



5.4.1 Disease Outbreak

The following section provides the hazard profile (hazard description, location, extent, previous occurrences and losses, probability of future occurrences, and impact of climate change) and vulnerability assessment for the disease outbreak hazard in Monroe County.

5.4.1.1 Hazard Profile

This section provides information regarding the description, extent, location, previous occurrences and losses, climate change projections, and the probability of future occurrences for the disease outbreak hazard. For this HMP update, the disease outbreak hazard will primarily focus on disease outbreak events caused by influenza, West Nile Virus, Lyme disease, and coronavirus.

Hazard Description

An outbreak or an epidemic occurs when new cases of a certain disease, in a given population, substantially exceed what is expected. An epidemic may be restricted to one locale, or it may be global, at which point it is called a pandemic. A pandemic is defined as a disease occurring over a wide geographic area and affecting a high proportion of the population. A pandemic can cause sudden, pervasive illness in all age groups on a local or global scale. A pandemic is a novel virus to which humans have no natural immunity that spreads from person to person. A pandemic will cause both widespread and sustained effects and is likely to stress the resources of both the State and Federal government (NJOEM 2019).

Most disease outbreaks occur due to respiratory viruses. A respiratory virus with pandemic potential is a highly contagious respiratory virus that spreads easily from person to person and for which there is little human immunity. This hazard includes pandemic influenza. This hazard strains the healthcare system, requires school closures, causes high rates of illness and absenteeism that undermine critical infrastructure across the city, and decreases community trust due to social distancing measures interfering with personal movement and being perceived as being ineffectual. Previous events that exemplify this hazard include the 1918 (“Spanish flu”) and 2009 (“Swine flu”) influenza pandemics and the 2003 SARS outbreak, which had pandemic potential (NYC Emergency Management 2019).

In addition to respiratory viruses, diseases with new or emerging features can challenge control. Emerging diseases are difficult to contain or treat and present significant challenges to risk communication since the mechanics of transmission, laboratory identification, and effective treatment protocols may be unknown (NYC Emergency Management 2019).

Of particular concern in Monroe County are respiratory illnesses such as influenza, also known as the ‘flu’. While flu symptoms are typically mild, vulnerable populations; older adults, younger children, pregnant persons, and people with pre-existing conditions are more likely to experience flu-related complications. Seasonal flu epidemics occur yearly, typically beginning at the end of October and continuing through the colder months (NYS DOH 2022).

West Nile Virus (WNV) disease is spread by the bite of a mosquito infected with the virus. Mosquitos become infected when they feed on infected birds (NYS DOH 2017). The West Nile Virus cases will increase in portions of the state during the late summer and early fall seasons.

Tick-borne diseases are bacterial illnesses that spread to humans through infected ticks. These types of diseases rely on ticks for transmission. Ticks become infected by micro-organisms when feeding on small, infected mammals (mice and voles). Different tick-borne diseases are caused by different micro-organisms, and it is



possible to be infected with more than one tick-borne disease at a time. Anyone who is bitten by an infected tick may get a tick-borne disease. People who spend a lot of time outdoors have a greater risk of becoming infected. The three types of ticks in New York that may carry disease-causing micro-organisms are the Blacklegged Tick (*Ixodes scapularis*) (also known as Deer Tick), Lone Star Tick (*Amblyomma americanum*), and the American dog tick (*Dermacentor variabilis*) (New York State Department of Health 2019).

The Novel-Coronavirus, also known as ‘Covid-19’ is an infection disease caused by the SARS-CoV-2 virus. The virus can spread from an infected person’s mouth or nose in small liquid particles through coughing, sneezing, speaking, singing, or breathing (World Health Organization 2022).

For the purposes of this hazard mitigation plan update, the following infectious diseases will be discussed in further detail: Influenza, West Nile Virus (WNV), Lyme Disease, and Coronavirus.

Influenza

Influenza (the flu) is a contagious virus that affects the nose, throat, lungs and other parts of the body. It can quickly spread from one person to another, causing mild to severe illness and can lead to death. Symptoms include fever, cough, sore throat, runny or stuffy nose, muscle or body aches, headache, and tiredness (New York State Department of Health 2021).

