

1. Climate Change Impacts to the City of Syracuse Today and Tomorrow

This section describes in general terms the effects that climate change is having and will have on the City of Syracuse and its community, as well as providing some examples of specific impacts that are important factors to consider in a Climate Action Plan.

Key to the development of a Climate Action Plan is understanding why the climate is changing, how a changing climate is felt and what are the future impacts. This understanding cements an informed foundation and provides direction towards where the City and greater community should invest resources to increase resiliency. **Investment today will protect from future costs.**

There are many avenues in which the City and community should prepare for climate change with the objective of becoming more livable, resilient, and climate friendly. Knowledge and understanding of future impacts are also motivators to take responsibility for the carbon emissions that cause global warming and slow the rate at which the climate is changing.

Climate change is global, but the way we experience it is typically local. Climate change's effects are being felt across New York and the Northeast U.S. In Syracuse, it manifests itself in several different ways. Although the impacts of climate change in our region will be largely negative, Syracuse has the advantage of being in northeast United States, with a relatively cool climate that will remain livable through the seasons for the foreseeable future, albeit with some significant alterations.

Winters are already milder and shorter, sometimes with more snow than people remember, but sometimes wetter and heavier snow, and more rain. Summers are hotter, more humid, and longer. Gardeners are noticing shifts in the growing season, and it is harder to sleep at night in the summertime without the air conditioner on. Heavy rain showers seem more frequent and more intense. Summer sports are being scheduled for mornings rather than afternoons to beat the heat.

These changes and the data that represents them are documented in several authoritative sources including the New York Department of Environmental Conservation's Climate Change Effects and Impacts page (<https://dec.ny.gov/environmental-protection/climate-change/effects-impacts>), the New York State Climate Impacts Assessment (<https://nysclimateimpacts.org/>), and the U.S. Global Change Research Program's Fifth National Climate Assessment (<https://repository.library.noaa.gov/view/noaa/61592>).

The general climate impacts outlined draw mostly from the New York State Climate Impacts Assessment Climate Impact Spotlight: *The Central/Finger Lakes Region*.² Rather than averaging climate change across the whole state or larger region, this section of the report looks specifically at the region around Syracuse and makes more predictions based on local meteorology, historical observations, and location-specific climate forecasts in areas of particular concern. The next page visualizes data that describe some of the key potential impacts on day-to-day life in Syracuse.

2. New York State Climate Impacts Assessment Climate Impact Spotlight: The Central/Finger Lakes Region. <https://nysclimateimpacts.org/explore-by-region/the-central-finger-lakes/>

Impacts of Climate Change

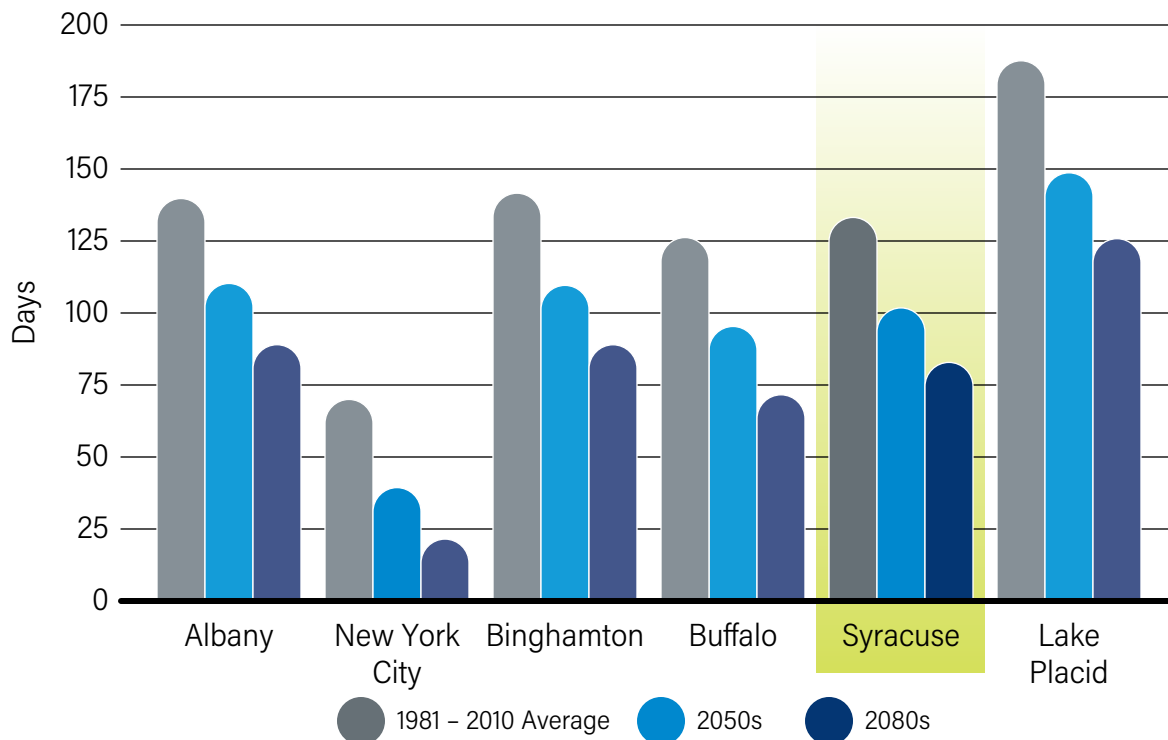
Temperature

The warming climate increases air temperatures globally, but this change is not distributed evenly across our planet or even New York State. **Temperatures are increasing faster at the north and south poles and in colder parts of the U.S., including the upstate region of New York, which unlike downstate areas such as Long Island, does not have proximity to the ocean as a buffer against rapid temperature change.** The differences in the expected temperature changes across the state are illustrated in the graphs below, including the City of Syracuse.

