Health and Human Services
Division of Public Health Services

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PLAN DISTRIBUTION

The publication of the State of New Hampshire Zika Virus Response Plan provides a framework for effectively preparing for, responding to, and recovering from the occurrence of Zika virus in New Hampshire. This plan describes the mechanisms for managing this disease risk in coordination with local, state, and federal partners through a scaled response. This document replaces and supersedes all previous versions, which are listed in the next section. When changes occur, they will be documented and the current version of the plan will be distributed to the entities listed here:

New Hampshire Department of Health and Human Services

Emergency Services Unit, ESF 6&8

Public Health Laboratories

Bureau of Infectious Disease Control

New Hampshire Department of Environmental Services

New Hampshire Department of Agriculture, Markets & Food

Division of Pesticides

State Entomologist

State Veterinarian

New Hampshire Arboviral Illness Task Force

PLAN MAINTENANCE

This table documents any time the plan is reviewed/updated.

Date	Changes	Section/Page(s)

ACRONYMS AND ABBREVIATIONS

Acronym	Definition
CDC	Centers for Disease Control and Prevention
DHHS	Department of Health and Human Services
DPHS	Division of Public Health Services
EOC	Emergency Operations Center
ESU	Emergency Services Unit
HSEM	Homeland Security and Emergency Management
ICS	Incident Command Systems
JIC	Joint Information Center
NH	New Hampshire
PHL	Public Health Laboratories

INTRODUCTION

The purpose of the New Hampshire (NH) Zika Virus Response Plan (Plan) is to provide guidance on the operational aspects of Zika virus surveillance, prevention, and response. This Plan will provide information for response to travel-related, sexual transmission, and local transmission of Zika Virus.

The development of this plan was supported by funds received through the Public Health Preparedness and Response Cooperative Agreement for All-Hazards Public Health Emergencies: Zika 2016. It was developed with input from partners through a series of multi-sector workshops and exercises conducted in the spring of 2017. The NH Department of Health and Human Services (DHHS) will continue to seek advice from partners and collaborators and modify the plan, as appropriate.

Contact Information

For questions about this document, please contact:

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USE OF THIS PLAN

Scope

This plan is intended for use by New Hampshire Zika Response Stakeholders in order to coordinate a comprehensive Zika Virus response across all phases of operation.

These stakeholder entities may include (but are not limited to) State agencies including New Hampshire Department of Health and Human Services (DHHS), New Hampshire Department of Agriculture, Markets & Food (DAMF), New Hampshire Department of Environmental Services (DES), New Hampshire Homeland Security and Emergency Management (HSEM), New Hampshire Public Health Networks, local health departments, healthcare facilities, and commercial vector control companies.

Resources are available in New Hampshire for public information and education, clinician and care provider information and education, and family services organizations, but are not included in this plan.

Plan Organization

The New Hampshire Zika Virus Response Plan is organized in alignment with the Centers for Disease Control and Prevention (CDC) Zika Interim Response Plan. Both the CDC Plan and the New Hampshire Zika Response Plan are aligned with the planning assumptions and structures identified in the National Preparedness Goal and the Comprehensive Planning Guide 101-v2. The New Hampshire Zika Virus Response Plan will be part of the comprehensive State of New Hampshire Public Health Services Emergency Plan.

Information on Disease Background for use by stakeholders who desire a greater level of understanding about Zika Virus as they consider their response roles and responsibilities has been included.

The plan identifies **Planning and Situational Assumptions** related to Zika Virus Response in New Hampshire. New information and research emerges on Zika Virus and response to Zika Virus at a rapid pace. These assumptions are valid as of the publication of this plan, but may be revised as necessary at any time given new information, or as part of the general plan maintenance schedule.

The Plan adopts a **phased operational response** methodology. This means that actions and considerations by Zika Response Stakeholders are triggered by events and/or information in discreet phases. Triggers that may occur during each phase are included for consideration to help guide planning and response. Triggers are events or **considerations** that initiate certain response activities and/or activate the activities described within a phase of response. This Plan does not presume to supplant the professional judgement of the people using it. The triggers are provided as guidance and points for consideration.

Critical tasks are identified for each phase and also include tables identifying the **roles and responsibilities** of stakeholders within that phase of response.

The phases echo those found in the CDC plan, adapted to be specifically relevant and useful for New Hampshire stakeholders.

This Plan includes a section describing Command, Control, and Coordination of Zika Response by phase. This table includes Operational Coordination tasks and considerations by phase, identifying the lead agency for each.

The Response Phases and their definitions are as follows:

Stage	Phase Level	Zika Transmission Risk Category
Pre-Incident/Surveillance	0	Preparedness: Vectors are not currently identified, established or active in New Hampshire.
	1	Mosquito Season: The vectors are present in New Hampshire. <i>Aedes aegypti</i> and/or <i>Aedes albopictus</i> mosquito biting activity is occurring. Any necessary response activities for: <ul style="list-style-type: none"> • Non-local, travel-related, sexually, or other bodily fluid transmitted cases, • Affected pregnancy.
Suspected/Confirmed Incident	2	Confirmed Local Transmission: Single, locally acquired case, or cases clustered in a single household and occurring < 2 weeks apart.
Incident Response	3	Confirmed Multi-Person Local Transmission: Zika virus illnesses with onsets occurring ≥2 weeks apart but within an approximately 1-mile (1.5 km) diameter.

