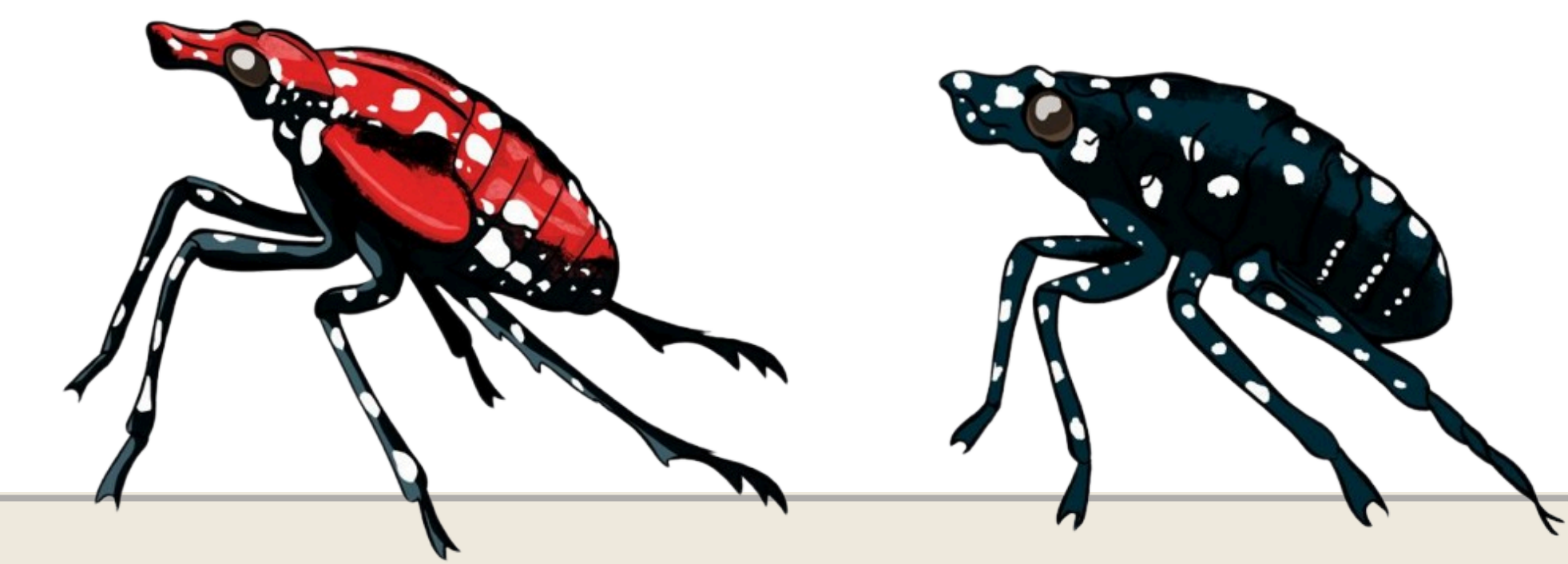


Jheillyn V., Michelle L., Nour S., Chris



# Spotted Lanternflies and Urban Heat



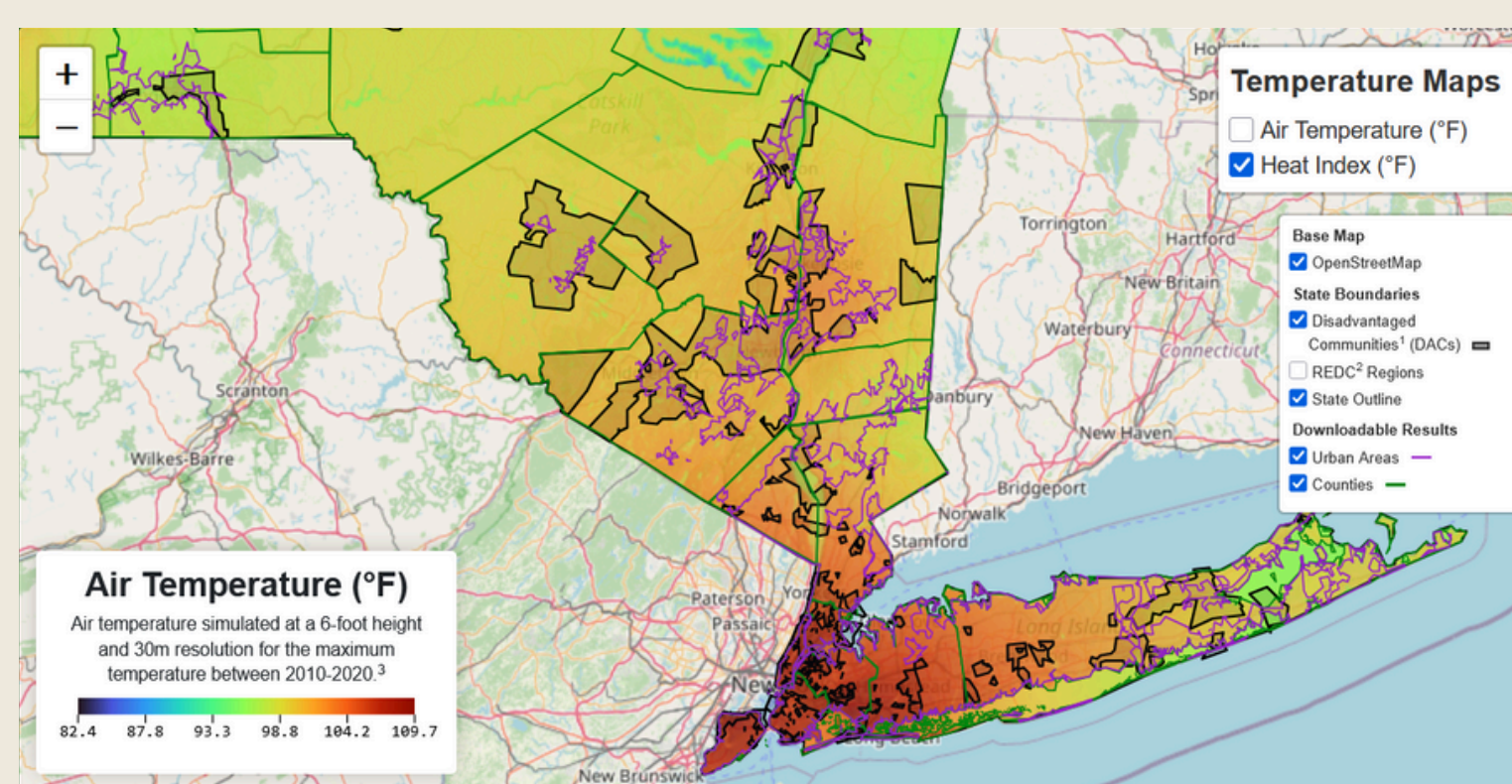
*How does the number and distribution of spotted lanternflies relate to urbanization and the temperature?*

## 01. Introduction and Hypothesis

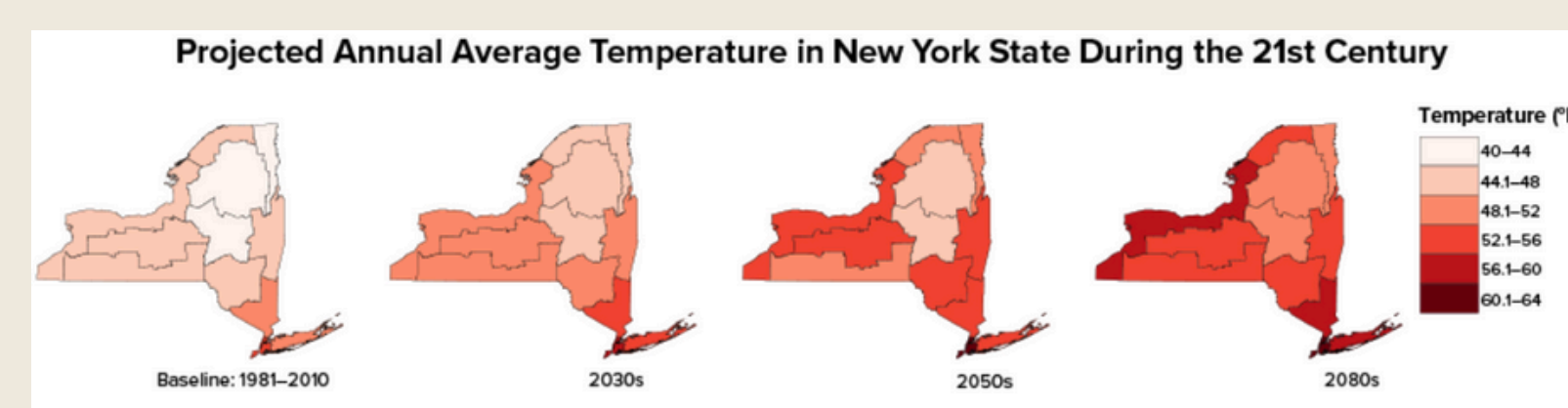
Spotted lanternflies (SLF, *Lycorma delicatula*) are insects from the lanternfly family, native to parts of China and Vietnam, now invasive in Korea, Japan, and the United States. They were first recorded in the U.S. in 2014 in Pennsylvania, mostly likely due to eggs transported with goods. First seen in New York in 2017 and NYC in 2018, their population expanded rapidly by 2020-2021.

Spotted lanternflies harm plants by feeding on their sap, stressing and weakening them, and producing a sticky substance called “honeydew” that promotes mold and blocks sunlight, impairing photosynthesis. This is taxing to the agricultural and forestry industries as well.