The risk of a global influenza pandemic has increased over the last several years. This disease can claim thousands of lives and adversely affect critical infrastructure and key resources. An influenza pandemic can reduce the health, safety, and welfare of the essential services workforce; immobilize core infrastructure, and induce fiscal instability.

Pandemic influenza differs from seasonal influenza (or ‘the flu’) because outbreaks of seasonal flu are caused by viruses already living amongst people. Pandemic influenza is a global outbreak of a new influenza A virus, which can infect people easily and spread from person to person in an efficient and sustained manner (Center for Disease Control and Prevention 2020). Additionally, the seasonal flu happens annually and usually peaks between December and February.

West Nile Virus

West Nile Virus (WNV) is the leading cause of mosquito-borne disease in the United States. West Nile Virus is most commonly spread to people who are bitten by an infected mosquito. WNV is usually diagnosed during mosquito season, starting in the summer months and continuing through the fall (CDC 2021). WNV was first found in New York State in 1999. Since 2000, 490 human cases and 37 deaths of WNV have been reported statewide (the data range is 2000-2017) (NYS DOH 2017). The symptoms of severe infection (West Nile encephalitis or meningitis) can include headache, high fever, neck stiffness, muscle weakness, stupor, disorientation, tremors, seizures, paralysis, and coma. WNV can cause serious illness, and in some cases, death. Usually, symptoms occur from 3 to 14 days after being bitten by an infected mosquito (NYS DOH 2017).

Lyme Disease

Lyme disease is the most common vector-borne disease in the United States. It is an illness caused by infection with the bacterium *Borrelia burgdorferi*, which is carried by ticks. Typical symptoms include fever, headache, fatigue, and skin rash. If left untreated, symptoms can be severe. Lyme disease is spread to people by the bite of an infected tick (CDC 2021). In New York, the commonly infected tick is the deer tick. Immature ticks become infected by feeding on infected white-footed mice and other small mammals. Deer ticks can also spread other tick-borne diseases. Anyone who is bitten by a tick carrying the bacteria can become infected (NYS DOH 2019).



Coronavirus

Coronavirus disease (COVID-19) is an infectious disease first identified in 2019. The virus rapidly spread into a global pandemic by spring of 2020. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illnesses (World Health Organization 2022). With the virus being relatively new, information regarding transmission and symptoms of the virus is still new. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes.

Reported illnesses have ranged from mild symptoms to severe illness and death. Reported symptoms include difficulty breathing and shortness of breath, fever or chills, cough, fatigue, muscle or body aches, loss of smell or taste, sore throat, congestion, and nausea or vomiting. Emergency symptoms that require immediate medical attention include trouble breathing, persistent pain or pressure in the chest, confusion, or inability to wake or stay awake, and bluish lips or face. Symptoms may appear 2-14 days after exposure to the virus (based on the incubation period of MERS-CoV viruses) (CDC 2021).

As of November 16, 2022, Monroe County has reported 183,834 positive cases of COVID-19 and 1,762 deaths (New York Times 2022).

Extent

The extent and location of disease outbreaks depend on the preferred habitat of the species, as well as the species' ease of movement and establishment. The magnitude of disease outbreaks species ranges from nuisance to widespread. The threat is typically intensified when the ecosystem or host species is already stressed, such as during periods of drought. The already weakened state of the ecosystem causes it to more easily be impacted by an infestation. The presence of disease-carrying mosquitoes and ticks has been reported throughout most of New York State and Monroe County.

The exact size and extent of an infected population depend on how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in more densely populated areas. The transmission rate of infectious diseases will depend on the mode of transmission of a given illness.

Influenza and Coronavirus

As noted above, the exact size and extent of an infected population depend on how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in more densely populated areas. The transmission rate of infectious diseases will depend on the mode of transmission of a given illness. The severity and length of the next pandemic cannot be predicted; however, experts expect that its effect on the United States could be severe.

Between 2018 and 2021, there were 17,058 confirmed cases of influenza in Monroe County (NYS DOH 2022). Those most vulnerable to influenza include young children and the elderly, although anyone can become infected.

