



5.4.5 Invasive Species

This section provides a hazard profile and vulnerability assessment of the invasive species hazard for the Livingston County Hazard Mitigation Plan (HMP).

5.4.5.1 Hazard Profile

This section presents information regarding 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 State has 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 5.4.1.

New York State has been impacted by various past and present infestations including Asian longhorned beetles; and hemlock woolly adelgid. Other infestations that have impacted the State include: Emerald Ash Borer, and Sirex Woodwasp. Some infestations, like hemlock woolly adelgid and Emerald Ash Borer, have already occurred in Livingston County. The following infestations listed below, will further be discussed in this section.

Invasive Species

According to the New York State Department of Environmental Conservation, invasive species are non-native species that can cause harm to the environment, to the economy, or to human health (NYSDEC 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. The following list contains the names of invasive species found in New York State. This list does not include all



plant species that are invasive or potentially invasive in the State. Jurisdictions in Livingston County and the Livingston County Soil and Water Conservation District are devoting resources to help control the invasive plant species populations, along with adopting codes and guidelines to help regulate and control the planting of different plant species. An invasive plant can thrive and spread aggressively outside its native range. A naturally aggressive plant may be especially invasive when it is introduced to a new habitat (USDA 2017). Invasive plants include invasive aquatic plants. Invasive aquatic plants are introduced plants that have adapted to living in, on, or next to water, and can grow either submerged or partially submerged in water (USDA 2017,). Invasive plants often are introduced to a new area for ornamental gardening.

The following table provides the animal and pathogen species that currently affect or may soon affect the natural areas of Livingston County.

Table 5.4.5-1. Animals, Insects, and Pathogens Impacted Natural Areas of Finger Lakes Region

Name	Species Type	Name	Species Type
Agriculture Weeds	Plant	Japanese Barberry	Plant
Akebia	Plant	Japanese hedgeparsley	Plant
Alewife	Fish	Japanese Stiltgrass	Plant
Amur River, California, Common privet	Plant	Kudzu (Not yet in region)	Plant
Amur cork-tree	Plant	Leafy Spurge	Plant
Asian bittersweet	Plant	Lesser celandine	Plant
Asian Clam	Fish	Lily-of-the-valley	Plant
Asian Longhorned Beetle (Not yet in region)	Insect	Mile-a-Minute	Plant
Asian Maple	Plant	Moneywort, creeping jenny	Plant
Autumn Olive	Plant	Mugwort	Plant
Balsam Woolly Adelgid (Not yet in region)	Insect	Multiflora Rose	Plant
Bittersweet nightshade	Plant	Norway Maple	Plant
Black locust	Plant	Norway Spruce	Plant
Black swallowwort	Plant	Oriental Bittersweet	Plant
Brittle Naiad (water nymph)	Plant	Pale swallowwort	Plant
Brazilian Elodea/waterweed (Not yet in region)	Plant	Periwinkle	Plant
Brown/Black Knapweed	Plant	Pondweed (Curly-leaf, Giant, Japanese)	Plant
Buckthorn (and Alder)	Plant	Porcelain-berry	Plant
Burning Bush/Winged euonymus	Plant	Purple Loosestrife	Plant
Callery Pear	Plant	Quagga Mussel	Mollusk
Canada Thistle	Plant	Reed canary grass	Plant
Common Crane Fly	Insect	Rocket	Plant
Common Reed Grass/Phragmites	Plant	Round Goby	Fish
Crabapple	Plant	Sheep sorrel	Plant
Creeping bellflower	Plant	Sirex (European Woodwasp)	Insect
Creeping Thistle	Plant	Slender Falsebrome	Plant
Crownvetch	Plant	Spiny Waterflea	Zooplankton
Daylily	Plant	Spotted Knapweed	Plant
Emerald Ash Borer	Insect	Spotted Wing Drosophila	Insect
English Ivy	Plant	Starry Stonewort	Plant
Eurasian Boar	Animal	Stilt-grass	Plant
Eurasian Watermilfoil	Plant	Swallow-worts	Plant
European black alder	Plant	Swede Midge	Insect
European barberry	Plant	Sycamore maple	Plant
European Crane Fly	Insect	Tree of heaven/ailanthus	Plant
European dewberry	Plant	Variable-leaf Watermilfoil	Plant
European Frog-bit	Plant	Water Chestnut	Plant
Evergreen bittersweet	Plant	White bedstraw	Plant