We hypothesize that spotted lanternflies will have a higher population in warmer urban areas, due to their preferences for warm weather (seen in life cycle seasonality and comparison in areas where they are highly invasive in Korea and Japan).



Heat Index (temperature + humidity score) for NYC and surrounding counties.



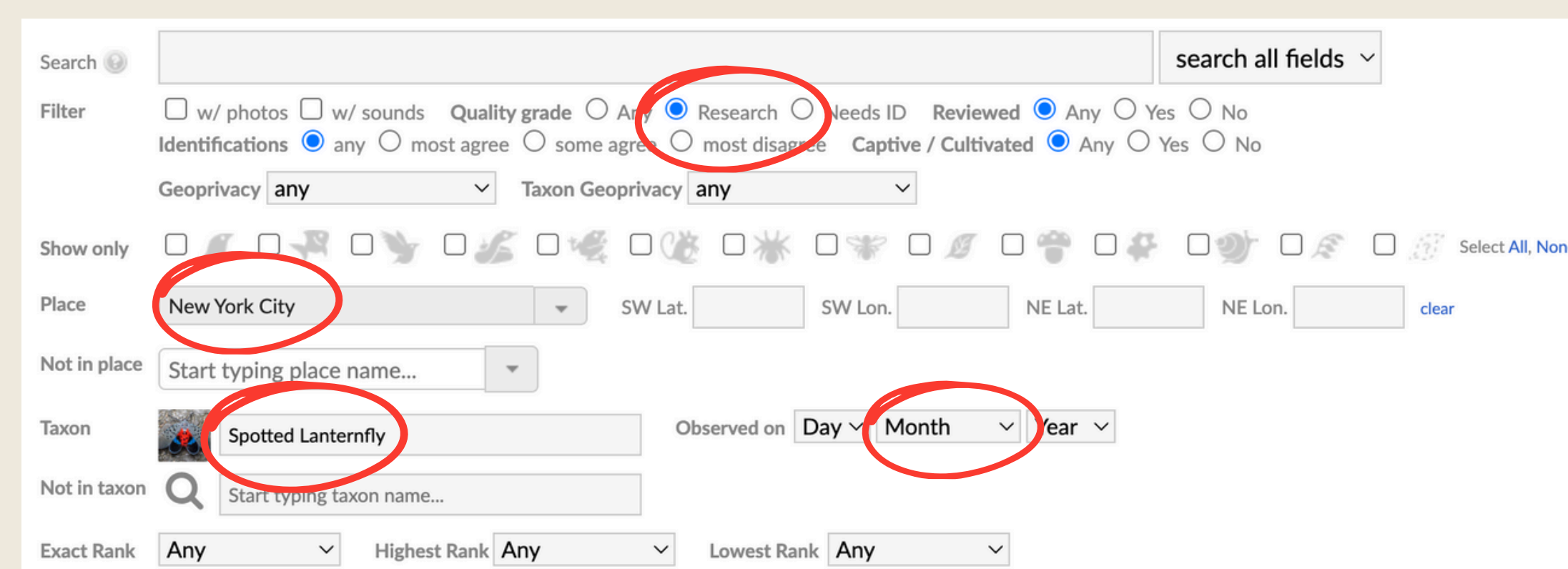
Projected temperatures in NY counties in future years (2030s, 2050s, 2080s).

## 03. Methodology

To obtain data on differences in the SLF population between rural and urban areas of NY, we used the iNaturalist public database, a nonprofit social network for mapping and sharing observations around the world.

In the map of spotted lanternfly observations, we took two same-sized snapshots of data points from the NYC area and the Kingston area. We then filtered those datasets by quality grade, and month.