In 1999, The World Health Organization (WHO) published guidance for pandemic influenza and defined the six phases of a pandemic. The updated guidance was published in 2005 to redefine these phases, and in 2009 WHO published the *Pandemic Influenza Preparedness and Response*, this guidance significantly updates and replaces the guidance published in 2005 (World Health Organization 2009). The revised guidance retains

the six-phase approach to facilitate the incorporation of new recommendations. Phases 1-3 and 5-6 have been grouped to include common action points. The WHO pandemic phases are outlined in Table 5.4.1-1 below.



Table 5.4.1-1. WHO Global Pandemic Phases

Phase	Description
Preparedness and Response– Global, Regional, National, Sub-National Level	
Phase 1	No animal influenza virus circulating among animals has been reported to cause infection in humans.
Phase 2	An animal influenza virus circulating in domesticated or wild animals is known to have caused infection in humans and is therefore considered a potential pandemic threat.
Phase 3	An animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks.
Containment	
Phase 4	Human-to-human transmission (H2H) of an animal or human-animal influenza reassortant virus able to sustain community-level outbreaks has been verified.
Response – Global Level	
Phase 5	The same identified virus has caused sustained community-level outbreaks in two or more countries in one WHO region.
Phase 6	In addition to the criteria defined in Phase 5, the same virus has caused sustained community-level outbreaks in at least one other country in another WHO region.
Post-Pandemic	
Post-Peak Period	Levels of pandemic influenza in most countries with adequate surveillance have dropped below peak levels.
Possible New Wave	Level of pandemic influenza activity in most countries with adequate surveillance rising again.
Post-Pandemic Period	Levels of influenza activity have returned to the levels seen for seasonal influenza in most countries with adequate surveillance

Source: WHO 2009

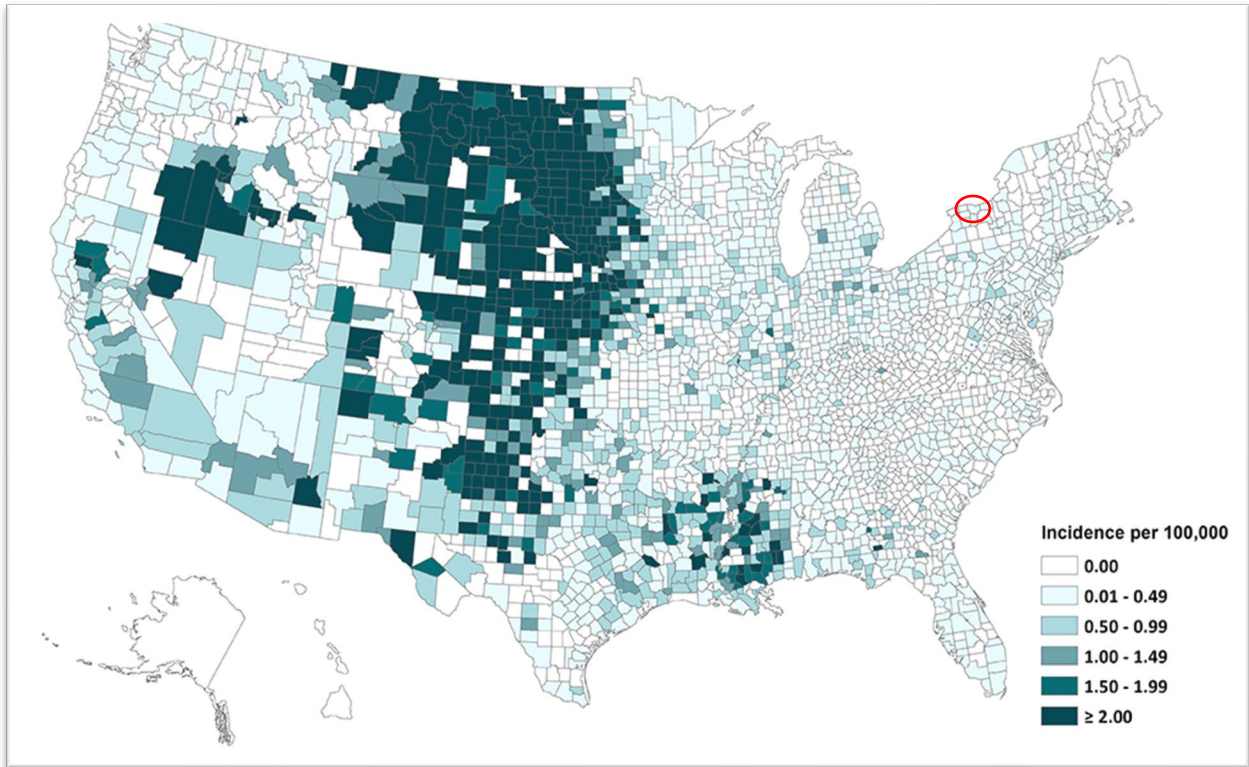
In New York State, activities to be undertaken during the pandemic period, use the World Health Organization’s classification system. The Pandemic Influenza Preparedness and Response document provides guidance to government agencies, individuals, families and communities, and the health sectors at the local and global levels.

