



5.4.11 INFESTATION AND INVASIVE SPECIES

This section provides a profile and vulnerability assessment of the infestation and invasive species hazard.

Hazard Profile

This section presents the description, extent, location, previous occurrences and losses, and probability of future occurrences for the infestation and invasive species hazard.

Description

Infestation

An infestation is defined as a state of being invaded or overrun by parasites that attack plants, animals and humans. Insect, fungi and parasitic infestations can result in destruction of various natural habitats and cropland, impact human health, and cause disease and death among native plant, wildlife and livestock. An infestation is the presence of a large number of pest organisms in an area or field, on the surface of a host, or in soil. They result from when an area is inhabited or overrun by these pest organisms, in numbers or quantities large enough to be harmful, threatening or obnoxious to native plants, animals and humans. Pests are any organism (insects, mammals, birds, parasite/pathogen, fungi, non-native species) that are a threat to other living species in its surrounding environment. Pests compete for natural resources or they can transmit diseases to humans, crops and livestock. Human populations are generally impacted by insect or animal infestations that can result in health impacts and can lead to potential epidemics or endemics. New York and Suffolk County have been impacted by insect borne diseases such as West Nile Virus, Lyme disease, Eastern Equine Encephalitis, La Crosse Encephalitis, Powassan Virus, St. Louis Encephalitis, Western Equine Encephalitis. These diseases are discussed in the Disease Outbreak profile, Section 5.4.3.

Invasive Species

According to the NYS DEC, invasive species are non-native species that can cause harm to the environment, to the economy, or to human health (NYS DEC 2018). Invasive species originate in many parts of the world and can be found in the form of aquatic or terrestrial species. Invasive species are one of the greatest threats to New York State's biodiversity. They can cause or contribute to:

- Habitat degradation and loss
- The loss of native fish, wildlife and tree species
- The loss of recreational opportunities and income
- Impact water quality
- Crop damage and diseases in humans and livestock
- Risks to public health and safety (NYSDEC 2018).

Thousands of species have been introduced in the U.S., posing serious threats to agriculture, human health, and the integrity of land and water. New York State is vulnerable to damages from these invasive species. Jurisdictions in Suffolk County are devoting funds, often assisted by New York State, to help control the invasive species populations, along with adopting codes to regulate and control invasive species.

The following table provides the plant, animal, insect, and pathogen species that currently affect or may soon affect the natural areas of Long Island and Suffolk County.



Table 5.4.11-1. Plants, Animals, Insects, and Pathogens Impacted Natural Areas of Long Island

Name	Species Type
Asian Carp	Fish
Asian Clam	Mollusk
Asian Raccoon Dog	Mammal
Asian Sea Squirt	Tunicate
Asian Long-horned Beetle	Insect
Chinese Mitten Crab	Crustacean
Curly Pondweed	Aquatic Plant
Emerald Ash Borer	Insect
Eurasian water milfoil	Aquatic Plant
European Common Reed Grass	Plant
European crane fly	Insect
European Green Crab	Crustacean
European Hare	Mammal
European Starling	Bird
Feral Swine	Mammal
Fishhook Water Flea	Insect
Giant African Land Snail	Mollusk
Green Fleece	Algae
Gypsy Moth	Insect
Hemlock Woolly Adelgid	Insect
House Sparrow	Bird
Late Blight	Pathogen
Lion Fish	Fish
Monk Parakeet	Bird
Muscovy Duck	Bird
Mute Swan	Bird
Northern Snakehead Fish	Fish
Nutria	Mammal
Oak Wilt	Pathogen
Plum Pox Virus	Pathogen
Purple Loosestrife	Plant
Rock Snot	Algae
Round Goby	Fish
Rusty Crayfish	Crustacean
Sea Lamprey	Fish
Sirex Woodwasp	Insect
Southern Pine Beetle	Insect
Spiny Waterflea	Insect
Spotted Lanternfly	Insect
Suminoe Oyster	Mollusk
Water Chestnut	Aquatic Plant



Name	Species Type
Water Thyme	Aquatic Plant
Yellow Flag Iris	Plant
Zebra and Quagga Mussel	Mollusk

Source: Long Island Invasive Species Management Area 2020

The Steering Committee selected the following non-native species or problematic native species to be discussed in further detail:

Asian Longhorned Beetle is an exotic pest, native to parts of Asia, threatening a wide variety of hardwood trees in North America, particularly in New York State, New Jersey and Chicago. The beetle is believed to have arrived in New York City in the 1980s, in wooden packing material used in cargo shipments from China. The Asian Longhorned Beetle has the ability to infest certain hardwood trees, eventually destroying them. They are threat to public, private and commercial hardwood trees. The U.S. Department of Agriculture (USDA) believes this beetle can probably survive and reproduce in most sections of the country where suitable host trees exist (NYSDEC 2020).