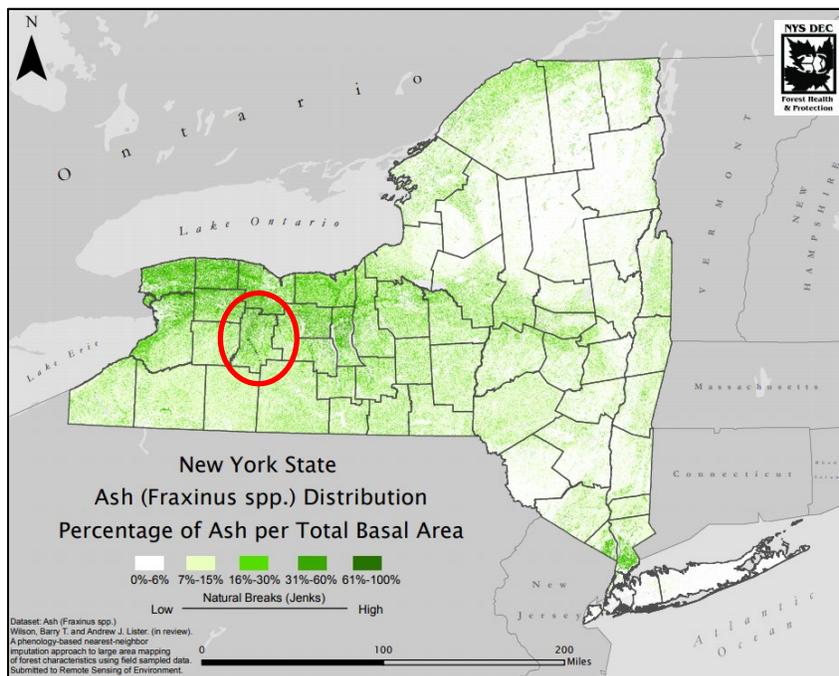
Name	Species Type	Name	Species Type
Fanwort	Plant	Wild Chervil	Plant
Fishhook Waterflea	Zooplankton	Wild onion/onion-grass	Plant
Flowering Rush	Plant	Wild Parsnip	Plant
Forget-me-not	Plant	Wineberry	Plant
Garlic Mustard	Plant	Wisteria	Plant
Giant Hogweed	Plant	Yellow-flag iris	Plant
Goutweed, bishop’s weed	Plant	Yellow Floating Heart	Plant
Hairy cress	Plant	Yellow Iris	Plant
Hedge Maple	Plant	Zebra Mussel	Mollusk
Hemlock Woolly Adelgid	Plant		
Honeysuckle (Japanese, Maack’s, Tartarian)	Plant		
Hydrilla	Plant		

Source: Finger Lakes PRISM, 2020; Livingston County Environmental Management Council 2018

For this HMP update, the following non-native species will be discussed in further detail for Livingston County:

Emerald Ash Borer (EAB) is a wood boring beetle native to Asia that feed on and kill all Ash Tree species. The beetle was first found in 2002 near Detroit, Michigan and has since spread to 13 states and 2 Canadian provinces, killing many millions of Ash Trees in both urban and rural settings. New York State’s Department of Environmental Conservation had instituted a quarantine zone to contain the spread of this beetle, of which Livingston County was included. The quarantine zone has since been eliminated since it is no longer effective. In general, Ash is a common tree found throughout most of New York State and comprises nearly 8% of all trees within the state. As the tree is a common food source and is commonly used in lumber, the effect of the EAB in New York State can be significant. A map below provided by NYSDEC shows the general population of ash. Increased woodpecker activity is often the first sign of an EAB infestation and most tree die within 2 to 4 years after being infected. The population of EAB is increasing quickly across the state, however, DEC is not actively pursuing management of this invasive species currently (NYSDEC, 2020).