West Nile Virus

West Nile Virus (WNV) is the leading cause of mosquito-borne diseases in the continental United States. There are no vaccines to prevent or medications to treat WNV in people, and those infected rarely experience sickness or symptoms. About 1 in 5 infected people will develop a fever and other symptoms, and 1 in 150 infected people will develop a serious, sometimes fatal, illness (CDC 2022). Figure 5.4.1-1 shows the annual average WNV incidences in the United States. The figure shows that Monroe County had between 0.01 and 0.49 incidents per 100,000 people.



Figure 5.4.1-1. Average Annual Incidence of West Nile Virus Neuroinvasive Disease Reported to CDC by County, 1999-2020



Source: CDC 2022

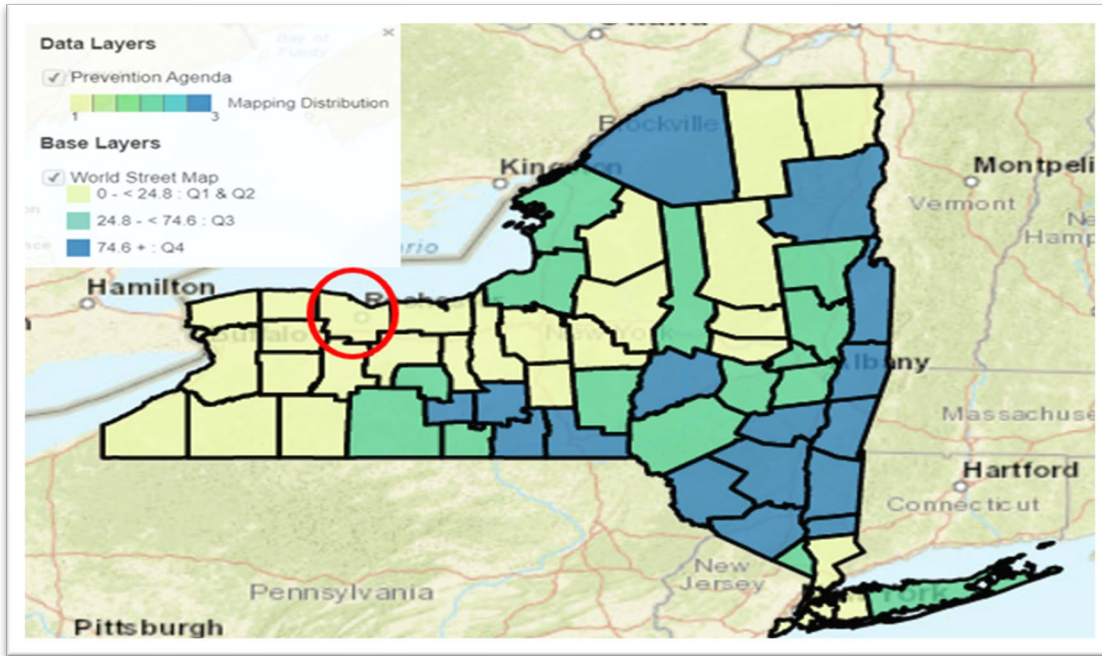
Note: The red circle shows the approximate location of Monroe County

Lyme Disease

Lyme disease is the most reported vector borne illness in the U.S. Between 2000 and 2018, there was a total of 527 confirmed cases in Lyme disease in Monroe County, including 89 cases in 2013, the highest number of reported cases of a given year (TickCheck 2022). The CDC only reports confirmed cases, due to this the true number of cases is estimated at 5,270. Figure 5.4.1-2 below shows New York State and Monroe County related Lyme disease incidents.