Sirex Woodwasp is a Eurasian native, which was first discovered in New York State in 2005. This was the first North American discovery of this exotic, invasive pest that is one of the top 10 most serious forest insect pest invaders worldwide. Native woodwasps utilize dead and dying pines, whereas the invasive *Sirex Woodwasp* attack healthy pines as well. Pines, with a diameter of six inches or greater, are susceptible; however, stressed, suppressed, and crowded pines are favored by the *Sirex Woodwasp* (NYIS, 2013). All pine species are believed to be at risk, particularly stressed Scots (or Scotch), red and eastern white pines (NYSDEC 2020b).

Southern Pine Beetle, or SPB, is a bark beetle that infests pine trees. The beetle is small, only 2-4 mm in length (about the size of a grain of rice) and is red-brown to black in color. The adult beetle enters the tree through crevices in the bark and then creates S-shaped tunnels in the cambium tissue, just beneath the bark. This disrupts the flow of nutrients, killing the tree in typically 2-4 months. Most trees resist the initial attacks by secreting resin that can "pitch out" some adults and slow the entry of others, but trees almost always die as their defenses are overwhelmed by thousands of attacking beetles (NYS DEC 2020c). This insect is native to the southeastern United States but has been expanding its range up the Eastern Seaboard in recent years. Warming of extreme winter temperatures has most likely contributed to this expansion.

The *Spotted Lanternfly (Lycorma deliculata)* is an Asian plant hopper. The adults are quite colorful with a black head, grayish black spotted forewings, and reddish black spotted hind wings. Adults are approximately 1" in length and a 1/2" in width and are present from mid-July through the fall. During this time, SLF adults are mating and laying eggs. Egg masses are laid on smooth surfaces and appear like a patch of mud.

In the USA, Spotted Lanternfly is an invasive species that could be very devastating to some New York crops and hardwood trees. This insect was accidentally introduced into Pennsylvania and was confirmed in September 2014. In 2019, SLF populations were found in New Jersey and Pennsylvania.

The Spotted Lanternfly can feed on more than 70 plant species including cultivated grapes, fruit trees, and hardwood trees. One tree of particular importance is *Ailanthus altissima* or the Tree of Heaven which is an invasive plant species abundant in New York. Tree of Heaven typically grows in clumps in sunny areas along highways or disturbed habitats such as the edges of crop fields, open spaces, or parks. Other key tree hosts include black walnut; red maple; and agricultural crops such as grapes, hops, apples, and peaches.

As with all plant hoppers, Spotted Lanternfly has sucking mouthparts that it inserts into plant tissues to remove the fluids it needs to survive. Spotted Lanternfly adults and nymphs are phloem feeders that feed in large congregations on woody tissue. Although there are no numbers or estimates on the economic impact of Spotted



Lanternfly —because this insect feeds in large numbers it can quickly cause damage. Feeding occurs on the trunk and limbs of plants, not on the fruit or leaf tissues. During feeding, the Spotted Lanternfly excretes significant amounts of honey dew (or sugar water). Honey dew deposits provide a food source for a sooty mold fungus that can grow on plant surfaces and fruit leading to reduced photosynthesis and plant vigor, leading to additional plant damage (NJAES 2020).

White-Tailed Deer can be found from southern Canada to South America. In summer months, they typically live in fields and meadows and during the winter, the deer generally keep to forests. White-tailed deer are herbivores and graze on most types of plants. There are not many natural predators to white-tailed deer which causes the deer population to grow too large for their environment and some areas may experience an overpopulation of deer (National Geographic 2015).

In New York white-tailed deer are a major component throughout the State, with the exception of the most urbanized areas, affecting forests, farms, gardens, backyards and roadways. They can have negative impacts on humans, including car accidents, depredation of agricultural and ornamental plantings, and the potential for harboring diseases that are transmissible to man or domestic animals. The size of the deer population in New York is managed through controlled sport hunting, with the main goal being to maintain healthy deer populations at a density tolerable to New York residents. In Suffolk County, the white-tailed deer population have a history of impacting native plants and wildlife species in natural areas of the County.