Figure 5.4.5-1. General Population of Ash Trees in New York State



Note: Livingston County is noted with a red oval.



Sirex Woodwasp (SW) an invasive insect that attacks pine species, including Scots Pine and Red Pine. It was found in Oswego County in 2004 and since then has spread throughout much of New York State. It is known for causing severe tree mortality as it lays its nests and inserts a fungus into distressed trees, which ultimately lead to the trees wilting and rotting.

Giant Hogweed This species is a perennial plant and a member of the carrot family. It is a garden ornamental from southwest Asia that is naturalizing in North America and has over time become a widespread issue in New York State. Giant hogweed has the potential to spread readily and grows along roadsides, ditches and streams. It invades old fields and native habitats such as open woodlands. Brushing against or breaking the plant releases sap that, combined with sunlight and moisture, can cause a severe burn within 24 to 48 hours. Giant hogweed is a Federally listed noxious weed and NYS law prohibits its possession with the intent to sell, import, purchase, transport, introduce or propagate (NYSDEC, 2020). Giant hogweed has been spotted in several towns throughout Livingston County and the NYSDEC is monitoring approximately 10 known locations of the plant. (Cornell Cooperative Extensions, 2020).

Starry Stonewort is an algae native to Eurasia, likely introduced to the Great Lakes by ballast water (NYS DEC n.d.). It has since spread to inland lakes in counties along Lake Ontario, the Finger Lakes region, and other locations in the state. It may outcompete native species of plants that provide shelter and food for native species of animals, and the mats it forms on the bottoms of waterbodies may negatively impact spawning of native species.

Wild Parsnip Wild parsnip is an invasive plant from Europe and Asia that has become naturalized in North America. The plant can grow up to five feet tall and has a hollow grooved stem. The plant can easily be mistaken for plants such as goldenrod or other yellow plants that can be found in the northeast region. It is well suited for the northeast climate and can be found in a broad range of habitat, especially along roads, in field and pastures, and along rivers or streams. The plant contains a chemical called furanocoumarins which cause human skin to become vulnerable to UV and thus cause swelling and inflammation. The burn can last between 24 and 48 hours and in severe cases cause discoloration of the skin. Livingston County and its associated organizations such as Cornell Cooperative Extension and SWCD are actively monitoring the species and have been providing education and outreach around the potentially hazardous plant (Cornell Cooperative Extension, 2020)

Hemlock Woolly Adelgid (HWA) is an invasive, aphid-like insect that attacks North American hemlocks. HWA are originally from Asia and is very small and hard to see but can be identified based on their whiteness that form underneath the branches around the needles. HWA develop by connecting at the base of needles and being feeding on the tree’s stored starches which depletes the tree of nutrients and destroys the canopy due to the inability for adequate nutrients to be delivered to the twigs and needles. Eventually, the tree dies within 4 to 10 years if not addressed immediately. While all hemlock species are vulnerable, most often HMA can be found on eastern (most common in NYS) and Carolina hemlocks. In addition to direct effects on hemlock, the decline of the species health can cascade to affecting black bears, salamanders, and migrating birds, as well as unique lichen and plant communities that all depend on the unique dense canopy of the hemlock.

Figure 5.4.5-2 Hemlock Woolly Adelgid





Asian Longhorned Beetles (ALB) are 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 ALB can 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.

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. While this species has not yet been documented in Livingston County, according to DEC, with changing weather patterns and increasing temperatures, the Finger Lakes region will likely start encountering this species in the near future.

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 Livingston County.

Giant Hogweed

The species has been documented across the state including Livingston County. The plant grows along streams and rivers and in fields, forests, yards and roadsides. It prefers open sites with abundant light and moist soils, though it can grow in partially shaded habitats, too. The species is often found as a standalone plant, unlike many invasive species that cluster together. Due to the large size of this plant, it could cause potential harm to surrounding vegetation. The map depicts the extent to which giant hogweed has been documented, and the adjacent map shows the sites that have been treated and the species was successfully exterminated.