Figure 5.4.1-2. Lyme disease Incidences Rate per 100,000 people,



Source: Health Data NY

Note: The red circle indicates the approximate location of Monroe County

Location

Monroe County’s geographic and demographic characteristics make it particularly vulnerable to importation and spread of infectious diseases. In terms of pandemic influenza, all counties may experience pandemic influenza outbreak caused by factors such as population density and the nature of public meeting areas. Densely populated areas will spread diseases quicker than less densely populated areas. There are some densely populated municipalities in the County, leading to the spread of influenza and coronavirus more quickly than less densely populated communities.

Previous Occurrences and Losses

Historical information regarding previous occurrences and losses associated with disease outbreak events throughout New York State and areas within Monroe County was obtained from many sources. Given so many sources reviewed for the purpose of this HMP, loss and impact information regarding many events could vary depending on the source.

FEMA Major Disaster and Emergency Declarations

New York State has included three disease outbreak-related declarations; one disaster declaration (DR) for Covid-19 and two emergency declarations (EM) for West Nile virus and Covid-19. Generally, these disaster declarations cover a wide range of the State and impact many counties. Monroe County was included in each of these Statewide disaster declarations.



Table 5.4.1-2. FEMA DR and EM Declarations for Disease Outbreak Events in Monroe County, 2000 to 2020

FEMA Declaration Number	Date(s) Of Event	Event Type	Details
EM-3155	May 22, 2000 – November 1, 2000	Other	West Nile Virus
DR-4480	January 20, 2020 – Ongoing	Biological	COVID-19 Pandemic
EM-3434	January 20, 2020 – Ongoing	Biological	COVID-19 Pandemic

Source: FEMA 2022

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2015 and 2022, Monroe County was not included in any USDA-designated agricultural disasters that included disease outbreak events.

Previous Events

Table 5.4.1-3 identifies the known flood events that impacted Monroe County between 2015 and 2022. For events before 2015, refer to Appendix H (Risk Assessment Supplementary Data). For detailed information on damages and impacts to each municipality, refer to Section 9 (Jurisdictional Annexes).