Table 1: Phases of Response to Zika Virus in New Hampshire

Activities by Phase

For each stage and phase as defined above, DHHS will initiate response and/or monitoring activities relevant to that phase as necessitated by events that occur in that phase. Understanding that not all activity categories are relevant to each operational phase, the plan will identify and explain the following activities for each phase where relevant:

- **Conditions:** conditions or considerations that would prompt a move to the next phase
- **Critical Tasks:** tasks and activities that are critical to ensure appropriate response
- **Roles and Responsibilities:** each phase will have a table with relevant agencies listed and what they are responsible for
- **Human Surveillance:** activities performed in each phase for the identification of Zika cases in New Hampshire
- **Vector Surveillance:** activities performed in each phase for the identification of vectors of concern, or, when vectors are present in New Hampshire, identification of virus in those vectors

- **Vector Control:** activities performed to decrease populations of immature and adult mosquitoes
- **Information Sharing:** providing appropriate and relevant information to people, groups and agencies that would benefit from that information
- **Public Information and Warning:** providing broadcast messaging to improve public safety

PLANNING ASSUMPTIONS AND SITUATIONAL ASSUMPTIONS

Planning Assumptions

- This plan is an annex of the State of New Hampshire Public Health Services Emergency Plan. It details information specific to Zika Virus response and builds upon the already established NH plan to monitor seasonal mosquito-borne viruses which describes what is currently done in NH for mosquito surveillance and control. That plan, the State of New Hampshire Arboviral Illness Surveillance, Prevention and Response Plan, is located on the DHHS website at: <https://www.dhhs.nh.gov/dphs/cdcs/arboviral/documents/arboviralresponse.pdf>
- This plan is considered current as of the date of its issuance. Zika Virus spread and disease control mechanisms are in constant flux. This plan will be updated annually and with improvements after any activation.
- This plan does not supplant or supersede the judgement, expertise, or operational decision-making of its users.
- It is assumed that users of this plan may not be experts in arboviruses. The plan provides some background information about Zika Virus, but is not meant to provide in-depth understanding of all aspects of the disease. Users needing more information on Zika Virus are encouraged to consult authoritative sources for the latest updates in clinical and response information.
- It is also assumed that not all users of this plan are experts in emergency response operations, incident command systems (ICS) and/or the National Incident Management System. Information regarding ICS, and public health ICS can be found in the following NH DHHS plans:

Situational Assumptions

- There is currently no vaccine or specific treatment for Zika Virus; however, vaccines are being evaluated. Clinical care is symptom-based.
- The majority of Zika Virus cases are of mild to moderate severity. Most people infected with Zika Virus, approximately 80%, will not know they have been infected.
- The virus is transmitted through the bite of infected *Aedes aegypti* and *Ae. albopictus* mosquitoes, through sexual transmission, or maternal-fetal (perinatal) transmission.
- These mosquitoes have not yet been identified in New Hampshire, and New Hampshire is unlikely to have sustained populations of either type of mosquito in the near future.
- Of the two species, New Hampshire is more likely to eventually have established populations of *Ae. albopictus*, which is more tolerant of temperate climates and already established in Massachusetts. *Ae aegypti* is truly a tropical mosquito and will not survive NH winters. *Ae aegypti* may have periodic introductions during the warmer spring and summer months, but will not be able to establish sustaining populations in NH.
- Monitoring for both mosquito species and planning for a local outbreak is appropriate because of:
 - The ease of travel to areas that do sustain populations of these mosquitoes

- The prevalence of international shipping from climate areas that sustain these mosquitoes (i.e. they may be imported with in containers with other goods).
 - Periodic identifications of these mosquitoes have been made in other New England states, and Massachusetts has established populations of *Ae. albopictus*.
 - Changing environmental and climate factors that may make New Hampshire more hospitable for these insects, at least seasonally.
-
- Funding for mosquito surveillance and control will be provided by the municipalities engaged in these activities. There are no state funds available to support routine mosquito surveillance or control activities at this time. If there is an event that occurs, such as local transmission, the state will provide support as resources allow.
 - Personnel and support resources such as subject matter experts on *Aedes* mosquito control and additional mosquito control professionals will be available to assist with any significant Zika virus threat to public health in NH.
 - Maximum protection of public health is the goal with the recognition that resources are scarce and may need to be judiciously allocated.

DISEASE BACKGROUND

Current Outbreak

Since the beginning of the 2015 outbreak, there have been cases of Zika virus disease in the United States in people who traveled to countries or territories where the virus is being transmitted and in individuals whose sex partner traveled to a Zika-affected area. Zika virus infection and disease became nationally notifiable in 2016. Since then, NH DHHS has identified cases of Zika virus amongst NH residents with travel to a Zika affected area as well as an infant who was infected in utero. NH reports all confirmed and probable cases to the ArboNET, a national database managed by the CDC. The CDC uses data submitted to ArboNET to provide weekly provisional and annual reports outlining national Zika virus infection and disease case counts.

In 2016, the CDC established the United States Zika Pregnancy and Infant Registry (USZPIR), however new enrollment into the registry has been discontinued as of March 2018. The USZPIR was used to monitor and track the effects of Zika virus on infants that may have been infected during pregnancy and pregnant women who test positive for Zika virus infection or disease during pregnancy. The data collected and analyzed as part of the USZPIR provided much of what we currently know about the impact of Zika virus on pregnancy outcomes.

It is important to note that Zika virus is not present in mosquitoes in NH and there is no evidence of sustained populations of the Zika virus mosquito vectors present in NH. New Hampshire DHHS will support expanded mosquito surveillance as part of this plan, however, local transmission of Zika virus by the mosquitoes present in NH is considered extremely unlikely at this time.

For additional history on the Zika virus, please refer to Appendix A: Resources.

Zika Virus Transmission Mechanisms

Vector Transmission

The primary mode of transmission of Zika virus in the Americas is through the bite of an infected *Ae. aegypti* or *Ae. albopictus* mosquito. Research is underway to determine the likelihood of transmission from other mosquitoes present in the US and elsewhere. At present, no other mosquitoes present in the Americas have been found that are able to serve as efficient vectors of Zika virus. Mosquito surveillance methods in place in NH have not identified any sustained populations of *Ae. aegypti* or *Ae. albopictus*. Consequently, risk of local mosquito-borne transmission in NH is considered unlikely. It should be noted that *Ae. aegypti* is much better at transmitting Zika virus than *Ae. albopictus*, and it is suspected that the local transmission that has taken place in Florida and Texas is due to *Ae. aegypti*.

Ae. aegypti is a tropical mosquito and could only survive for a brief period of time during the warmer months in NH. This mosquito species will not be able to overwinter and establish populations in NH. *Ae. albopictus* is more cold adapted and could, in theory, establish overwintering or sustaining populations in NH. This mosquito is already established in Massachusetts in small numbers. It is expected that if *Ae. albopictus* does establish populations

in NH, they will be small and sparse. However, as our climate continues to change and mosquitoes continue to migrate, *Ae. albopictus* could establish larger populations in NH over many years, possibly decades. Vector population expansion is extremely difficult to predict and continued efforts to maintain enhanced surveillance for *Ae. aegypti* and *Ae. albopictus* will be made in partnership with municipalities conducting mosquito surveillance and control activities.