Figure 5.4.5-3 2021 NYSDEC Giant Hogweed Eliminated Plant Sites

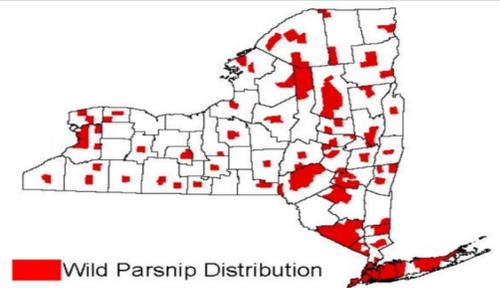




Wild Parsnip

The species, like many other invasive plants can be found in large clusters along the side of the roads and can be especially prevalent during the summer months. The plant can be found in most of upstate New York Counties including Livingston County. The plant is most likely to be found in areas where sunlight is fully accessible and therefore not in shady areas such as forests. The adjacent map shows the distribution of the wild parsnip in New York State.

Figure 5.4.5-4 Wild Parsnip Distribution



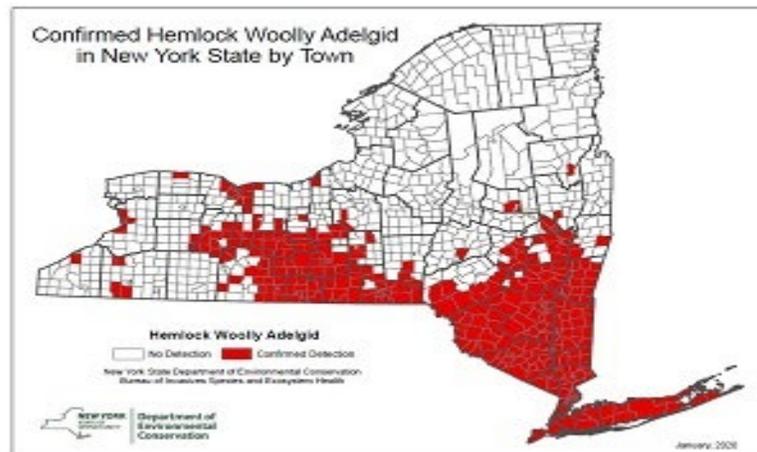
Starry Stonewort

Starry Stonewort has spread to inland lakes in counties along Lake Ontario, the Finger Lakes region, and other locations in the state. It has recently been found in Conesus Lake.

Hemlock Woolly Adelgid (HWA)

HWA was originally introduced to North America in the 1920s. Ever since, it has spread along the east coast from Georgia to Maine and now occupies nearly half of the eastern range of native hemlocks. It was documented in New York State around 1985 in the Lower Hudson Valley and Long Island and continued upward toward the Capital Region. The species has spread over the years across the state and in 2008 has been documented in Livingston County (Livingston County, 2020). The adjacent map shows the extent to which HWA has been documented in New York State (NYS DEC)

Figure 5.4.5-5 Confirmed Hemlock Woolly Adelgid Locations



Emerald Ash Borer (EAB)

As previously mentioned, EAB can be found across the state and has been identified in much of Upstate New York including Livingston County. However, no active mitigation measure is in place at this time (NYSDEC 2020).

Sirex Woodwasp (SW)