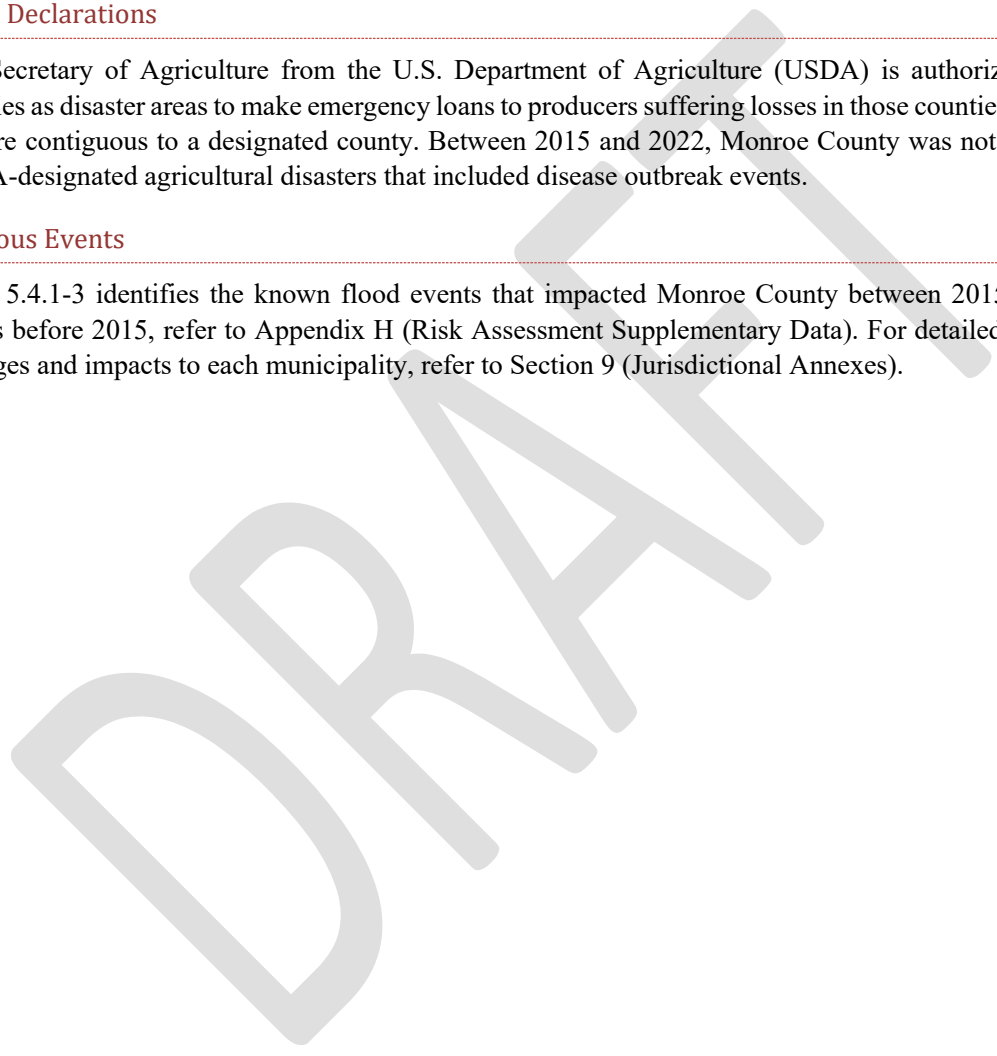




Table 5.4.1-3. Major Disease Outbreak Events in Monroe County, 2015 to 2022

Dates of Event	Disease Type	FEMA Declaration Number (if applicable)	Monroe County Designated?	Description
2015	Influenza	N/A	N/A	2,616 confirmed cases of influenza in Monroe County
2015	Lyme Disease	N/A	N/A	123 confirmed cases of Lyme disease in Monroe County
2015	West Nile Virus	N/A	N/A	One confirmed case of West Nile Virus in Monroe County
2016	Influenza	N/A	N/A	2,824 confirmed cases of influenza in Monroe County
2016	Lyme Disease	N/A	N/A	109 confirmed cases of Lyme disease in Monroe County
2016	West Nile Virus	N/A	N/A	One confirmed case of West Nile Virus in Monroe County
2017	Influenza	N/A	N/A	3,701 confirmed cases of influenza in Monroe County
2017	Lyme Disease	N/A	N/A	184 confirmed cases of Lyme disease in Monroe County
2018	Influenza	N/A	N/A	6,902 confirmed cases of influenza in Monroe County
2018	Lyme Disease	N/A	N/A	101 confirmed cases of Lyme disease in Monroe County
2018	West Nile Virus	N/A	N/A	Five confirmed cases of West Nile Virus in Monroe County
2020-2021	Coronavirus	DR-4480, EM-3434	Yes	Monroe County received Public Assistance: Emergency protective measures (Category B). As of November 16, 2022, Monroe County has reported 183,834 positive cases of COVID-19 and 1,762 deaths.

Source: FEMA 2022; NYSDOH 2021; USA Facts 2022

Note: 2019 to present reports were not available for influenza, Lyme disease, and West Nile Virus.



Climate Change Impacts

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to increase. The impacts related to increasing temperatures and sea level rise are already causing complications in the state. *ClimAID: The Integrated Assessment for Effective Climate Change in New York State (ClimAID)* was undertaken to provide decision-makers with information on the state’s vulnerability to climate change and to facilitate the development of adaptation strategies informed by both local experience and scientific knowledge (NYSERDA 2011/2014).

Temperatures in New York State are warming, with an average rate of warming over the past century of 0.25° F per decade. Average annual temperatures are projected to increase across New York State by 2–3.4 °F by the 2020s, 4.1–6.8 °F by the 2050s, and 5.3–10.1 °F by the 2080s. By the end of the century, the greatest warming is projected to be in the northern section of the state (NYSERDA 2011/2014).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Monroe County is part of Region 1 (Western New York and the Great Lake Plains), where temperatures are estimated to increase by 4.3 to 6.3°F by the 2050s and 5.7 to 9.6°F by the 2080s (baseline of 47.7°F, middle range projection). Precipitation totals are estimated to increase between four to ten percent by the 2050s and four to thirteen percent by the 2080s (baseline of 34.0 inches, middle-range projection). Table 5.4.1-4. 4 displays the projected seasonal precipitation change for the region (NYSERDA 2011/2014).