Winter Temperatures

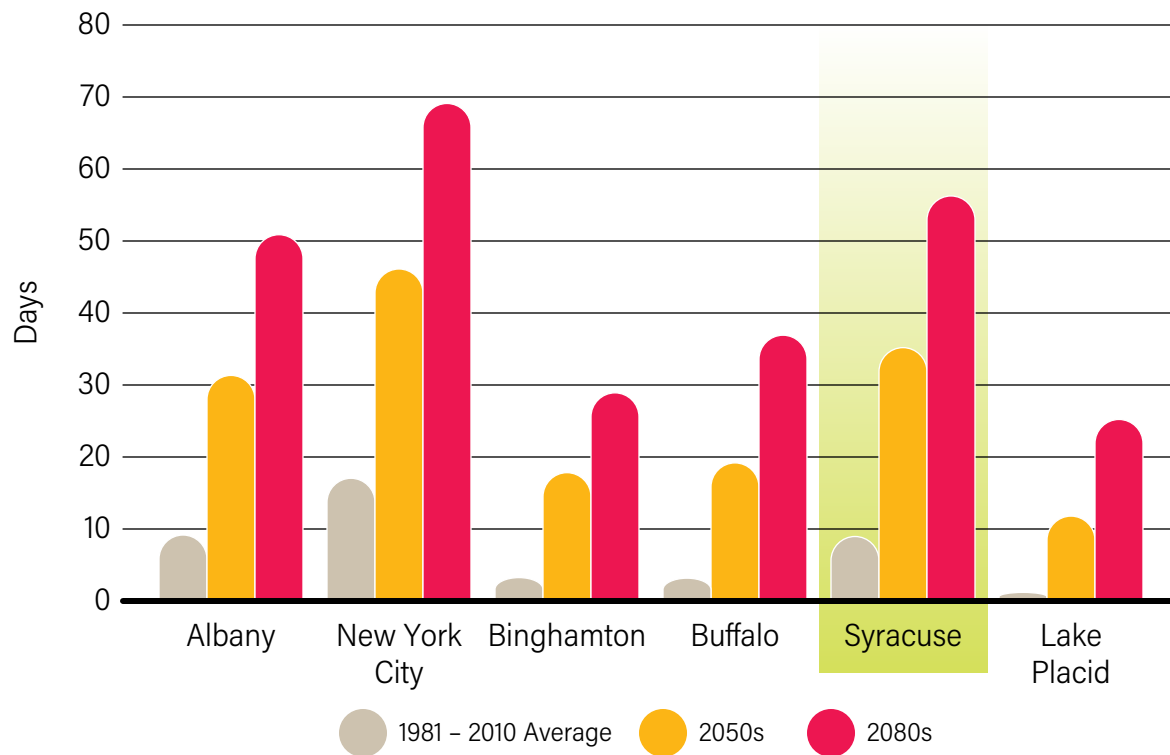
By the middle of this century (2050s), the average annual temperature will have increased by 4.5 to 6.4 degrees Fahrenheit (°F) relative to the 1981-2010 average. Winters will become shorter and warmer: between 1981 and 2010, Syracuse experienced an average of about 134 days below 32°F/0°C each winter. By the 2050s, it is projected to have declined to about 78-110 days, and by the 2080s, Syracuse is projected to have only 56-89 days below freezing. This will reduce the amount of energy needed to heat homes and businesses, but it will also seriously impact ecosystems, winter sports, cultural events, and winter-based tourism. More precipitation will fall as heavy snow, or rain, with impacts on everything from weight-bearing structures such as roofs, to stormwater. Lake effect snowfall may increase for a time, as Lake Erie freezes less and more moisture can evaporate from its surface to form snow, but over time the winter air temperatures will be too warm for that moisture to freeze, and it will fall as rain.

Figure 1-1
Projected Changes to the Number of Days Per Year with Temperatures Below 32°F for Six Locations Across the State



Source: New York State Climate Impacts Assessment: Temperature.
<https://nysclimateimpacts.org/explore-by-region/the-central-finger-lakes/>

Figure 1-2
Projected Changes to the Number of Days with Temperatures Above 90°F at Six Locations Across the State



Source: New York State Climate Impacts Assessment: Temperature.
<https://nysclimateimpacts.org/explore-by-region/the-central-finger-lakes/>

Summer Temperatures

Summers are projected to become longer and hotter, with more frequent, intense, and longer heat waves. Between 1981 and 2010 Syracuse experienced an average of about nine days per year over 90°F; this number is projected to increase to about 24 to 42 days by mid-century and to about 35 to 70 days per year by the 2080s.