When *Ae. aegypti* and/or *Ae. albopictus* are identified in NH, additional surveillance methods will be introduced to determine if there are populations of these mosquitoes reproducing in NH or if they are transient populations. These methods may include, but are not limited to, field trials of different mosquito traps and mosquito egg surveillance. Insecticide resistance (IR) testing will be performed on mosquitoes available for this laboratory test. Depending on the condition of mosquitoes that are trapped, IR testing may not be able to be performed. The ability to perform additional mosquito surveillance and IR testing will depend on the availability of funding and staff to perform the work.

In January 2016, the U.S. Centers for Disease Control and Prevention issued a travel advisory for people planning to visit countries where Zika virus is being transmitted by mosquitoes. NH DHHS recommends that pregnant women postpone travel to any affected areas. If avoiding travel to these areas is not possible, women and their partners who are planning to become pregnant should take steps to prevent mosquito bites while in Zika affected areas, including the use of insect repellents, ensuring window and door screens are in good repair at your destination, use of bed nets, and wearing appropriate clothing.

Sexual Transmission

Zika virus can be passed through sex from an individual with Zika virus to his or her sex partner. Sexual transmission can occur before an individual's symptoms begin, while the individual is symptomatic, or after symptoms end. Additionally, infected individuals who do not have any symptoms can also pass on the virus to their sex partner.

Studies have indicated the presence of Zika virus in both semen and vaginal fluids. Thus, it is possible for infected males and females to transmit the virus to their sex partner. It is unknown how long the virus remains in genital fluids; however, it is believed that it persists in semen longer than any other bodily fluid. It is currently thought that Zika virus could be present in semen up to six months after a man is infected, based on PCR testing.

It is recommended that men and women who lived in or traveled to regions where Zika virus is being transmitted by mosquitoes and who have a pregnant sex partner should abstain from sex or consistently and correctly use condoms during their partner's pregnancy or for six months, whichever is longer. Anyone planning to travel should talk to their healthcare provider or visit a travel medicine clinic prior to any travel to determine what the risk is.

Other Bodily Fluid Transmission

Zika virus particles have been detected in other bodily fluids including blood, urine, saliva and breastmilk. To date, transmission has not occurred through exposure to urine, saliva or breastmilk.

Zika Virus Clinical Signs and Symptoms

Approximately 80% of people who are infected with the Zika virus do not develop symptoms. In those who do become ill, the disease is usually mild and lasts from several days to a week. The most common symptoms of Zika virus infection include fever, rash, headache, joint pain, conjunctivitis (red eyes), and muscle pain. Severe disease requiring hospitalization is uncommon.

Becoming infected with Zika virus while a woman is pregnant or trying to get pregnant can lead to serious birth defects in the baby that may or may not be identified before the baby is born. While a full description of the concerns with infection of Zika during pregnancy is out of the scope of this response plan, it is important for pregnant women, men and women that are attempting pregnancy, and partners of pregnant women to understand it is critical to avoid infection with Zika virus in the pre-natal and natal periods. More information on this topic can be found in Appendix A: Resources.

COMMAND, CONTROL, AND COORDINATION OF ZIKA VIRUS RESPONSE

This section describes, by response phase, the coordination tasks inherent to each phase, the lead agency and any decision-making considerations important to the overall coordination of response for that phase.

Phase/Stage	Lead Agency	Operational Coordination	Messaging
0/1 Pre-event and Surveillance	NH DHHS, BIDC	<ul style="list-style-type: none"> • Routine coordination of activities within NH DHHS. • Routine human and mosquito surveillance and reporting. • No Emergency Operations Center (EOC) is activated at this point. • Conference calls/meetings may be held with identified stakeholders to discuss current state of preparedness and mitigation and/or to plan for anticipated response. 	<ul style="list-style-type: none"> • Press releases will be sent to alert the public to the beginning of the arboviral season • Health Alert Network (HAN) messages will be sent to healthcare providers prior to the start of the arboviral season. • Reports and maps will be updated routinely and posted on the DHHS website.
2 Suspected or Confirmed Incident	NH DHHS, BIDC or DPHS IMT if activated	<ul style="list-style-type: none"> • Coordination of response within NH DHHS, to include coordination with the Emergency Services Unit (ESU) for logistical and emergency operational support. • Consider activation in whole or in part of DPHS Incident Management Team (IMT) to support enhanced response. • Coordination with Public Health Networks and Townships for vector control. • Consider Joint Information Center (JIC) 	<ul style="list-style-type: none"> • Press releases will be sent to alert the public to changing local risk. • Health Alert Network (HAN) messages will be sent to healthcare providers with relevant clinical updates. • Event specific reports and maps will be updated routinely and posted on the DHHS website.

		<p>to coordinate public information and warning.</p> <ul style="list-style-type: none"> Consider mobilization of the CDC Zika CERT team. Ref: CDC Zika Interim Response Plan, Pg. 22: Appendix B: CDC's Emergency Response Team, https://www.cdc.gov/zika/pdfs/zika-draft-interim-conus-plan.pdf 	
3 Incident Response	NH DHHS, with HSEM in support.	<ul style="list-style-type: none"> Activation of DPHS IMT. Coordination with HSEM for enhanced response capabilities and capacities as needed. Consider request for Public Health Emergency Declaration. Request mobilization of the CDC Zika CERT team. Ref: CDC Zika Interim Response Plan, Pg. 22: Appendix B: CDC's Emergency Response Team, https://www.cdc.gov/zika/pdfs/zika-draft-interim-conus-plan.pdf 	<ul style="list-style-type: none"> Press releases will be sent to alert the public to changing local risk. Health Alert Network (HAN) messages will be sent to healthcare providers with relevant clinical updates. Event specific reports and maps will be updated routinely and posted on the DHHS website.