Table 5.4.1-4. Projected Seasonal Precipitation Change in Region 2, 2050s (% change)

Winter	Spring	Summer	Fall
+5 to +15	0 to +15	-10 to +10	-5 to +10

Source: NYSEDA 2014

Warmer temperatures and changing rainfall patterns provide an environment where mosquitos can remain active longer, greatly increasing the risk for animals and humans. Lyme disease could also expand throughout the United States as temperatures warm, allowing ticks to move into new areas of the country. The climate changes can also allow tropical and subtropical insects to move from regions where diseases thrive into new places (Natural Resource Defense Council 2015).

An increase in temperature and humidity may also lead to a larger number of influenza outbreaks. Studies have shown that warmer winters led to an increase in influenza cases. During warm winters, fewer people contract influenza which causes a large number in population to remain vulnerable into the next season. This causes an early and strong occurrence of the virus (Towers, et al. 2013).

Probability of Future Occurrences

It is difficult to predict when the next disease outbreak will occur and how severe it will be because viruses are always changing. The United States and other countries are constantly preparing to respond to pandemics. The Department of Health and Human Services and others are developing supplies of vaccines and medicines. In addition, the United States has been working with the WHO and other countries to strengthen the detection of disease and response to outbreaks. Preparedness efforts are ongoing via the New York State Department of Health, and local health departments through community preparedness programs to empower local health departments and their community partners to promote local readiness, foster community resilience, and to ensure comprehensive, coordinated, and effective responses



In Monroe County, the probability for a future disease outbreak event is dependent on several factors. One factor that influences the spread of disease is population density. Populations that live close to one another are more likely to spread diseases. As population density increases in the County, so too will the probability of a disease outbreak event to occur. When there is a significant change in a circulating strain of a virus, more of the population is susceptible and the strain could rapidly spread from person to person (NYC Emergency Management 2019).

As for mosquito-borne and tick-borne diseases, as long as mosquitoes and ticks are found in Monroe County, the risk of contracting WNV, Lyme disease, or other diseases carried by these insects exists. Instances of WNV have been generally decreasing throughout the northeast United States due to planning and eradication efforts. However, some scientists anticipate an increase in WNV and other mosquito-borne diseases due to changing climate conditions creating suitable habitats for mosquitoes (CDC 2013). Disease-carrying ticks will continue to inhabit Monroe County and the threat of Lyme disease and other tick-borne diseases will continue. Similar to mosquitoes, there are eradication efforts in place to control the tick population and new methods of control are being developed (Steere, Coburn and Glickstein 2004). Therefore, based on all available information and available data regarding mosquito and tick populations, it is anticipated that mosquito- and tick-borne diseases will continue to be a threat to Monroe County.

Based on historical records and input from the Steering Committee, the probability of occurrence for disease outbreak events in the County is considered “occasional” (between 10 and 100 percent annual probability of a hazard event occurring as presented in Table 5.3-2). Disease outbreak was not previously ranked as a hazard of concern for the County. With the emergence of the COVID-19 pandemic, disease outbreak has been identified as a new hazard of concern for many counties throughout the State.

5.4.1.2 Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable to the identified hazard. The following discusses Monroe County’s vulnerability, in a qualitative nature, to the disease outbreak hazard.

Impact on Life, Health, and Safety

The entire population of Monroe County (753,109) is vulnerable to the disease outbreak hazard. Due to a lack of quantifiable loss information, a qualitative assessment was conducted to evaluate the assets exposed to this hazard and the potential impacts associated with this hazard. Healthcare providers and first responders have an increased risk of exposure due to their frequent contact with infected populations. Areas with a higher population density also have an increased risk of exposure or transmission of disease to the closer proximity of the population to potentially infected people.

Most recently with COVID-19, the Centers for Disease Control and Prevention have indicated that persons over 65 years and older, persons living in a nursing home or long-term care facility, and persons with underlying medical conditions such as diabetes, severe obesity, serious heart conditions, etc. are at a higher risk of getting severely ill (CDC 2021). According to the 2020 American Community Survey 5-year Estimates, there are 128,588 persons over 65 years old in Monroe County (16.9 percent of the County population). This age group would be considered at risk for getting severely ill from the COVID-19 virus.