At the same time, the heat index will also increase. The heat index is a measure that accounts for the effect of humidity on temperature, making hot days feel hotter. Climate change is putting more moisture into the atmosphere, which drives the heat index higher. Extreme heat is a serious public health concern.³ Together, these trends will increase the risk of heat stroke and other negative health effects associated with extreme, persistent heat. The increased heat will also impact outdoor activities in the summer, ecosystems, water bodies, agriculture, forestry, fishing, and other aspects of the natural environment (Table 1-1).

3. Extreme Heat in NY State. <https://dec.ny.gov/sites/default/files/2024-06/extremeheatsummaryimpactsreport.pdf>.

Effects from Increased Heat

Heat, Public and Environmental Health

The fundamental input of climate change is heat. Syracuse summers have been getting warmer for decades.⁴ Longer and more intense heat waves have health impacts. **Extreme heat is a significant threat to public health.** Of all disasters, extreme heat is already the leading cause of morbidity and mortality in New York. Extreme heat tends to be less noticeable since it typically impacts people with pre-existing conditions such as diabetes, heart and lung illnesses, high blood pressure, as well as the elderly and very young. Extreme heat events can send people to the emergency room with heat stroke, breathing and heart issues, and dehydration.

The heat will drive people indoors during the summer, curtail summer sports and other activities, as well as outdoor work such as construction, and increase the need for air conditioning. **Of particular concern in Syracuse, particularly around the City center and in disadvantaged neighborhoods, is the urban heat island effect where paved surfaces such as roads and parking lots, together with the lack of trees and grass magnify temperatures during the day and make it harder for the City to cool off at night.**

The impacts of climate change on heat and health are extensively described in the 2024 NY DEC report *Extreme Heat in New York State: Summary of Impacts and Vulnerabilities*.⁵ New York State has also developed an Extreme Heat Action Plan to coordinate action to equitably address extreme heat and its impacts. Adaptation planning and implementation support for communities is a key component of the plan.⁶ The State also maintains a list of cooling centers including those in the City of Syracuse.⁷ Syracuse has developed an Urban Forest Master Plan one of the objectives of which is to reduce the urban heat island effect.⁸

Table 1-1
Projected Winter and Summer Temperature Changes
for the Central/Finger Lakes Region

		1981-2010	BY THE 2050S	BY THE 2080S
AVERAGE NUMBER OF DAYS PER YEAR BELOW FREEZING	Winter	134 Days	78 – 110 Days	56 – 89 Days
AVERAGE NUMBER OF DAYS PER YEAR OVER 90°F	Summer	9 Days	24 – 42 Days	35 – 70 Days

Source: New York State Climate Assessment – Central/Finger Lakes Region's Changing Climate.
<https://nysclimateimpacts.org/explore-by-region/the-central-finger-lakes/#section-2>.

4. Climate Central Extremely Hot Days 1970-2023. <https://www.climatecentral.org/graphic/extremely-hot-days-school-sports?graphicSet=Extremely+Hot+Days+1970+to+2023&location=Syracuse&lang=en>.

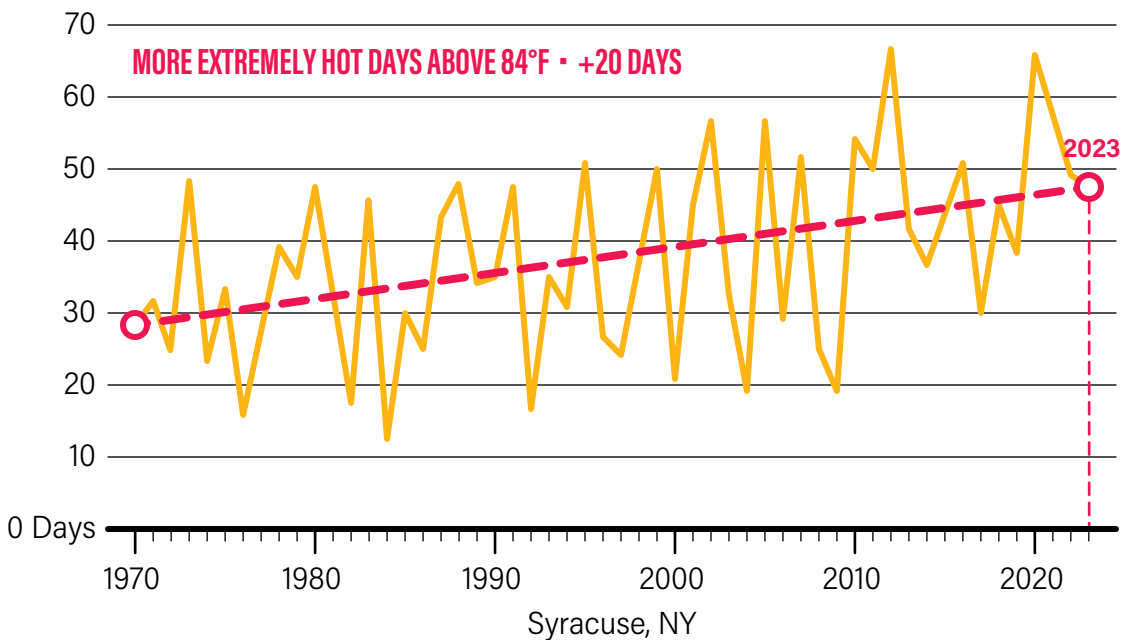
5. Extreme Heat in New York State. <https://dec.ny.gov/sites/default/files/2024-06/extremeheatsummaryimpactsreport.pdf>

6. Extreme Heat Action Plan Executive Summary - NYSDEC. <https://dec.ny.gov/environmental-protection/climate-change/effects-impacts/extreme-heat/extreme-heat-action-plan-executive-summary>.