Suffolk County is also impacted by the increase in invasive marine species in coastal waters that impact the health of the marine ecosystem and the County's fisheries. Warming ocean temperatures are also contributing to the northerly shift of fish stocks, resulting in the local decrease in certain fish stocks and the new arrival of traditionally southern species in Suffolk County's coastal waters.

Regulations

The Invasive Species Council is a statutory body created in 2008 by Title 17, Section 9 of the Environmental Conservation Law (ECL). It was created to coordinate among multiple state entities and partners in addressing the environmental and economic threats of invasive species. The legislation defines invasive species as “a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely causing economic or environmental harm or harm to human health”. The Council is co-led by the NYSDEC and the Department of Agriculture and Markets (NYSDAM) and consists of nine members: the Commissioners of the NYSDEC; NYSDAM; Transportation; Education; the Office of Parks, Recreation and Historic Preservation; the Secretary of State, the Chairperson of the New York State Thruway Authority, the Director of the New York State Canal Corporation, and the Chairperson of the Adirondack Park Agency (NYSDEC 2020d).

The NYSDEC, in cooperation with the Department of Agriculture and Markets, has proposed new invasive species regulations (6 NYCRR Park 575). The proposed regulation includes a list of prohibited species which shall be unlawful to knowingly possess with the intent to sell, import, purchase, transport or introduce; a list of regulated species which shall be legal to possess, sell, purchase, propagate, and transport, but may not be knowingly introduced into a free-living state; and require a permit for education, research, and other approved activities involving prohibited species and release of regulated species into a free-living state. The regulation also specifies the criteria used in making such classifications and a means for future classification of species. The proposed regulation establishes grace periods for certain prohibited species to allow businesses to plan the management of existing stock (NYSDEC 2020d).

In Suffolk County, municipalities have adopted codes to regulate the control and planting of certain plant species. For example, the Town of Babylon adopted a code in 2013 to regulate and control the planting of certain bamboo species.



Extent and Location

The extent and location of infestations and invasive species depends on the preferred habitat of the species, as well as the species' ease of movement and establishment. However, each of these threats can impact most areas of New York State, including Suffolk County.

The magnitude of infestations and invasive species ranges from nuisance to widespread. The threat is typically intensified when the ecosystem or host species is already stressed, such as periods of drought. The already weakened state of the ecosystem causes it to more easily be impacted to an infestation. The presence of disease-carrying mosquitoes and ticks and the presence of the Sirex Woodwasp have been reported throughout most of New York State and in Suffolk County as well.

Asian Longhorned Beetles (ALB)

Although it is believed that this beetle arrived in the U.S. between the 1980's and 1990's, the Asian Longhorned Beetle was first discovered in McCarren Park of Greenpoint, Brooklyn on August 19, 1996 and soon after in Amityville, Long Island in September 1996. Since then, infestations were found in and around New York City, including on Long Island (Bayside, Islip), Manhattan, Queens and Flushing Park. At present, the population is considered under control in Suffolk County thanks to mitigation and control efforts but concerns remain of future outbreaks.

The USDA-APHIS Plant Protection and Quarantine (PPQ) has implemented quarantine and control strategies and restrictions in New York State, Massachusetts, and Ohio that seek to eradicate this serious pest from the U.S. Quarantine areas have been established where beetles or their damage have been found, as a legal measure taken by a state of federal agency to prohibit the spread of a pest from one area to another. Code of Federal Regulations (e-CFR), Title 7: Agriculture, PART 301—Domestic Quarantine Notices, have been developed by the USDA-APHIS for handling wood and planting trees in these Asian Longhorned Beetle quarantine zones. The Nature Conservancy has indicated that if Asian Longhorned Beetles were to break out of the established quarantine areas and spread into upstate New York State and New England, they could cause a devastating economic blow to the sugar maple, tourism, timber, and forest product industries. Over 1.5 billion trees are susceptible across New England (The Nature Conservancy 2007). Figure 5.4.11-1 shows the 2020 regulated boundaries in Central Long Island. Figure 5.4.11-2 shows a detailed map of the New York State Asian Longhorned Beetle program. The Islip area has infected trees and is an active regulated area.