Roles and Responsibilities

Agency, Facility, or Company	Role and Responsibility
NH DHHS BIDC	<ul style="list-style-type: none"> Conduct routine arboviral surveillance activities Support enhanced mosquito surveillance
NH DHHS PHL	<ul style="list-style-type: none"> Conduct or coordinate appropriate arboviral testing
NH DHHS PIO	<ul style="list-style-type: none"> Provide public communication of changing risk through press releases and other outreach mechanisms
Mosquito Contractors, Local Health Departments, Municipalities	<ul style="list-style-type: none"> Conduct routine mosquito surveillance and control Participate in enhance mosquito surveillance

PHASE 0: PRE-INCIDENT AND SURVEILLANCE

Phase 0 is the Preparedness and Mitigation stage for Zika Virus response. This section deals with the normal activities the NH DHHS takes related to monitoring for Zika (and other Arboviruses). In essence, Phase 0 is the on-going steady state of activities related to Zika and other mosquito-borne illness.

Baseline Situation

- Mosquito Season – During NH’s mosquito season, vector surveillance will be performed to monitor for the presence of *Ae. aegypti* and *Ae. albopictus* through a collaboration between DHHS and the mosquito contractors submitting mosquito specimens to the PHL as part of routine surveillance.
- Year Round – Human surveillance and testing at the PHL will be performed year round for Zika virus, as it is for other arboviral conditions.

Critical Tasks

- Communicate with healthcare providers, health officers, and the public at the beginning of the mosquito season about what risks are present
- Ensure laboratory capacity to test, or coordinate testing, for all human specimens that come to the PHL
- Support enhanced mosquito surveillance to monitor for *Ae. aegypti* and *Ae. albopictus*
- Epidemiological investigations of all human cases of Zika virus will be performed to determine exposures, risk factors, and likely source of transmission
- Support enhanced surveillance for Zika-associated birth defects or other infant health outcomes

Roles and Responsibilities

Agency/Facility/Company	Role/Responsibility
NH DHHS BIDC	<ul style="list-style-type: none"> • Conduct routine arboviral surveillance activities • Support enhanced mosquito surveillance
NH DHHS PHL	<ul style="list-style-type: none"> • Conduct or coordinate appropriate arboviral testing
NH DHHS PIO	<ul style="list-style-type: none"> • Provide public communication of changing risk through press releases and other outreach mechanisms
Mosquito Contractors, Local Health Departments, Municipalities	<ul style="list-style-type: none"> • Conduct routine mosquito surveillance and control • Participate in enhance mosquito surveillance

Human Surveillance Activities

The NH DHHS is the agency responsible for conducting human case surveillance for Zika virus disease. Zika virus disease was declared a Nationally Notifiable Disease on January 21, 2016,

enabling health departments to share Zika virus disease information. Strict protocols have been established by BIDC and are in place for the processing, management, and delivery of secure data regarding Zika cases.

Human testing facilitation is performed by BIDC staff. BIDC staff work with healthcare providers to ensure that each patient questioned for possible exposure to the Zika virus meets BIDC testing guideline algorithm requirements, which are based on the CDC testing algorithm. CDC recommendations for testing can be found at: <https://www.cdc.gov/zika/hc-providers/testing-for-zikavirus.html>. Testing facilitation is documented using a BIDC electronic Zika Virus Testing Facilitation Form. Data are entered into and tracked using the New Hampshire Electronic Disease Surveillance System (NHEDSS). Should a patient not meet BIDC testing guidelines algorithm requirements, BIDC staff will inform the patient's provider of private labs capable of providing testing.

As laboratory results are received, NH PHL staff will fax results to the ordering provider. Upon receipt of a positive lab report, BIDC staff will conduct further investigation to determine whether the case meets the national case definition for a confirmed or probable case. If a case meets confirmed or probable case definition criteria, DPHS management and BIDC staff will be notified within 24 hours, and appropriate procedures for reporting and follow up (if necessary), will be carried out dependent upon each individual case scenario.

For information on Zika laboratory testing, please see Appendix B: State Laboratory Testing.

Surveillance for Potentially Affected Pregnancies and Children

BIDC staff will perform follow-up activities for pregnant woman infected with Zika during their pregnancy and their infants throughout pregnancy and their first two years of life, in accordance with CDC guidelines. Should any pregnancy result in the birth of a Zika impacted infant, DHHS will work with the healthcare provider(s) and impacted families to ensure that resources are available to support those in need of assistance.

Blood Supply Safety Monitoring

On August 26, 2016, the U.S. Food and Drug Administration (FDA) released guidelines on testing for Zika virus in donated blood and blood components in the US. Though the possibility that Zika virus can be transmitted through blood transfusion remains low, there is still much uncertainty. The guidance recommends that an investigational donor screening test be performed on all blood and blood component donations until a licensed test becomes available.

As instructed by the US FDA, New Hampshire blood establishments implemented these new recommendations no later than November 18, 2016.

These recommendations can be found in the CDC's *Revised Recommendations for Reducing the Risk of Zika Virus Transmission by Blood and Blood Components.*¹

¹ CDC blood supply monitoring recommendations can be found at: <https://www.fda.gov/downloads/BiologicsBloodVaccines/GuidanceComplianceRegulatoryInformation/Guidances/Blood/UCM518213.pdf>

Vector Surveillance Activities

Mosquito surveillance in NH is performed at the discretion of cities and towns funding that work. No state or federal funds are available to support routine mosquito trapping or control activities. Funds are available to perform arboviral testing on mosquito specimens submitted to the PHL. As funds become available, enhanced mosquito surveillance activities will be prioritized and supported wherever possible.

In the fall of 2016, NH DPHS purchased BG Sentinel 2 traps that target *Ae. aegypti* and *Ae. albopictus* mosquitoes. These traps were used as part of enhanced mosquito surveillance activities in cooperation with the mosquito contractors and municipalities already trapping and submitting mosquitoes for arboviral surveillance testing. Enhanced mosquito surveillance indicates the use of more and different types of traps than are normally used during a mosquito surveillance season. Usually, gravid and CDC light traps are used for mosquito surveillance in NH. The BG Sentinel 2 traps, and any additional traps purchased by DHHS to improve mosquito surveillance, will be used each season that there are resources to do so to enhance surveillance activities and increase the likelihood that these, or other, invasive mosquitoes are identified.