7. Environmental Public Health Tracker – New York State Department of Health. https://apps.health.ny.gov/statistics/environmental/public_health_tracking/tracker/#/CCList.

8. Urban-forest-master-plan.pdf. <https://www.syr.gov/files/sharedassets/public/v/2/departments/parks-recreation/documents/forestry/urban-forest-master-plan.pdf>.

Figure 1-3
Number of Days Above 84°F in Syracuse, 1970 – 2023



Number of Days with Temperature Above 84°F in Syracuse, 1970 – 2023
 Source: Climate Central Extremely Hot Days 1970-2023.

Architecture and Housing

Central New York's traditional architectural styles were developed for a cold climate with the objective of keeping freezing air out and the heat in. According to the 2023 Syracuse Housing Market Study, 75% of housing in Syracuse was constructed before 1960. **It is imperative that the City and community partners take an active role in connecting residents with resources to install insulation and air conditioning in their homes and businesses.**

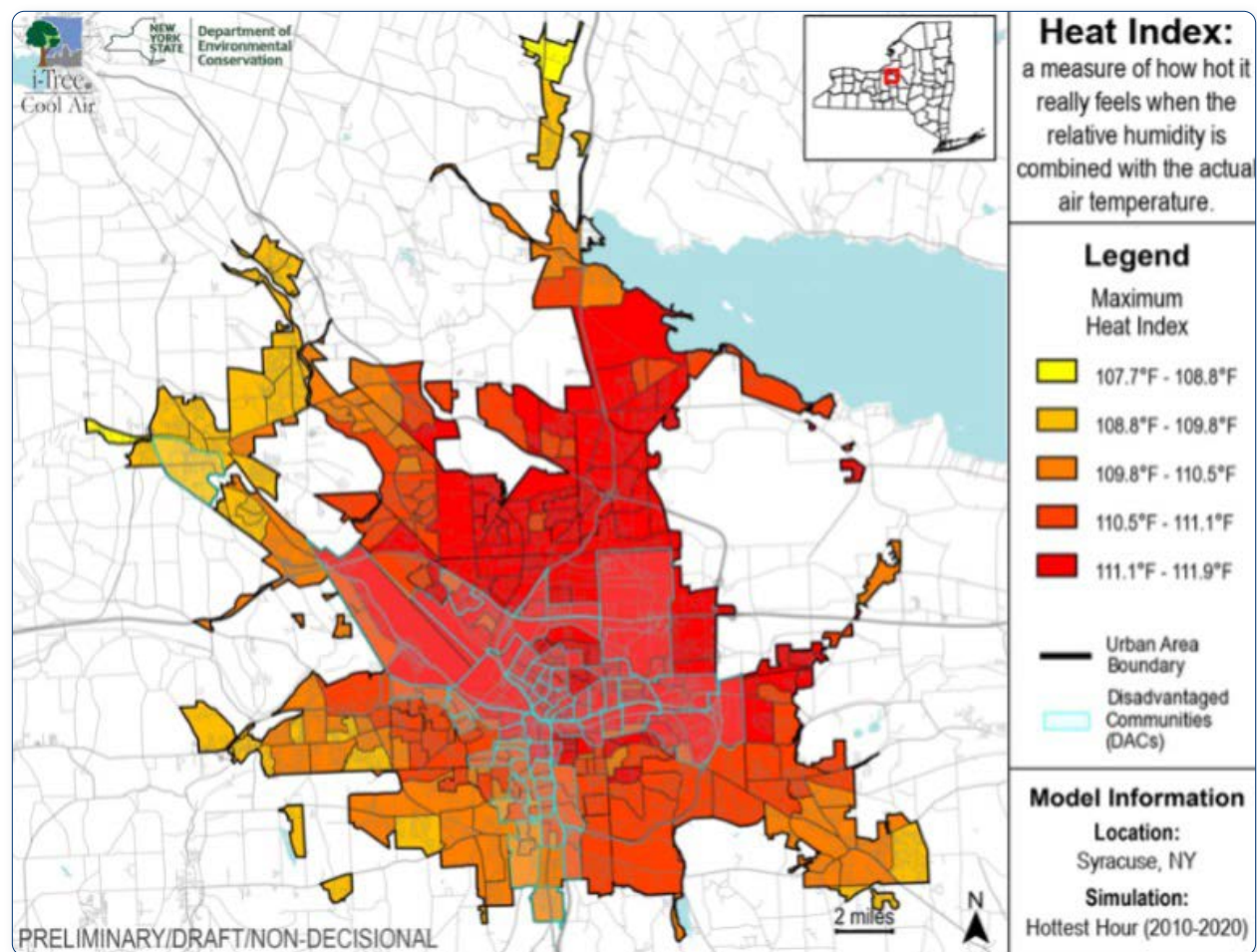
Syracuse is anticipating an influx of population and increased investment in new construction, especially housing: this development must take climate change into account. Most new constructions will have to have air conditioning included and adopt warmer climate architectural styles to accommodate the changes.