Impact on General Building Stock

No structures are anticipated to be directly affected by disease outbreaks.



Impact on Critical Facilities

No critical facilities are anticipated to be affected by disease outbreaks. Hospitals and medical facilities will likely see an increase in patients which may cause an interruption of services, but it is unlikely that there will be damage to the facilities. Large rates of infection may increase the rate of hospitalization which may overwhelm hospitals and medical facilities and lead to decreased services for those seeking medical attention. The recent coronavirus pandemic has led to overwhelmed hospitals in numerous locations across New York State, including Monroe County.

Impact on Economy

The impact disease outbreaks have on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with the activities and programs implemented to conduct surveillance and address disease outbreaks have not been quantified in the available documentation. Instead, activities and programs implemented by the County to address this hazard are described below, all of which could impact the local economy.

COVID-19 has had a significant impact on employment levels in the Finger Lakes Region. At its peak decline in April, the Rochester Metropolitan Statistical Area (RMSA) had 101,500 fewer non-farm jobs than a year earlier, including nearly 87,000 in the private sector. May through July brought partial recovery, with the July year-over-year decline totaling 69,500 overall jobs (including 59,400 in the private sector) (Finger Lakes Regional Economic Development Council 2020). Tourism, hospitality, and retail trade sectors accounted for nearly a third of job losses as of July 2020.

Smaller-scale disease outbreaks can also cause negative economic impacts, though the extent of the impact is variable. For example, an outbreak of mosquito or tick-borne diseases can impact Monroe County's local economies associated with tourism and the use of parks and waterbodies

Impact on the Environment

Disease outbreaks may have an impact on the environment if the outbreaks are caused by invasive species. Invasive species tend to be competitive with native species and their habitat and can be the major transmitters of disease like Zika, dengue, and yellow fever (Placer Mosquito and Vector Control District 2019). Secondary impacts from mitigating disease outbreaks could also have an impact on the environment. Pesticides used to control disease carrying insects like mosquitos have been reviewed by the EPA and the New York Department of Environmental Conservation. If these sprays are applied in large concentrations, they could potentially leach into waterways and harm nearby terrestrial species. As a result, pesticides must be registered before they can be sold, distributed, or used in the state (New York Department of Environmental Conservation 2020).

Cascading Impacts on Other Hazards

There are no known cascading impacts that disease outbreaks can cause to other hazards of concern for Monroe County.

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the county can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The county considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development



- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

As discussed in Section 4 (County Profile), areas targeted for future growth and development have been identified across the County. Any areas of growth could be potentially impacted by the disease outbreak hazard because the entire planning area is exposed and vulnerable. Additional development of structures in areas with high population density are at an increased risk. Please refer to the specific areas of development indicated in tabular form and/or on the hazard maps included in the jurisdictional annexes in Volume II, Section 9 of this plan

Projected Changes in Population

According to the 2020 Census, the population of the County has increased by approximately 1.2 percent since 2010. The County’s population is anticipated to slightly increase over the next decade (0.7 percent increase by 2030). Changes in the density of population could influence the number of persons exposed to disease outbreaks. Higher density jurisdictions are not only at risk of greater exposure to disease outbreak, density may also reduce available basic services provided by critical facilities such as hospitals and emergency facilities for persons that are not affected by a disease. Refer to Section 4 (County Profile), which includes a discussion on population trends for the County.

Climate Change

As discussed earlier in this section, the relationship between climate change and increase in infectious diseases is difficult to predict with certainty, however there may be linkages between the two. Changes in the environment may create a more livable habitat for vectors carrying disease as suggested by the Centers for Disease Control and Prevention (CDC 2021). Localized changes in climate and human interaction may also be a factor in the spread of disease.

Change of Vulnerability Since 2017 HMP

Disease outbreak was not identified as a hazard of concern in the 2017 HMP. Tick-borne diseases including Lyme and West Nile Virus as well as coronavirus are included in this section. Updated data regarding the extent of these diseases are included to provide a better understanding of the potential impacts caused by the disease outbreak hazard.