Figure 5.4.11-1. 2019 Asian Longhorned Beetle Regulated Boundaries – Central Long Island

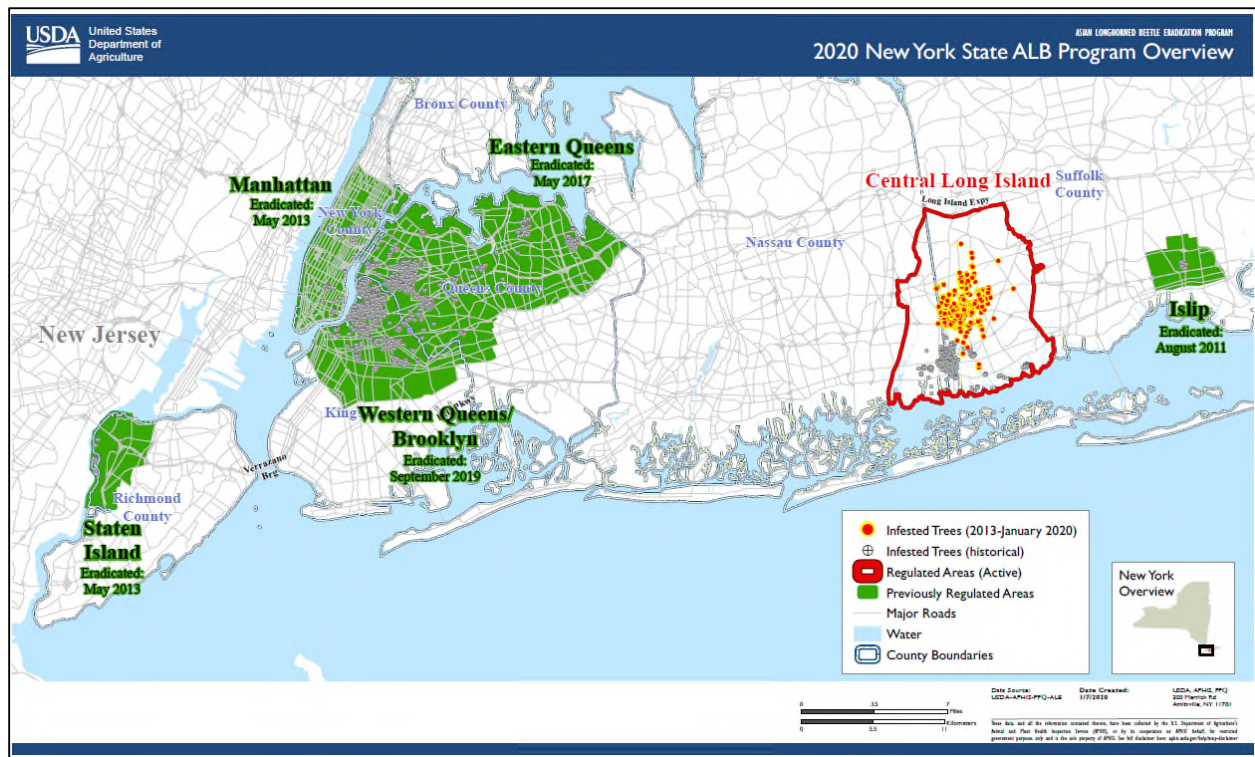


Source: APHIS, 2020





Figure 5.4.11-2. 2020 New York State Asian Longhorned Beetle Program Overview



Source: APHIS 2020

Sirex Woodwasp

Sirex Woodwasp is native to Europe, Asia, and North Africa. It can now be found within the northeast U.S. ranging from Michigan to New Hampshire. In New York State, the most affected species are scots pine, Austrian pine, and red pine from plantations dating to the mid-1900s. The damage to the underperforming trees has a minimal economic effect to the state (NYIS 2019).