These styles and approaches reflect a more indoor-outdoor ethos with emphasis on shade trees, green space, porches, roof decks, patios, balconies, breezeways, fans, and larger windows and doors to promote air flow without having to insulate living spaces and turn the air conditioning on. **Environmentally proactive archi-**



ecture with green landscaping and hard-scaping infrastructure will exponentially return the geographic advantage of the milder temperatures and minimize the neighborhoods' urban heat island effect. The City must direct developers to build sustainably, with respect to the natural environment, and to anticipate the climate of the future.

Figure 1-4
Modeled Heat Index for Syracuse



Air Conditioning/Heat Pumps

Homes and businesses will experience some relief from high winter heating costs. But rising summer temperatures and a longer cooling season will drive people to buy air conditioners and use them more frequently. Today, New York State ranks 37th out of the 50 states in the household use of air conditioning, and in the bottom five in the use of central air.⁹ **New York State and Syracuse in particular have older housing stock that was not built with cooling in mind, and retrofits can be challenging.** Although air conditioning and heat pumps can provide relief from general heat and extreme heat events, they are electricity-in-

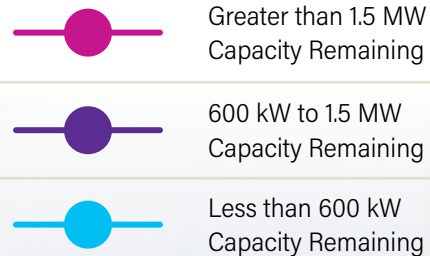
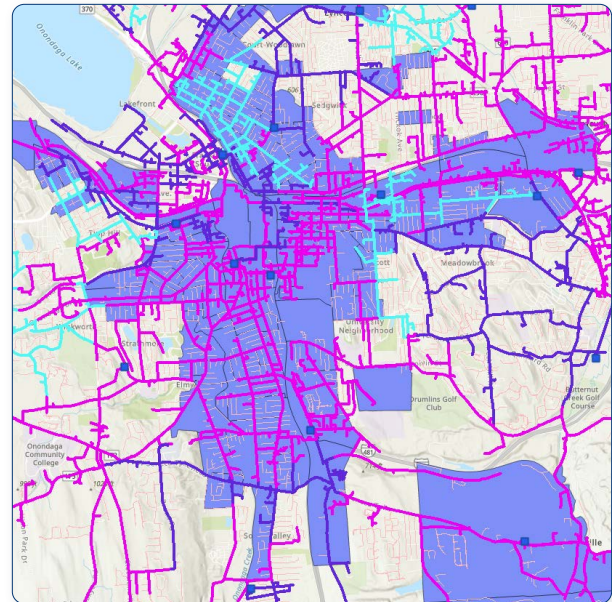
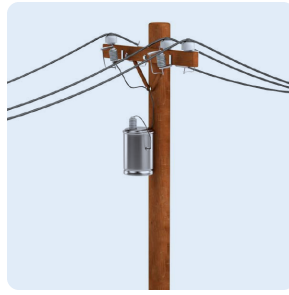
tensive, and electricity is becoming more expensive. **Without a move to energy-efficient cooling equipment, improved insulation, and strategies that are not dependent on technology, utility bills will increase the cost of living and doing business in the region.** At the same time, the increased use of air conditioning will increase the demand on the electric grid, which is in significant need of upgrades just to keep pace with expected growth after decades of stagnant electricity demand.

9. U.S. Energy Information Administration - EIA - Independent Statistics and Analysis. <https://www.eia.gov/consumption/residential/data/2020/index.php?view=state#nc>.

Electricity Grid

After years of stable electricity demand, there is increasing demand for electricity on the New York grid.¹⁰ Although electricity consumption by both the City and the community actually decreased since the 2010 GHG inventory, the arrival of Micron, the expansion of data centers, electric vehicles, heat pumps, and other electricity-intensive consumers points to future growth and higher prices.

As summer temperatures rise with global warming, increased demand could put stress on certain parts of the grid. **The electrical distribution system in Syracuse experiences varying degrees of congestion** (see map of existing capacity for illustrative purposes only)¹¹ with some areas more able to absorb more demand than others (the purple shading shows potential environmental justice areas with high levels of poverty and minority population).



10. NYISO "2025 Power Trends: The New York ISO Annual Grid and Markets Report". <https://www.nyiso.com/documents/20142/2223020/2025-Power-Trends.pdf/51517a1b-36fa-4f3d-d44d-eabe23598514?t=1749138890547>.

11. National Grid System Data Portal, Electrification Capacity, National Grid New York System Data Portal. <https://systemdataportal.nationalgrid.com/NY/>.