The state will conduct risk assessments for Zika virus to determine appropriate levels of response using mosquito surveillance data collected from cities and towns during the mosquito season. Risk assessments are done continuously throughout the mosquito season for West Nile Virus and Eastern Equine Encephalitis virus as described in the *State of New Hampshire Arboviral Illness Surveillance, Prevention and Response Plan*.² The same basic principles will be applied to perform Zika virus risk assessments.

Vector Control Activities

It is assumed and expected that any town that identifies either *Ae. aegypti* or *Ae. albopictus* through their surveillance activities will work with their mosquito contractor to eliminate the identified population of mosquitoes immediately.

NH DHHS will develop and maintain contracts for emergency mosquito control activities to reduce the risk of local transmission of Zika virus. These contracts will address both ground control and aerial control of the Zika virus vectors *Ae. aegypti* and *Ae. albopictus*. Monitoring of mosquito populations after control measures have been applied will be performed to ensure that there is a reduction or elimination of potential vectors.

Information Sharing

Mosquito and arboviral surveillance reports and maps will be distributed as outlined in the State of New Hampshire Arboviral Illness Surveillance, Prevention and Response Plan (<https://www.dhhs.nh.gov/dphs/cdcs/arboviral/documents/arboviralresponse.pdf>). These reports and maps will be routinely updated and posted on the DHHS arboviral webpage (<https://www.dhhs.nh.gov/dphs/cdcs/arboviral/results.htm>). Additionally, human arboviral case counts will be included in the BDC Reportable Communicable Disease Monthly Report

² The *State of New Hampshire Arboviral Illness Surveillance, Prevention and Response Plan* can be found at: <http://www.dhhs.nh.gov/dphs/cdcs/arboviral/documents/arboviralresponse.pdf>

which is posted on the DHHS BIDC webpage (<https://www.dhhs.nh.gov/dphs/cdcs/documents/monthly.pdf>).

DHHS travel, testing and clinical recommendations will be in accordance with CDC's recommendations. Any new information may be distributed as appropriate through the NH HAN to healthcare providers and posted on the DHHS Zika and arboviral websites as appropriate. Press releases will be made when new information is available that increases risk or concern for the public's health.

The Zika Virus Resource Guide created by DHHS will be available on the DHHS Zika website to healthcare providers and the public. This guide will be maintained by DHHS staff and contain information to support persons at risk or that have been infected with Zika virus, including pregnant women and Zika impacted infants.

PHASE 1: PRE-INCIDENT AND SURVEILLANCE DURING MOSQUITO SEASON

Phase 1 begins when *Ae. aegypti* and/or *Ae. albopictus* are present and biting during the mosquito season, when there is no local transmission of Zika virus. When populations of these mosquitoes are identified in NH, surveillance activities will be enhanced, as resources allow, during mosquito season. These enhanced activities will include a lower threshold for Zika testing. Presence of these mosquitoes indicates elevated risk of human to human disease transmission for Zika virus.

It should be noted that while the presence of *Ae. aegypti* and/or *Ae. albopictus* mosquitoes might not currently be found in NH, other areas of the US will be in Phase 1 at the beginning of their mosquito season. NH residents traveling to these areas need to be aware of the risk and take appropriate precautions due to the potential for travel-related transmissions (example: Spring break in Florida) and sexual transmission (example: traveler infected in Florida transmits virus sexually to partner upon return to NH).

Considerations for Entering Phase 1

- Mosquito season in NH, typically May through October, and the presence of *Ae. aegypti* and/or *Ae. albopictus* and a non-locally transmitted Zika infection of a NH resident has been identified

Critical Tasks

- Ensure laboratory capacity to test, or coordinate testing, for all human specimens that come to the PHL
- Ensure capacity to evaluate the epidemiology of cases to determine if the virus was transmitted locally or not
- Support enhanced mosquito surveillance to monitor for *Ae. aegypti* and *Ae. albopictus* to identify populations of mosquitoes in new areas
- Support enhanced mosquito surveillance to monitor for *Ae. aegypti* and *Ae. albopictus* to identify populations of mosquitoes around viremic cases, appropriately testing mosquitoes
- Support enhanced surveillance for Zika-associated birth defects or other infant health outcomes
- Prevention of pregnancy related impacts through aggressive messaging and mosquito control
- Messaging to all returning travelers from Zika endemic areas should include information about the importance of mosquito bite avoidance and risks of sexual transmission

Roles and Responsibilities

Agency/Facility/Company	Role/Responsibility
NH DHHS BIDC	<ul style="list-style-type: none"> • Conduct routine arboviral surveillance activities • Support enhanced mosquito surveillance
NH DHHS PHL	<ul style="list-style-type: none"> • Conduct or coordinate appropriate arboviral testing
NH DHHS PIO	<ul style="list-style-type: none"> • Provide public communication of changing risk through press releases and other outreach mechanisms
Mosquito Contractors, Local Health Departments, Municipalities	<ul style="list-style-type: none"> • Conduct routine mosquito surveillance and control • Participate in enhance mosquito surveillance

Human Surveillance Activities

Human case surveillance activities during Phase 1 will be a continuation of activities during Phase 0.

Vector Surveillance Activities

In addition to vector surveillance activities described in Phase 0, enhanced mosquito surveillance and testing around homes of persons who have documented Zika virus circulating in their blood (viremic cases) will be performed in an attempt to identify any potential risk of local transmission during the mosquito season as resources allow.

Vector Control Activities

Vector control activities during Phase 1 will be a continuation of activities during Phase 0. Additionally, aggressive control measures should be taken and recommendations for prevention of mosquito bites will be made. Aggressive ground control measures will need to be instituted by municipalities.

Information Sharing

Information will be shared as in Phase 0.

Additional recommendations will focus on prevention of local or continued transmission, testing and birth control or delaying pregnancy. Messages will include the recommendation that infected persons should avoid additional mosquito bites in NH to prevent infecting others.

PHASE 2: SUSPECTED/CONFIRMED INCIDENT

Phase 2 represents a shift from preparedness and mitigation activity to incident response activity resulting from an acute case that epidemiological investigation determines to most likely be the result of local vector transmission. *Ae. aegypti* and/or *Ae. albopictus* need to be present in order for NH to reach Phase 2.