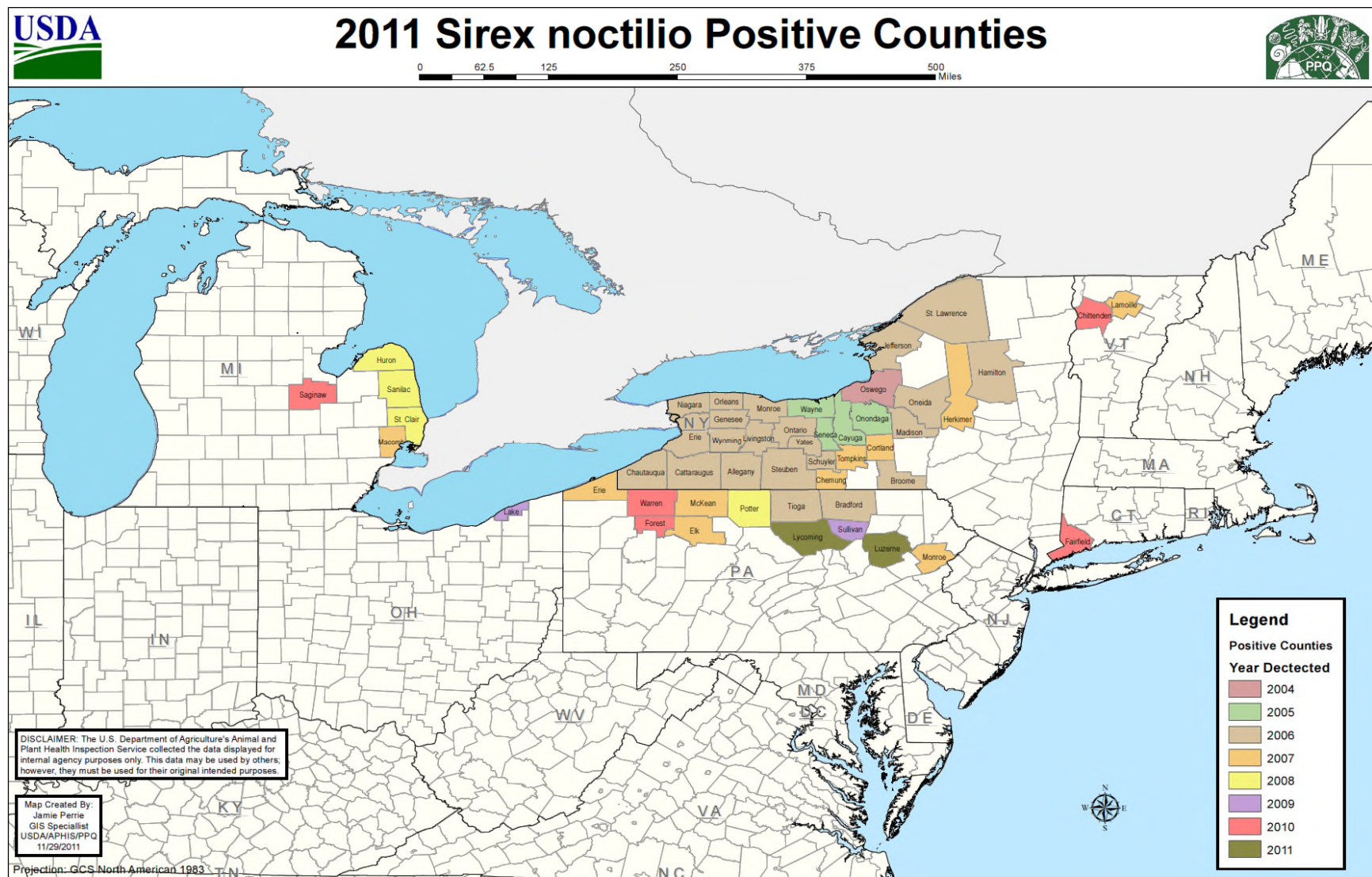
Impacts of the Sirex Woodwasp have been relatively minor in New York State, including Suffolk County. The largest damage is being seen in Scots, Austrian, and red pine forests that are crowded, stressed, and underperforming (NYIS, 2019). Little economic or environmental impact is expected in Suffolk County

Figure 5.4.11-3 shows the positive counties in New York State where Sirex Woodwasp has been detected. According to this figure, as of 2011, Sirex Woodwasp has not been detected in Suffolk County.





Figure 5.4.11-3. Sirex Woodwasp in New York State



Source: New York State Invasive Species Clearinghouse 2019





Southern Pine Beetle has killed thousands of pine trees since it was found in New York State in 2014 with Pitch Pine Trees being the most impacted. Southern Pine Beetle is widespread throughout Suffolk County, but the largest infestations are located in Wertheim National Wildlife Refuge, Connetquot River State Park, Hubbard County Park, and in East Quogue, NY (NYS DEC 2020c). Large forested and unique areas such as the Long Island Central Pine Barrens Preserve are of the highest priority to protect (NY State Parks & Historic Sites 2016).