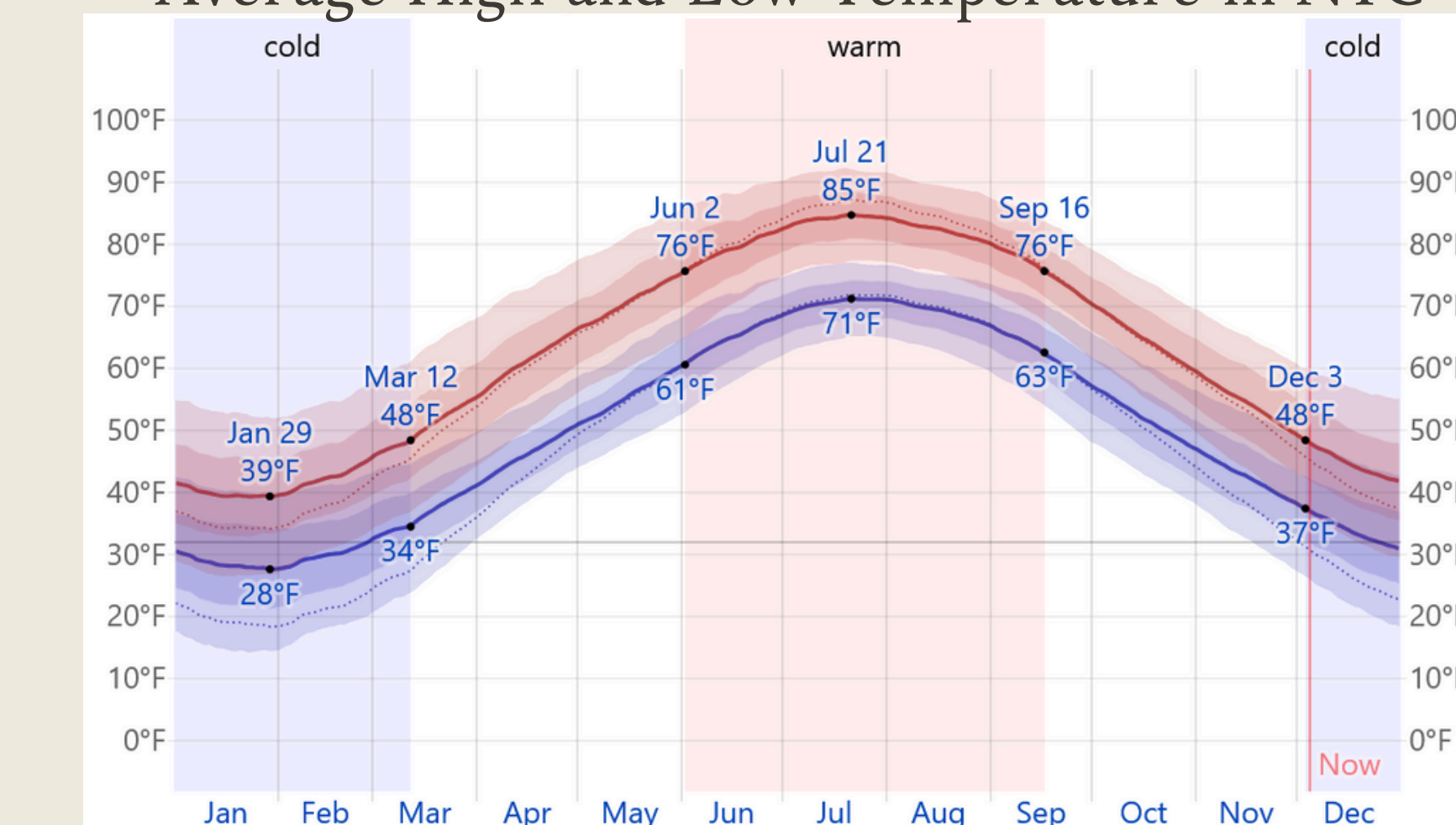
Filtering the quality grade ensures that we see the recorded data from users that use iNaturalist for “research” purposes, instead of “casual”. This way, we can see filter recordings that are inaccurate, and focus on those that match what we’re looking for.