Considerations for Entering Phase 2

- A single, locally acquired infection or multiple cases clustered in a single household and occurring < 2 weeks apart in which mosquito bites are the reason for virus spread

Critical Tasks

- Ensure laboratory capacity to test, or coordinate testing, for all human specimens that come to the PHL
- Support enhanced mosquito surveillance to monitor for *Ae. aegypti* and *Ae. albopictus* to identify populations of mosquitoes in new areas
- Support enhanced mosquito surveillance to monitor for *Ae. aegypti* and *Ae. albopictus* to identify populations of mosquitoes around locally acquired cases and travel acquired viremic cases, appropriately testing mosquitoes
- Stop local transmission through ground control mechanisms established in the mosquito ground control contract
- CDC will be notified immediately and additional support will be requested
- Support enhanced surveillance for Zika-associated birth defects or other infant health outcomes
- Prevention of pregnancy related impacts through aggressive messaging and mosquito control

Roles and Responsibilities

Agency/Facility/Company	Role/Responsibility
NH DHHS BIDC	<ul style="list-style-type: none"> • Conduct routine arboviral surveillance activities • Support enhanced mosquito surveillance
NH DHHS PHL	<ul style="list-style-type: none"> • Conduct or coordinate appropriate arboviral testing
NH DHHS PIO	<ul style="list-style-type: none"> • Provide public communication of changing risk through press releases and other outreach mechanisms
Mosquito Contractors, Local Health Departments, Municipalities	<ul style="list-style-type: none"> • Conduct routine mosquito surveillance and control • Participate in enhanced mosquito surveillance

Human Surveillance Activities

Human case surveillance activities during Phase 2 will be a continuation of state-level activities during Phase 0 and Phase 1. Additionally, enhanced human Zika virus testing will be performed around cases of local transmission to determine extent of transmission. Appropriate testing surveys will include the collection of urine and/or serum (blood) to evaluate people in the immediate area, minimally a 150 meter radius, of the identified locally transmitted case. This area may be expanded on a case by case basis depending on mosquito populations and/or to protect the identity of the locally transmitted case.

Vector Surveillance Activities

If a locally transmitted case is confirmed or suspected, surveillance within the CDC recommended 150-meter radius of where the infected person lives will be intensified to determine the presence or absence of breeding and sustaining populations. This may include, but is not limited to, larval sampling, placement of oviposition traps with rearing of mosquitoes for identification, and/or sustained adult mosquito trapping with BG Sentinel 2 traps. Testing of the mosquitoes for insecticide resistance and infection with Zika virus will be performed. Similarly to enhanced human surveillance activities, this area may be expanded on a case by case basis depending on mosquito populations and/or to protect the identity of the locally transmitted case.

Vector Control Activities

If a locally acquired case is identified and either *Ae. aegypti* or *Ae. albopictus* mosquitoes are identified near their residence, aggressive control measures will be taken and recommendations for prevention of mosquito bites will be made. NH DPHS will immediately alert local officials and recommend initiating vector control plans. Trapping will be established near the residence and/or work place of the person infected, insecticide application will be performed based on mosquito insecticide resistance testing performed by the mosquito contractors that have identified the mosquitoes of concern, and appropriate ground control (pesticide application through hand held or truck mounted devices) will be done.

Ground Control

Ground control activities will consist of enhanced mosquito surveillance within a minimum 150-meter radius around persons that are considered a risk for continuing the transmission cycle because they have virus actively circulating in their blood stream. If any adult or immature mosquitoes of concern are identified through this surveillance, an insecticide resistance profile will be performed on mosquito specimens collected from the field. Insecticide application will be performed based on the susceptibility of the mosquitoes identified and in accordance with NH Department of Agriculture, Markets & Food, Division of Pesticide Control rules and regulations. Insecticides used will include appropriate adulticides and larvicides.

Removal of mosquito breeding habitat will also be performed. If the breeding habitat cannot be removed, as in the case of cisterns and catch basins, those habitats will be treated with larvicides to stop mosquito breeding.

Information Sharing

Information will be shared as in Phase 0 and Phase 1.

Additional recommendations will focus on preventing continued transmission, expanding testing (human surveys) and using birth control or delaying pregnancy.

Additional communications will be provided through press releases and HANs about evolving risk for NH residents. Municipalities impacted by the identification of local transmission will also be expected to communicate with their residents through their established mechanisms about increased risk with support from State staff. The identification of local transmission of Zika virus will result in the establishment of a Joint Information Center (JIC) to coordinate messaging and response appropriately.

PHASE 3: INCIDENT RESPONSE

- Phase 3 results from the identification of multiple cases of locally transmitted Zika virus indicating more widespread risk to NH residents. Vector surveillance and control activities will be enhanced because of the greater likelihood of exposure to disease-carrying mosquitoes. It is expected that there will need to be sustained or breeding populations of *Ae. aegypti* or *Ae. albopictus* present in NH in order for Phase 3 to occur.

Considerations for Entering Phase 3

- Multiple locally-transmitted Zika virus infections with onsets occurring ≥ 2 weeks apart, but within an approximately 1-mile (1.5 km) diameter.

Critical Tasks

- Ensure laboratory capacity to test, or coordinate testing, for all human specimens that come to the PHL
- Support enhanced mosquito surveillance to monitor for *Ae. aegypti* and *Ae. albopictus* to identify populations of mosquitoes in new areas
- Support enhanced mosquito surveillance to monitor for *Ae. aegypti* and *Ae. albopictus* to identify populations of mosquitoes around locally acquired cases and travel acquired viremic cases, appropriately testing mosquitoes
- Support enhanced surveillance for Zika-associated birth defects or other infant health outcomes
- Prevention of pregnancy related impacts through aggressive messaging and mosquito control
- Stop local transmission through ground control mechanisms established in the mosquito ground control contract
- Stop local transmission through aerial control mechanisms, if necessary, through an aerial mosquito control contract
- CDC will be notified immediately and additional support will be requested