Precipitation

Higher atmospheric and water temperatures cause more evaporation, injecting more moisture into the atmosphere. This results in both more rain and snow, depending on the temperature. This effect is already being felt across New York State: between 1901 and 2022, total annual precipitation (rain and snow) increased by about 10% to 20%. This trend is expected to continue through the end of the century with an additional increase of about 6% to 17%. **Although it is fortunate that New York will not be suffering from chronic reductions in rainfall under climate change leading to drought, the increased rainfall causes more runoff, which can lead to flooding and contamination of rivers, streams, and lakes.**

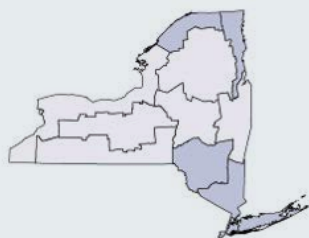
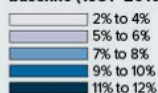
Heavy precipitation events have increased since the 1950s. Although the terrain around Syracuse is not conducive to extreme flooding events as is the case with the Southern Tier or the Adirondacks, certain neighborhoods are prone to “nuisance flooding” (i.e., not catastrophic but certainly extremely disruptive) and certain areas in and near the known FEMA-designated flood plains will experience more flooding in the future. There will also be flooding in areas that have not typically experienced flooding before.

Wear and tear on the sewer and stormwater systems due to repeated extreme events, combined with the simple overloading of these systems is of serious concern to the City and its citizens, who must cope with basement flooding and sewer back-ups; **therefore, identifying actions the community and municipality available to mitigate the impact of floods is a strategic and data driven initiative.**

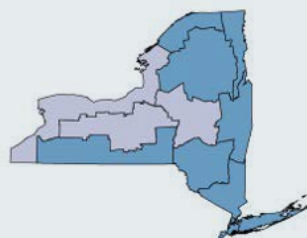


Figure 1-5
Projected Changes to Precipitation
in New York State

Change in precipitation since baseline (1981–2010), percent



2030s

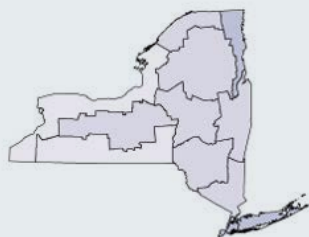
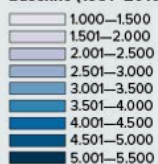


2050s

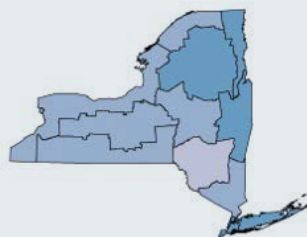


2080s

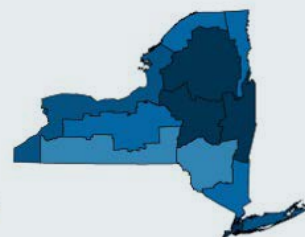
Change in precipitation since baseline (1981–2010), inches



2030s



2050s



2080s

Source: New York State Climate Impacts Assessment: Precipitation.
<https://nysclimateimpacts.org/explore-the-assessment/new-york-states-changing-climate/nysc-precipitation/>.



Seasonal Snow and Rainfall

Winter precipitation is projected to increase between 11% and 31% by the 2080s relative to the 1981 – 2010 average, while spring precipitation is projected to increase 6% to 23% over the same period. More of this precipitation will fall as rain rather than snow due to warmer temperatures, with consequences for winter sports, culture, and tourism. It could also cause winter flooding as rain during spring melts and washes away accumulated snow, discharging substantial amounts of runoff into stormwater systems in a single event. The snow that does fall will typically be wetter and heavier, with implications for roofs and other outdoor load-bearing structures. Projections for summer and fall rainfall have been more difficult to forecast.