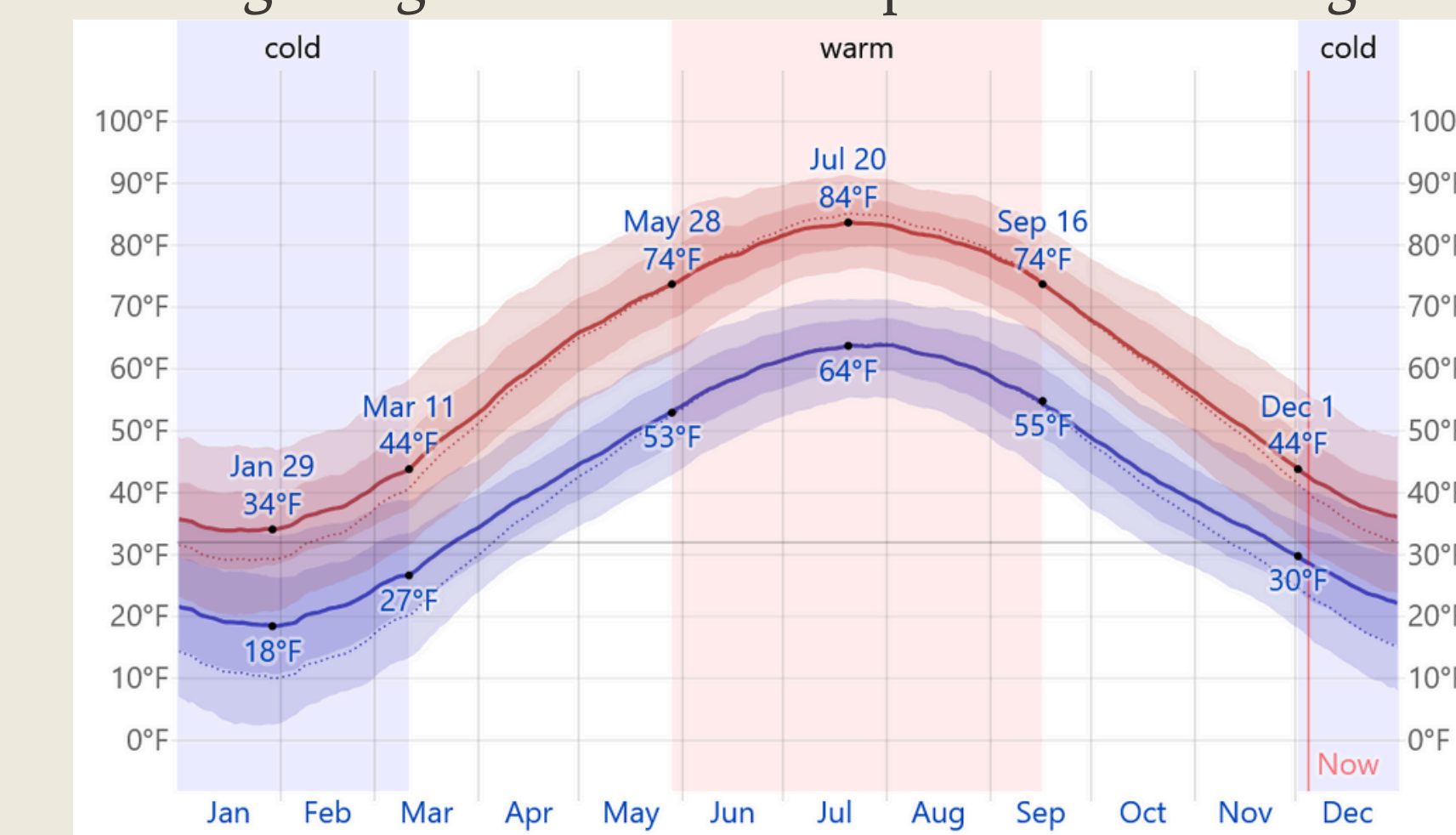
## 04. Results

Note: The accuracy number of observations overall from both the NYC and Kingston may be affected by the population difference, seasonal migration, and iNaturalist’s mechanics (citizen science).