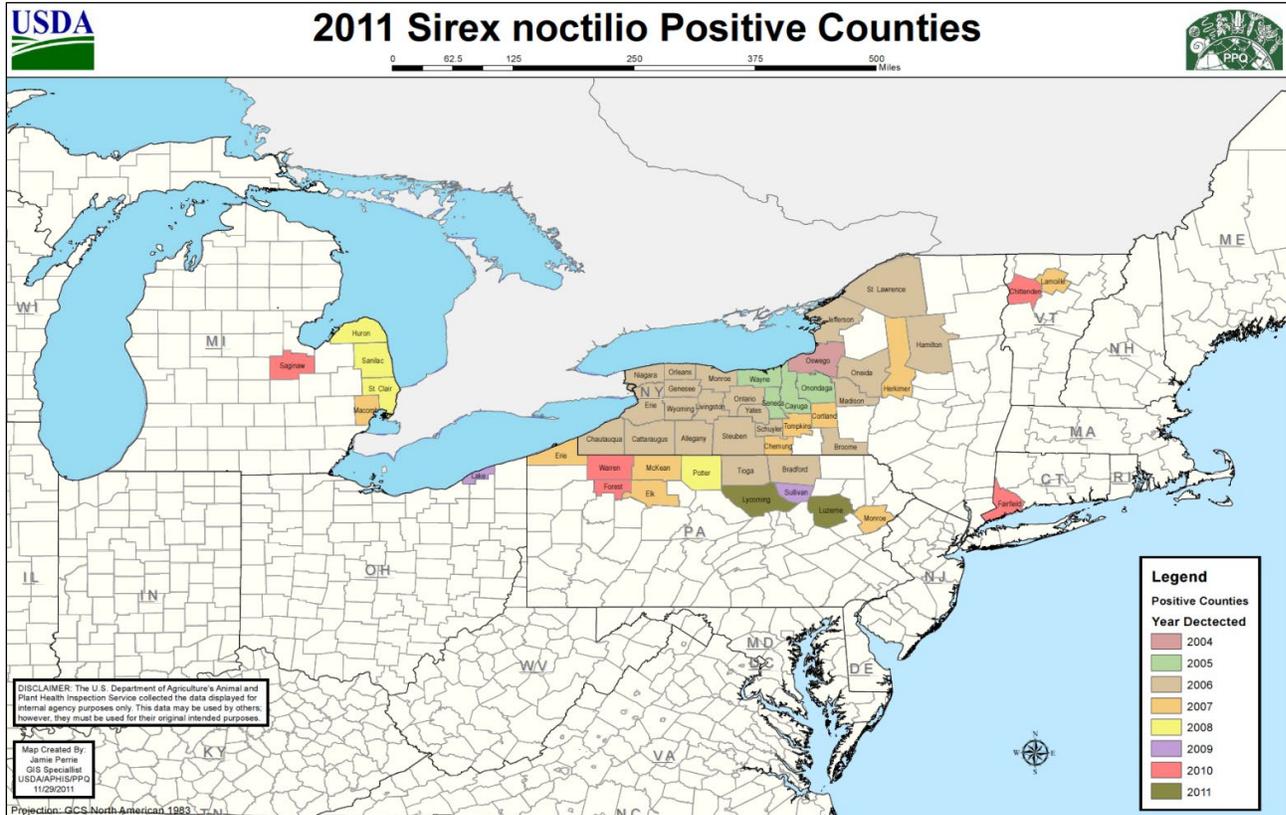
The species is native to Europe, Asia, and North Africa. It can now be found within the northeast U.S. ranging from Michigan to New Hampshire. In New York State, the most affected species are scots pine, Austrian pine, and red pine from plantations dating to the mid-1900s. The damage to the underperforming trees has a minimal economic effect to the state (NYIS, 2019). It was found in Oswego County in 2004 and since then has spread throughout much of New York State, including Livingston County. The USDA Forest Service ranks Livingston



County as having a medium to very high introduction potential, establishment potential, and susceptibility potential for Sirex Woodwasp infestations (USDA Forest Service, 2006).

Figure 5.4.5-6 shows the counties in New York State where Sirex Woodwasp has been detected. According to this figure, as of 2011, Sirex Woodwasp has been documented in Livingston County. Available information regarding the identification of the species in Livingston County is provided below.

Figure 5.4.5-6. Sirex Woodwasp in New York State.



Source: New York State Invasive Species Clearinghouse, 2019

Previous Occurrences and Losses

Many sources provided historical information regarding previous occurrences and losses associated with infestation events throughout New York State and Livingston County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

Between 1954 and 2021, FEMA declared that New York State experienced one infestation-related emergency (EM) classified as a virus threat. Generally, these disasters cover a wide region of the State; therefore, they may have impacted many counties. However, not all counties were included in the disaster declarations. Livingston County was included in this declaration (FEMA 2021).