Roles and Responsibilities

Agency/Facility/Company	Role/Responsibility
NH DHHS BIDC	<ul style="list-style-type: none"> Conduct routine arboviral surveillance activities Support enhanced mosquito surveillance
NH DHHS PHL	<ul style="list-style-type: none"> Conduct or coordinate appropriate arboviral testing
NH DHHS PIO	<ul style="list-style-type: none"> Provide public communication of changing risk through press releases and other outreach mechanisms

Mosquito Contractors, Local Health Departments, Municipalities	<ul style="list-style-type: none"> • Conduct routine mosquito surveillance and control • Participate in enhanced mosquito surveillance
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Human Surveillance Activities

Human case surveillance activities during Phase 3 will be a continuation of state-level activities during Phase 0, Phase 1, and Phase 2. Depending on the geographical spread of the locally-transmitted cases, a broad human sampling survey of urine and/or specimens will be performed to identify additional cases of Zika. In this scenario, broad human sampling means sampling beyond 150-meter radius of individual cases. This will allow a more accurate risk assessment and application of control measures. Additionally, in a broader survey, being able to survey areas by blocks or streets will simplify the increased surveillance activities if a large number of cases are being investigated.

Vector Surveillance Activities

If multiple, locally-transmitted Zika virus infections are identified, vector surveillance activities described in Phase 2 will be intensified to include the areas surrounding each infected person’s home. Similar to human surveillance activities, the area of surveillance may be broadened to enhance and simplify surveillance activities. Vector control teams and epidemiologists should work closely together to delineate the most appropriate area for surveillance efforts. Testing of mosquitoes for insecticide resistance and presence of Zika virus infections will be performed.

Vector Control Activities

Vector control activities during Phase 3 will be a continuation of activities during Phase 2. Vector control teams and epidemiologists should work closely together to delineate the most appropriate area for control efforts. Should initial small, local populations *Ae. albopictus* and/or *Ae. aegypti* in NH expand to large, widespread populations of mosquitoes over time, aerial response (pesticide application through the use of airplanes) will be done as necessary and appropriate. It is unlikely that NH will ever have widespread populations of *Ae. aegypti*.

Aerial Control

Even though the need for aerial application of pesticide to control Zika virus vectors is considered remote in NH at the initial writing of this plan, contracts will be developed and maintained for this response activity. The current Zika virus disease global epidemic is continually evolving and NH’s risk of local transmission is likely to evolve. Aerial response activities will be performed when continued local transmission is a documented risk and in conjunction with aggressive ground control measures. Similar to ground control activities, pesticides for use will be selected based on mosquito pesticide resistance testing and applied in accordance with NH Department of Agriculture, Markets & Food, Division of Pesticide Control rules and regulations.

Information Sharing

Information will be shared as in Phase 0, Phase 1 and Phase 2. The JIC that was established in Phase 2 will continue operations to support the response during Phase 3.

Recommendations to avoid areas with continuing transmission may occur.

DEMOBILIZATION AND RESET

Considerations for Entering Demobilization

- The most likely trigger for demobilization from a local transmission event will be the end of the mosquito season (two hard frosts statewide)

Critical Tasks

- Ensure laboratory capacity to test, or coordinate testing, for all human specimens that come to the PHL
- Support enhanced mosquito surveillance to monitor for *Ae. aegypti* and *Ae. albopictus*

Roles and Responsibilities

Agency/Facility/Company	Role/Responsibility
NH DHHS BDC	<ul style="list-style-type: none"> • Conduct routine arboviral surveillance activities • Support enhanced mosquito surveillance
NH DHHS PHL	<ul style="list-style-type: none"> • Conduct or coordinate appropriate arboviral testing
NH DHHS PIO	<ul style="list-style-type: none"> • Provide public communication of changing risk through press releases and other outreach mechanisms
Mosquito Contractors, Local Health Departments, Municipalities	<ul style="list-style-type: none"> • Conduct routine mosquito surveillance and control • Participate in enhanced mosquito surveillance

Human Surveillance Activities

Human surveillance activities will return to Phase 1 levels if the documented local transmission of Zika virus occurred from sustained or established populations of *Ae. aegypti* and/or *Ae. albopictus*. If local transmission occurred as a result of transient *Ae. aegypti* and/or *Ae. albopictus* populations, then surveillance activities will return to those of Phase 0.

Vector Surveillance Activities

Vector surveillance activities will return to Phase 0 activities regardless if the local transmission was a result of transient populations of *Ae. aegypti* and/or *Ae. albopictus*. NH is at risk of developing established *Ae. albopictus* more so than *Ae. aegypti*. It is unlikely that NH will develop sustaining populations of *Ae. aegypti*. If there are documented locally transmitted cases due to what is thought to be transient mosquitoes, more aggressive trapping and surveillance activities should be performed around the areas of introduction of these mosquitoes to monitor for establishment of populations. This is necessary to try to identify at

risk areas and perform aggressive mosquito control measures to prevent establishment, or eliminate established populations, if possible, as quickly as possible.

If local transmission is due to established populations of *Ae. aegypti* and/or *Ae. albopictus*, vector surveillance activities will revert back to Phase 1.

Vector Control Activities

If local transmission is due to transient populations of *Ae. aegypti* and/or *Ae. albopictus*, control activities will revert back to Phase 0 vector control activities.

If local transmission is due to established populations of *Ae. aegypti* and/or *Ae. albopictus*, control activities will revert back to Phase 1 vector control activities.

Information Sharing

Widespread notification would be provided by DHHS through all applicable mechanisms (press release, HAN, web postings) about risk levels decreasing or returning to baseline. It is expected that the municipalities impacted by local transmission would also broadcast information relevant to their residents through their established communication pathways.

After Action Reporting

At the conclusion of the response, DPHS leadership or the Incident Management Team may elect to conduct an After Action Report, which would assess the response and culminate in an improvement plan to improve preparedness and response plans for Zika virus in the future. Updates to this plan will be made accordingly.

Administrative and Record-Keeping

All records from the event that are required to be retained by law will be stored in accordance with agency policy and practice.