Spotted Lanternfly has not yet been found on Long Island but has been spreading regionally and is likely to impact Suffolk County in the future. Spotted Lanternfly damages plants through the extraction of plant sap. Infestations of Spotted Lanternfly can result in decimation of crops, forest habitat, and landscaping (NJ Department of Agriculture 2019).

The White-Tailed Deer population in New York has fluctuated over time but the species has become quite abundant today. Changes to the natural landscape created by humans provide an abundant and ideal deer habitat, which in return has increased the deer population in the State. Substantial deer populations are not only a by-product of agriculture, but the result of greenways and large building lot sizes common in the suburban and rural areas of the State. In suburban areas, deer populations have been increasing due to land development and opposition to hunting. The impacts of deer overabundance can be shown by the number of deer/automobile collisions, destruction of residential flower and shrub plants, damage to agricultural crops, and increased risks of contracting wildlife-transmitted diseases such as Lyme disease (discussed in Section 5.4.3, Disease Outbreak).

Previous Occurrences and Losses

Between 1954 and 2020, FEMA declared that New York State experienced one infestation-related emergency (EM) classified as a virus threat. EM-3155 was declared for a West Nile Virus outbreak in 2000. Generally, these disasters cover a wide region of the State; therefore, they may have impacted many counties. Suffolk County was included in this declaration (FEMA 2020).

Since 2014, Suffolk County has continued to be impacted by Asian Longhorned Beetle, Southern Pine Beetle, and White-Tailed Deer.

Probability of Future Occurrences

Based on historical documentation, increased incidences of infestation throughout New York and the overall impact of changing climate trends, it is estimated that Suffolk County and all its jurisdictions will continue to experience infestation events that may induce secondary hazards and health threats to the County population if infestations are not prevented, controlled or eradicated effectively.

In Section 5.3, the identified hazards of concern for Suffolk County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Committee, the probability of occurrence for earthquake in Suffolk County is considered 'frequent'.

Climate Change

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to continue growing. Impacts related to increasing temperatures and sea level rise are already being felt 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 (New York State Energy Research and Development Authority [NYSERDA], 2011).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Suffolk County is part of Region 4, New York City and Long Island. Some of the issues in this region, affected by climate change, include: the area contains the highest population density in the State; sea level rise and storm



surge increase coastal flooding, erosion, and wetland loss; challenges for water supply and wastewater treatment; increase in heat-related deaths; illnesses related to air quality increase; and higher summer energy demand stresses the energy system (NYSERDA 2011).

In Region 4, it is estimated that temperatures will increase by 4.1°F to 5.7°F by the 2050s and 5.3°F to 8.8°F by the 2080s (baseline of 54.6 °F, mid-range projection). Precipitation totals will increase between 4 and 11% by the 2050s and 5 to 13% by the 2080s (baseline of 49.7 inches, mid-range projection) (NYSERDA 2014). The heaviest 1% of daily rainfalls have increased by approximately 70% between 1958 and 2011 in the Northeast (Horton et al. 2015). Average annual precipitation is projected to increase in the region by four to 11-percent by the 2050s and five to 13-percent by the 2080s (New York City Panel on Climate Change [NPCC] 2015). Increased rainfall and heavy rainfalls increase the chances of standing water where mosquitos breed.

Table 5.4.11-2 displays the projected seasonal precipitation change for the New York City and Long Island ClimAID Region (NYSERDA 2011).

Table 5.4.11-2. Projected Seasonal Precipitation Change in Region 4, 2050s (% change)

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

Source: NYSEDA, 2011

Ocean acidification due to climate change may also contribute to negative environmental impacts and changes to the established species makeup of the area. Ocean acidification is occurring because the ocean is absorbing carbon dioxide from the atmosphere, leading to lower pH and greater acidity. This is causing a fundamental change in the chemistry of the ocean from pole to pole (NOAA OAP 2020). Ocean acidification is particularly damaging to shellfish.

With the projection of temperature and rainfall increase due to climate change, there is evidence that climate change may be a factor in the expansion of invasive species in the U.S. As temperatures increase and rainfall patterns change, traditionally southern species may remain active for longer seasons and in wider areas.

Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed and vulnerable. For the infestation hazard, the entire County is exposed. The following discusses Suffolk County’s vulnerability, in a qualitative nature, to the infestation and invasive species hazard.

Impact on Life, Health and Safety

The entire population of Suffolk County is vulnerable to infestation; however, the elderly population and people with suppressed immune systems are more susceptible. According to the 2018 ACS 5-year estimate, there are 239,284 persons over the age of 65 in Suffolk County.