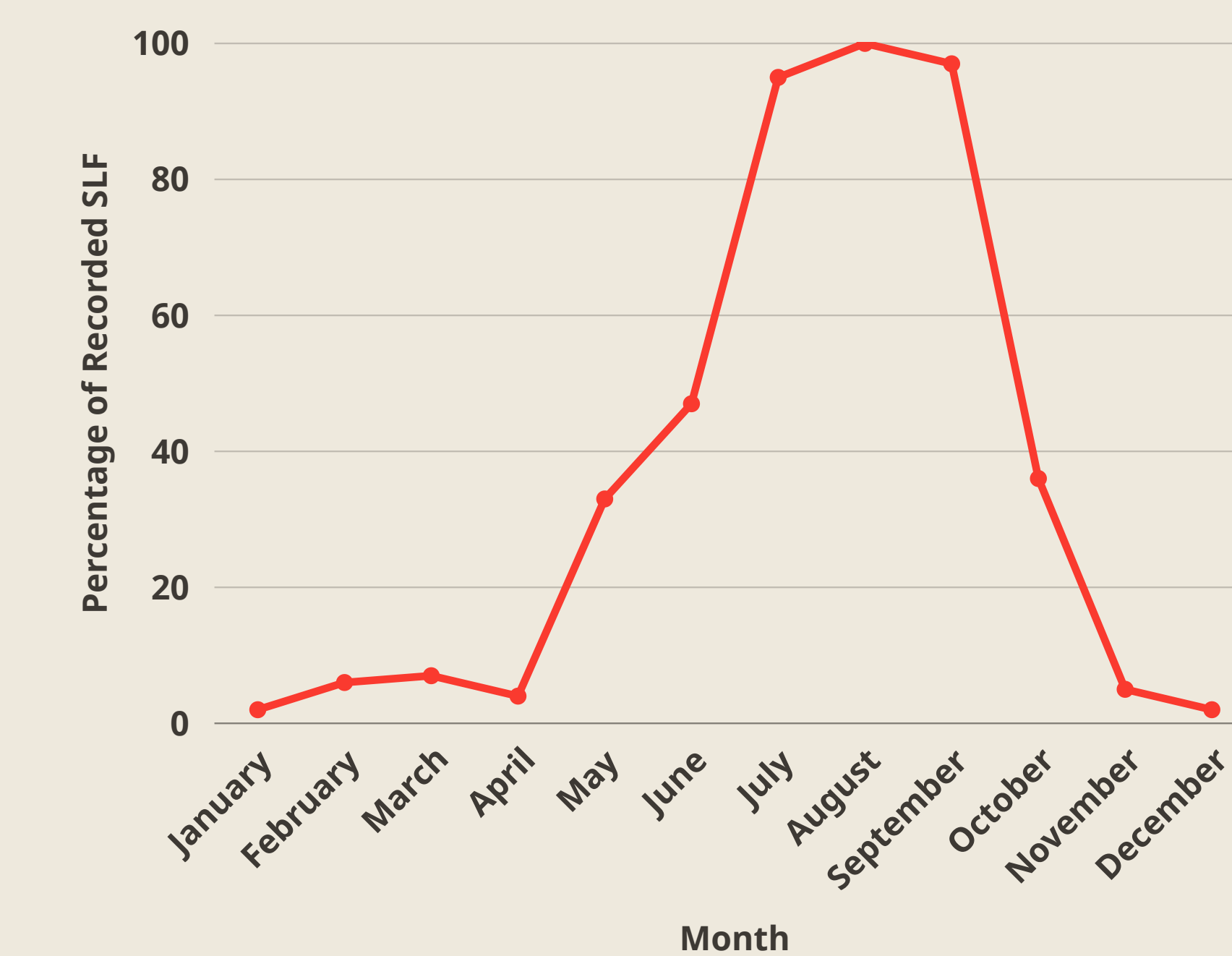
Average High and Low Temperature in NYC



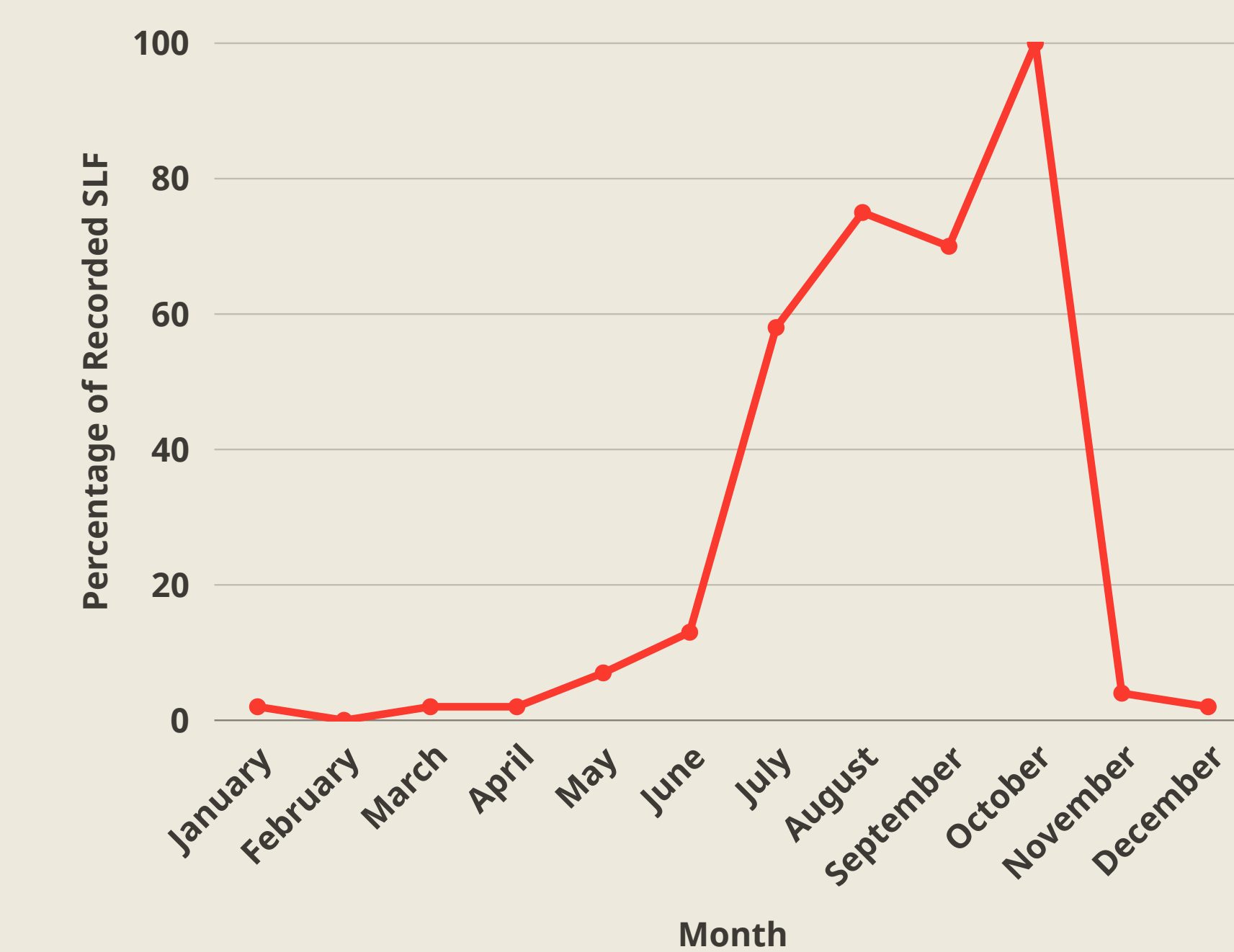
Average High and Low Temperature in Kingston