Climate Change by the Impact

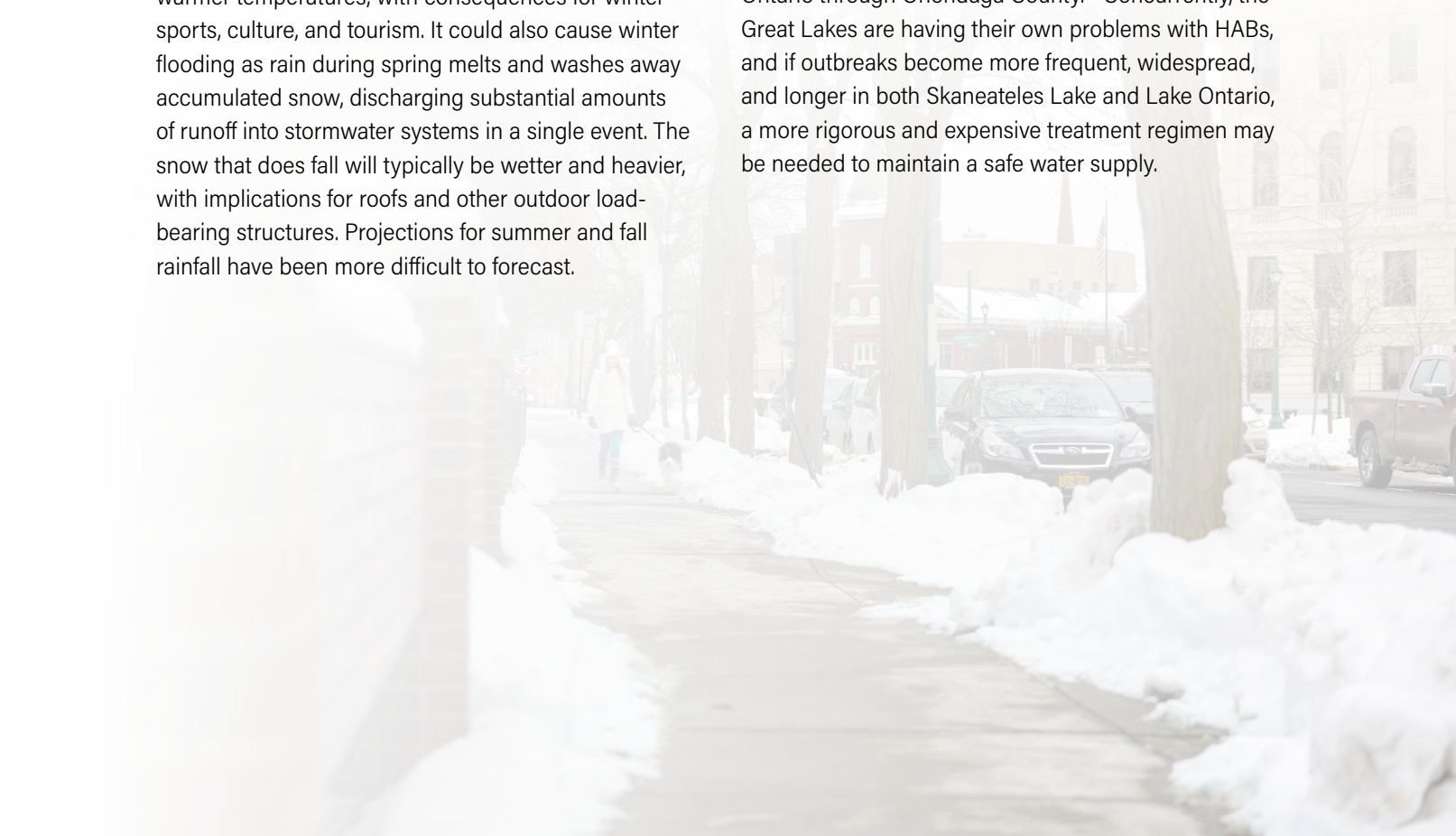
Public Health

Increasing Heat and Water Quality

Syracuse sources its drinking water from **Skaneateles Lake**, located 20 miles southwest of the city.

Water is transported to Syracuse via a gravity-fed system. Skaneateles Lake is one of the cleanest in the world, and one of the few in the country that has been approved as an unfiltered water supply.

Starting in 2017 however, harmful algal blooms (HABs) of toxic cyanobacteria have been observed in the lake at various times in the summer and fall,¹² brought on by higher water temperatures as well as excessive nutrients washed into the lake from the land. Giardia and Cryptosporidium, other disease-causing microorganisms, are also a concern. The drinking water from Skaneateles Lake is monitored and treated with chlorine for disinfection, and then with ultraviolet (UV) light at the Westcott and Woodland Reservoirs. The City also has access to a back-up water supply from Lake Ontario through Onondaga County.¹³ Concurrently, the Great Lakes are having their own problems with HABs, and if outbreaks become more frequent, widespread, and longer in both Skaneateles Lake and Lake Ontario, a more rigorous and expensive treatment regimen may be needed to maintain a safe water supply.



Urban Forests and Public Health

The City of Syracuse owns and manages about 46,401 trees, and thousands more live on private and other public lands. Elevated temperatures are both a potential benefit and hazard to trees. Some tree species will thrive in a warmer climate. Others will experience stress, particularly during extreme heat and droughts. Warmer temperatures, particularly in winter, help the spread of invasive pests that threaten entire species of trees. Historically, Upstate New York's harsh winters killed insects such as the hemlock wooly adelgid (which attacks hemlocks). Those who live in the City long-term will see a noticeable shift in tree species over the coming decades as these changes occur.

Collectively Syracuse's trees provide shade, reduce the urban heat island, protect water resources, bring nature into the City, and otherwise contribute to its livability and beauty. They also sequester carbon from the atmosphere in their wood and roots. They are therefore agents in the fight against climate change and the protection of the City against its negative effects. New York is promoting tree-planting as part of its state-wide Climate Action Plan. As part of the Climate Action Plan, Syracuse can plant more trees, and prioritize the preservation of the existing Urban Forest, to help reduce the negative impacts of both extreme heat and extreme rainfall.



Wild Fire Smoke and Air Quality

As wildfires raged in Canada during the fire season of 2023, 2024, and 2025, smoke has been blown across the northeast United States, including Syracuse. The impact to air quality was sufficient for the State DEC to issue air quality advisories based on the concentrations of fine particles of smoke that lead to both short-term health effects such as eye irritation and shortness of breath and aggravate existing conditions such as asthma and heart disease. **These effects are compounded in urban areas with existing air pollution and intensifying urban heat islands such as Syracuse.** Although not unprecedented, these wildfires have become more frequent and severe, as previously wet northern forests have dried out during extended droughts.

12. HAB Alerts – Skaneateles Lake Association. <https://skaneateleslake.org/bloom-updates/>.

13. Water Frequently Asked Questions – City of Syracuse. <https://www.syr.gov/Departments/Water/Water-FAQs>.

Quality of Life and Public Services

People: Socioeconomics, Demographics, Health, and Housing

It is not news that the City of Syracuse is a challenged socioeconomic environment. The population of Syracuse is uniquely vulnerable in terms of self-reliance and access to social capital. A review of United States Census data from 2023 shows that 48.3% of the population of Syracuse under the age of 18 is below the poverty line, and 22% of the population who is 65 and older are also living in poverty. Rents are low relative to the rest of New York, but the rate of home-ownership (39.3%) is much lower than the state-wide average of 54.1%.