APPENDIX A: RESOURCES

- 1.) New Hampshire Department of Health and Human Services Frequently Asked Questions on Zika Virus: <https://www.dhhs.nh.gov/dphs/cdcs/zika/documents/zika-virus-faqs.pdf>
- 2.) New Hampshire Department of Health and Human Services Zika Virus Fact Sheet: <https://www.dhhs.nh.gov/dphs/cdcs/zika/documents/zika-virus-fact-sheet.pdf>
- 3.) New Hampshire Department of Health and Human Services Zika Community Resource Guide
- 4.) Centers for Disease Control and Prevention Zika Website: <https://www.cdc.gov/zika/>
- 5.) Centers for Disease Control and Prevention Countries with Active Transmission: <https://www.cdc.gov/zika/geo/index.html>
- 6.) Centers for Disease Control and Prevention Zika Virus Sexual Transmission and Prevention: <https://www.cdc.gov/zika/prevention/sexual-transmission-prevention.html>
- 7.) Centers for Disease Control and Prevention Protecting Yourself and Others from Zika Virus: <https://www.cdc.gov/zika/prevention/protect-yourself-and-others.html>
- 8.) Centers for Disease Control and Prevention Preventing Mosquito Bites: <https://www.cdc.gov/zika/prevention/prevent-mosquito-bites.html>
- 9.) Centers for Disease Control and Prevention Zika Virus Communication Resources: <https://www.cdc.gov/zika/comm-resources/index.html>
- 10.) United States Health and Human Services Video on Zika Virus Prevention: <https://www.facebook.com/attn/videos/vb.160389977329803/1052232938145498/?type=2&theater>
- 11.) The World Health Organization Zika website: <http://www.who.int/emergencies/zika-virus/en/>
- 12.) The Pan American Health Organization Zika website: http://www.paho.org/hq/index.php?option=com_content&view=article&id=11585:zika-virus-infection&Itemid=41688&lang=en

APPENDIX B: STATE LABORATORY TESTING

On February 26, 2016 the FDA issued an Emergency Use Authorization (EUA) for the Zika virus IgM Antibody Capture Enzyme-Linked Immunosorbent Assay (MAC-ELISA). The decision to issue an EUA is based on a multitude of factors including existing scientific data, as well as the U.S. Secretary of Health and Human Services' declaration of a public health emergency. An EUA allows timely access to appropriate diagnostic tools during a time in which commercial tests are unavailable.

On March 17, 2016, the FDA issued an EUA to authorize the emergency use of CDC's Trioplex Real-time RT-PCR Assay (Trioplex rRT-PCR) for the qualitative detection and differentiation of RNA from Zika virus, dengue virus, and chikungunya virus in human sera or cerebrospinal fluid (collected alongside a patient-matched serum specimen), and for the qualitative detection of Zika virus RNA in urine and amniotic fluid (each collected alongside a patient-matched serum specimen).

Since December, 2015, the BDC and the NH PHL have been coordinating the submission of specimens for Zika virus testing. The NH PHL is performing the Trioplex PCR assay and the MAC-ELISA assay for patients who meet the criteria for testing.

A positive rRT-PCR result on any sample confirms Zika virus infection and no additional testing is indicated. A negative rRT-PCR result does not exclude Zika virus infection and serum should be analyzed by IgM antibody (serological) testing.

The Zika IgM Antibody Capture Enzyme-Linked Immunosorbent Assay (Zika MAC-ELISA) is used for the qualitative detection of Zika virus IgM antibodies in serum or cerebrospinal fluid; however, due to cross-reaction with other flaviviruses and possible nonspecific reactivity, results may be difficult to interpret. Consequently, presumptive positive, equivocal, or inconclusive tests must be forwarded for confirmation by plaque-reduction neutralization testing. This testing is performed by CDC or a CDC-designated confirmatory testing laboratory.

The NH PHL will continue to perform both molecular and serological testing for identification of Zika cases in NH. Test results will be shared with the BDC in real-time through the PHL's Laboratory Information Management System. The PHL will also be responsive to CDC's testing guidelines and evaluate the utility of alternate testing methods as they become available, either through EUA or FDA approval.

APPENDIX C: ZIKA HISTORY

Zika virus disease is a mosquito-borne flavivirus that is related to dengue, yellow fever, and West Nile virus. Zika virus was first discovered in monkeys in the Zika forest of Uganda in 1947. The first human cases of Zika virus were identified in 1952 in Uganda and Tanzania. Prior to 2007, there had only been fourteen human cases of Zika virus infection documented in the literature. Since 2007, three notable outbreaks have been detected, including the current outbreak in the Americas.

In 2007, an outbreak in the Yap Island's resulted in 7,000 Yap Island citizens becoming infected with Zika virus. Cases were identified through active surveillance, including antibody surveys which involved collecting serum sample from residents and testing them for Zika virus RNA or neutralizing antibody response to Zika virus, in addition to conducting patient interviews. Of those infected with Zika virus in the Yap Islands, 19% developed symptoms consistent with the virus.

The second notable outbreak of Zika virus occurred in 2013 in French Polynesia. 140,000 French Polynesians became infected, and of those, 28,000 developed symptomatic infection. In those that developed severe illness, symptoms included encephalitis (an inflammation of the brain), tingling of extremities, and paralysis. In addition, an increase in the number of Guillain-Barré (GBS) cases was observed at the time of the outbreak, suggesting a possible link between Zika virus and GBS.

The current outbreak began in early 2015, with the first confirmed transmission occurring in Brazil. This outbreak also led to increased reports of GBS as in previous outbreaks. A more serious complication was being identified through the increased number of reports of pregnant women giving birth to babies with microcephaly (small head size), as well as other birth defects, than expected for the population of Brazil. This outbreak has since spread across South America as well as to Central and North America, with locally acquired cases being identified in the US (Florida and Texas). Additionally, the outbreak has led to further discovery that the virus can be transmitted through sexual contact with an infected individual.

The impact Zika has had in the Americas has been devastating to some areas. Every country in the Americas has been impacted in some way either through local transmission or the infection of people traveling to areas with active Zika virus transmission. Those countries with prolonged and frequent transmission of Zika virus will be challenged with the effects of Zika virus for the foreseeable future. The Centers for Disease Control and Prevention, the World Health Organization, and the Pan American Health Organization regularly update their Zika webpages to give an updated list of case counts, countries experiencing active Zika transmission, and guidance on preventing infection. Those websites are listed in Appendix A: Resources.