As discussed earlier, infestations can have an impact on agricultural commodities. The NYS DEC has indicated that agricultural commodities are at risk of becoming infested with invasive species, such as the spotted lanternfly, gypsy moth, and hemlock wooly adelgid (NYS DEC 2020e). Agricultural goods and services may include consumable resources sold to persons throughout the County. Not only can the livelihood of farmers become affected by crops that are infested, consumers of the goods and services that are infested will also be impacted.





Impact on General Building Stock

No structures are anticipated to be directly affected by infestation or invasive species; however, the Emerald Ash Borer may cause a catastrophic loss of ash trees throughout the County, which could result in stream bank instability, erosion, and increased sedimentation, impacting ground stabilization and possibly cause foundation issues for nearby structures. Additionally, with an increased number of dead trees, there is an increased risk of trees falling on roadways, power lines, and buildings.

Some invasive plants have been shown to destabilize soil due to high densities and shallow root systems, negatively impacting nearby buildings and septic systems. Other invasive plant species have been known to clog culverts and streams, increasing flooding risk.

Impact on Critical Facilities

Water treatment plants could be impacted by infestation and invasive species because of similar issues that the general building stock may experience. Water that becomes polluted due to increased sedimentation and erosion will require additional treatment. If the system becomes clogged with these pollutants, the ability of water treatment plants to operate may become impaired. Additionally, soil that becomes unstable due to decaying vegetation can impact critical facilities that are built on or around these soils.

Impact on Economy

Impacts of invasive species and infestations on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with activities and programs implemented to conduct surveillance and address invasive species and infestations have not been quantified in available documentation. However, since 2016, the DEC Invasive Species Grant Program has awarded approximately \$6.5 million to 114 municipalities, non-profit, and academic institutions to address the issue of invasive species including measures of control, removal, additional research, and prevention techniques (NYDEC 2020f).

In 2018, DEC and the NYS Department of Agriculture and Markets (DAM) developed a Final Invasive Species Comprehensive Management Plan (NYDEC 2020f). This plan highlights some of the major programs that have been established for invasive species control for the State. According to the plan, up to \$13.3 million has been raised by the NYS Environmental Protection Fund (NYSDEC 2018b).

Impact on the Environment

As previously discussed, Suffolk County's parks, forests and neighborhood trees are vulnerable to gypsy moth, spotted lanternfly and EAB. In addition, a high population density of deer and the amount of browsing can have detrimental effects on the forest communities in the County.

Invasive species can cause eventual destabilization of soil, such as invasive insects that destroy plants or invasive plants that outcompete native vegetation but have less effective root systems, can increase runoff into waterbodies. This can lead to increased harmful algal blooms and negative impact on drinking water supplies. Soil destabilization can also increase the likelihood of mudslides in areas with a steep slope.

Cascading Impacts to Other Hazards

There are no known cascading impacts caused by infestation and invasive species to other hazards of concern for Suffolk 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 Sections 4 (County Profile) and 9 (Jurisdictional Annexes), areas targeted for future growth and development have been identified across Suffolk County. Changes in land use have the potential to render some habitats more susceptible to invasive species, such as clearing the land and providing opportunities for invasive species to inhabit the area. Clearing the land may also reduce the habitat for predator species that could manage the spread of invasive species naturally. The specific areas of development are 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 Suffolk County Department of Economic Development and Planning's February 2017 Annual Report update, the population of the County is growing. The report indicates that slow population growth is expected to continue in the future. Any growth can create changes in density throughout the County, which can affect the location of future development projects. As a result, habitat changes can impact the distribution of natural wildlife to mitigate against infestation and invasive species.

Furthermore, infestation to cropland can have a wider impact on persons outside of Suffolk County if the farmers within the County supply resources to neighboring communities. Being aware of trends occurring around the County may reveal that infestations within agricultural commodities provided by the County impacts a greater number of persons.

Climate Change

Climate change could exacerbate the impacts of these species in the County. As mentioned above, changing weather patterns could create a change in the migration patterns for when these species move into and out of Suffolk County. If the species have a more prolonged existence in the County, there may also be a greater number of infestation events or a higher value of loss tied to infestation.

Change of Vulnerability Since the 2014 HMP

Overall, the entire County continues to remain vulnerable to the infestation and invasive species hazard.