In addition, because invasive species can sometimes go unrecorded and the number of occurrences can be unclear, it can be more precise to identify the date when the identified species was first documented in the region.





Giant Hogweed

This species has been continuing to infest the Finger Lakes region and, according to DEC, the species is under strict monitoring. Proper education and outreach will need to be conducted, as the prevalence of this species and its spreading will likely increase.

Wild Parsnip

This species has been continuing to infest the Finger Lakes region and, according to DEC, the species is under strict monitoring. Proper education and outreach will need to be conducted, as with climate change eradication of this species is unlikely.

Starry Stonewort

Starry Stonewort was only recently discovered in Conesus Lake. No information on impacts was available.

Hemlock Woolly Adelgid

The HWA has been rapidly spreading across the State and there are no signs of this decreasing. While New York State is currently actively trying to mitigate the spread of this species, with climate change this species will likely continue to increase and reach northern counties over the years (NYSDEC, 2020)

Emerald Ash Borer

Currently there are no County-wide mitigation measures in place to combat this species spread. However, Cornell University is proactively treating, inventorying, and culling ash trees to manage the impact of the thousands of on- and off-campus trees that have succumbed to this insect and could become a life-safety concern as they fail. (Cornell Chronical, 2020). This program could provide a basis for a larger, regional program. Unless mitigation actions are taken by the state and County, the species will likely continue to increase its presence in Livingston County and the Finger Lakes Region.

Sirex Woodwasp

The USDA Forest Service ranks Livingston County as having a medium to very high introduction potential, establishment potential, and susceptibility potential for Sirex Woodwasp infestations (USDA Forest Service, 2006).

Probability of Future Occurrences

Based on historical documentation and the overall impact of changing climate trends, it is estimated that Livingston County and all its jurisdictions will continue to experience invasive species that may induce secondary hazards and health threats to the county population if these species are not prevented, controlled, or eradicated effectively. The Planning Partnership views this as an “occasional” hazard of concern (hazard event that occurs from once in 10 years to once in 100 years).

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 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. Livingston County is part of Region 1, Western New York and the Great Lakes Plain. Some of the issues in Region 1 affected by climate change include the fact that this region has the highest agricultural revenue in the state; relatively low rainfall, and therefore, increased summer drought risk; irrigation for high-value crops; improved condition for grapes (NYSERDA 2014).

Since the start of the twentieth century, annual temperatures in New York State have been rising. State-average temperatures have increased by approximately 0.6°F since 1970, with winter warming exceeding 1.1°F per decade. In Region 1, 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 will increase between 4 and 10 percent by the 2050s and 6 to 13 percent by the 2080s (baseline of 34.0 inches, middle-range projection).

The amount of rain fall in a 100-year event is projected to increase, while the number of years between such storms (return period) is projected to decrease. Rainstorms will become more severe and more frequent (NYSERDA, 2011).

With the projection of temperature and rainfall increase due to climate change, there is the possibility that wetter soils will allow invasive plant species to thrive. Additionally, as temperatures increase, invasive pests can remain active for longer seasons and in wider areas.

5.4.5.2 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 Livingston County’s vulnerability, in a qualitative nature, to the infestation and invasive species hazard.

Impact on Life, Health, and Safety

The entire population of Livingston County is vulnerable to infestation and invasive species; however, the elderly population and people with suppressed immune systems are more susceptible. According to the 2019 American Community Survey 5-year estimate, there are 10,929 persons over the age of 65 in Livingston County.

As discussed earlier, infestations and invasive species 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 and Lifelines

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 caused by infestation or invasive species 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 the 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 (NYSDEC 2018b). 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, Livingston County’s parks, forests and neighborhood trees are vulnerable to gypsy moth, 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 on Other Hazards

There are no known cascading impacts caused by infestation and invasive species to other hazards of concern for Livingston 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 Livingston 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 2019 American Community Survey 5-year population estimates, the population of the County has decreased by approximately 3-percent since 2010. 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.

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 Livingston 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 2015 HMP

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