Health and other metrics are also daunting in terms of the numbers of people who may need extra help in their daily lives as well as in climate change preparedness. For example, 16.5% of the population is living with a disability. Only 4.5% have no health insurance, however Syracuse's 31.6% poverty rate drives a high Medicaid enrollment of 31.8%,¹⁴ both indicators of high financial stress.¹⁵ **Lack of housing diversity, quality, and rising regional rents in Syracuse are well-known and well-documented problems tangential to strategies identified in this Climate Action Plan which should be supported in the City's Comprehensive Plan.**

The New York Climate Justice Working Group, as part of the implementation of the Climate Act, developed criteria to map those census tracts that would be disproportionately impacted by climate change. Figure 1-6 shows that a large number of Syracuse communities are particularly vulnerable to its effects. **This broad classification identifies strong need for climate solutions in the Syracuse Community and identifies ample opportunity to capitalize on specific funding to help socioeconomically challenged environments.**

Climate change will fall hardest on those least able to cope with its effects. Those at the lower end of the socio-economic spectrum, the elderly, disabled persons, and the houseless will find living with the effects of climate change more difficult than the average person. Public and private health and social services organizations will experience increased demand as the climate warms. These types of services are highly dependent on federal, state, and local funding and their reach ebbs and flows depending on these funds. Outreach and support efforts to help vulnerable populations access social, health, and other services, e.g., cooling centers during heat emergencies is a necessary role of government when facing a climate crisis.

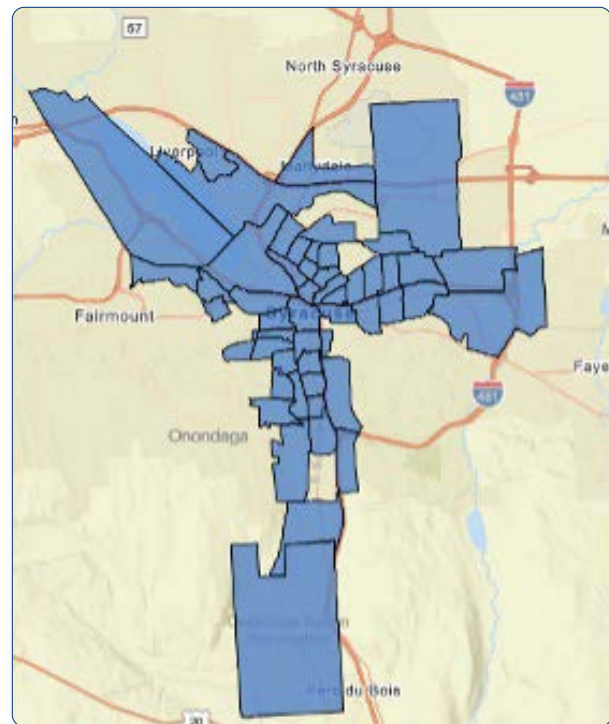


Figure 1-6
Disadvantaged Communities
in the Syracuse Area

14. Medicaid Coverage in New York Counties, 2023—Center For Children and Families. <https://ccf.georgetown.edu/2025/02/06/medicaid-coverage-in-new-york-counties-2023/>.

15. Syracuse city, New York - Census Bureau Profile. https://data.census.gov/profile/Syracuse_city_New_York?g=160X000US3673000.

Impacts to City Budgets

With damaging weather becoming more frequent, the regular wear and tear on City-maintained buildings, streets, sidewalks, storm drains, and other infrastructure will accelerate. Maintaining and repairing the City's assets is a priority but may necessitate difficult choices between maintaining existing infrastructure versus making improvements such as new bike trails, land purchases and restoration, and completing the projects in the Onondaga County Hazard Mitigation Plan (HMP).

In addition, the increased use of air conditioning, combined with the move to electrified heat to reduce emissions and the increasing price of electricity will directly impact the City's fiscal stability. The City's energy bill is over \$2.5 million a year, and is likely to increase 38% over the next 3 years due to these effects. **Projects to increase energy efficiency, cost-effectively implement electrification, and capitalize upon renewable energy opportunities need to be supported to preclude impending pressure on the City budget.**

These types of energy and stormwater projects are specifically intended to mitigate and enhance resilience to climate change, and must be promoted for their multiple benefits that enhance the resilience of the City, reduce costs, and increase quality of life for all.



Looking to the Future

A Call to Action

The success of both the City and the Community to reduce in GHG emissions speaks to the ability of the City and the Community to get things done even under significant constraints.

Many initiatives that are in development or underway now, such as the I-81 project and the expansion of Bus Rapid Transit (BRT), point to a profound shift in momentum towards positive and long-lasting change. Now is the time to accelerate efforts to reduce GHG emissions and increase climate resilience to establish Syracuse as a resilient, innovative, and prosperous City for all, as put forth in the actions described in the Building a Climate-Ready Syracuse chapter.