NYC SLF Relative Observations By Month



Kingston's SLF Relative Observations By Month

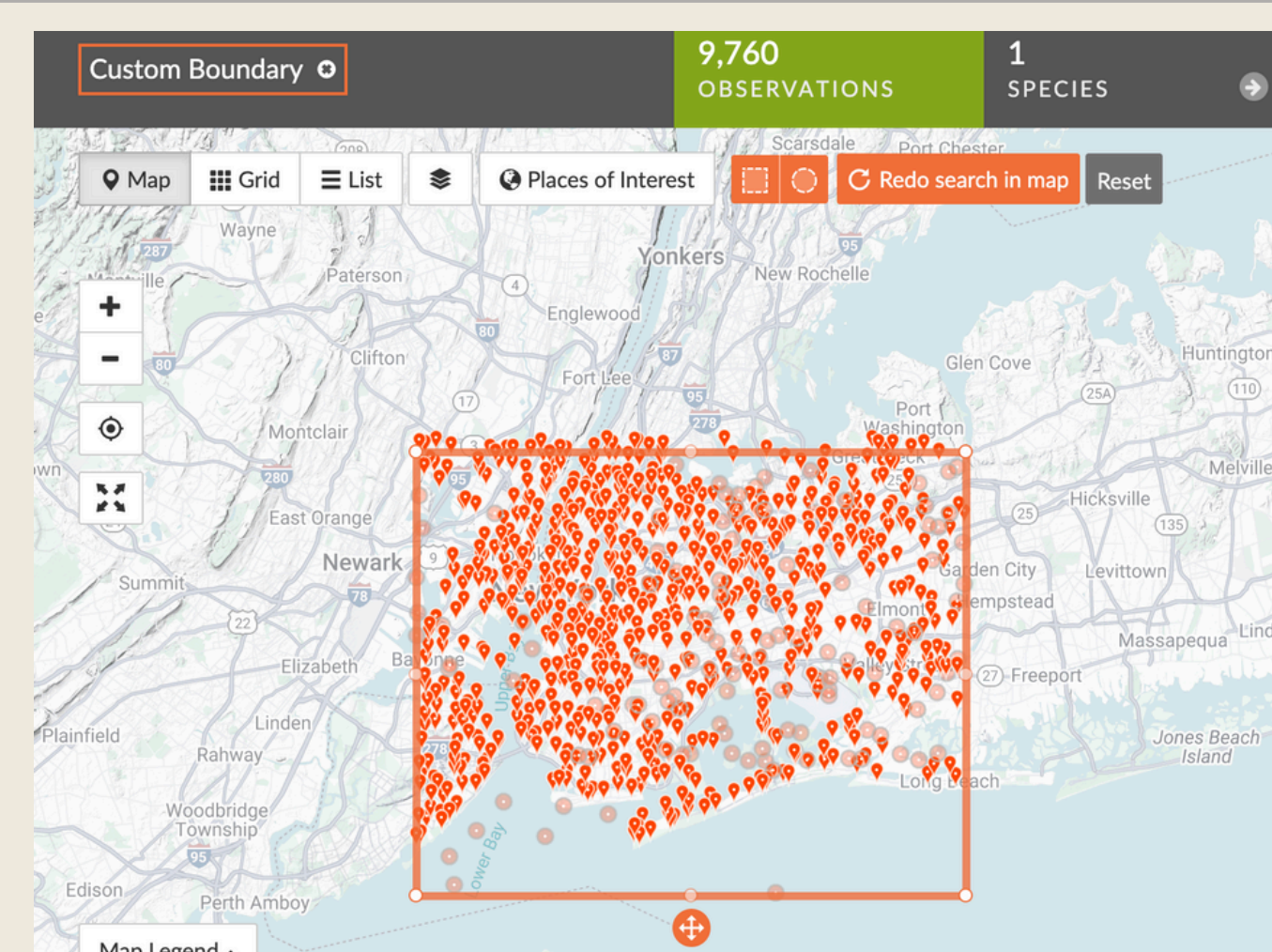


## 02. Objective

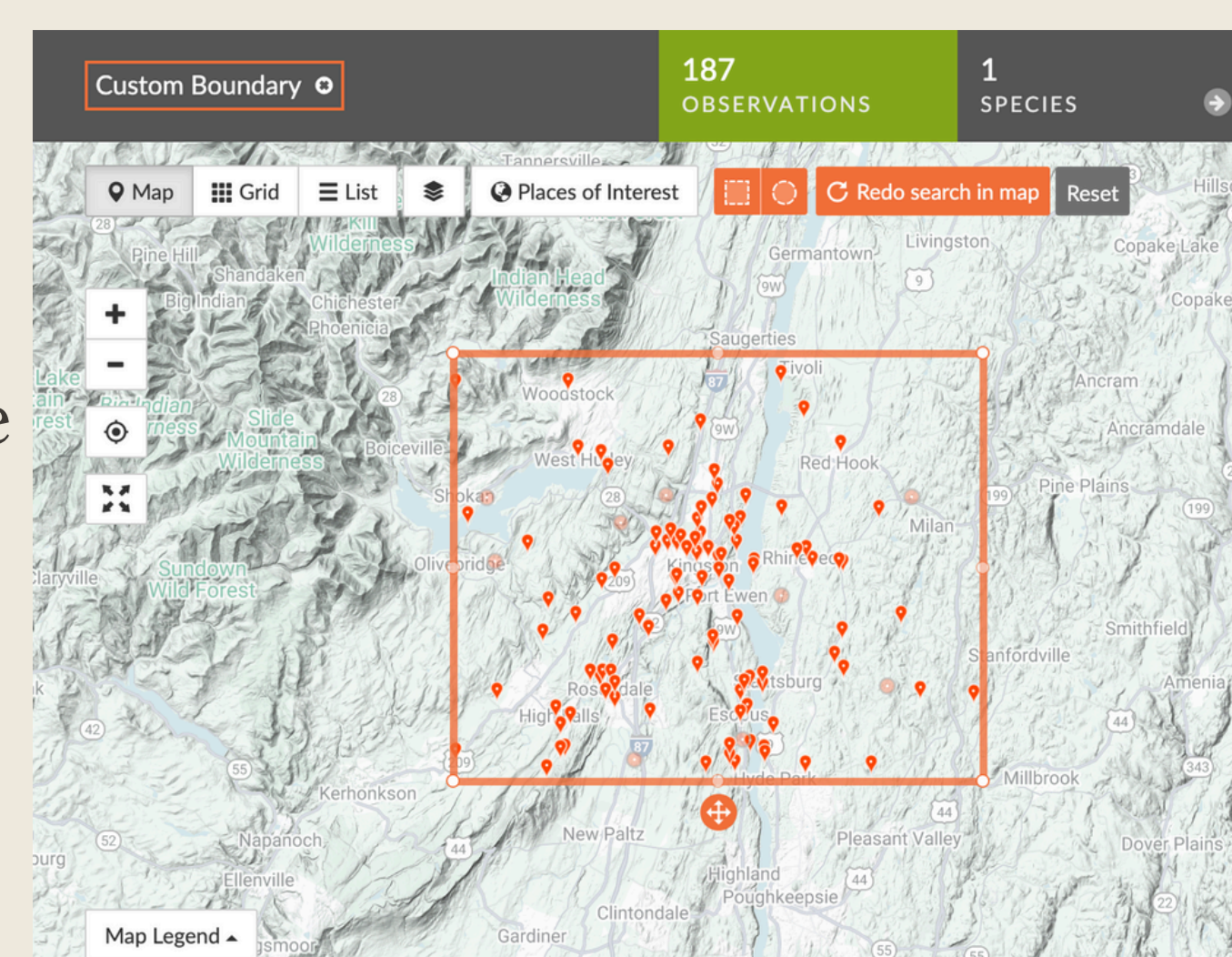
Understanding and controlling SLF populations is crucial because they love the city as it’s the perfect environment for them (e.g. and they cause extensive damage to trees, negatively impacting ecosystems, agriculture, and the economy).

As an invasive species, SLFs lack natural predators in new habitats, so they can proliferate rapidly. Therefore, it is important to take preventative measures to limit their reproduction and spread.

Being aware of their life cycle through different temperatures can help predict future proliferation patterns, such as faster development to adults when warm, and subsequently formulate new solutions (e.g. scraping off their frozen eggs to dispose properly in the colder months, fungal pathogens, testing biocontrol predators).



New York City, NY



Kingston, NY

## 05. Analysis and Conclusions

After looking at both graphs, we can see that the recorded numbers of Spotted Lanternflies are much higher in New York City than in Kingston. When comparing these trends to the urban heat patterns, we can see a correlation between heat index and SLF numbers.

The data that we compiled was **normalized**. Through normalization, we were able to change between the relative proportions of all observations and the total counts. This gives us calibrated data. After normalization into percentages, we can understand the recorded spottings with less bias. It is also essential to keep in mind that NYC’s population is almost 8.5 million as of 2024, and Kingston’s is around 25,000. The difference in population also contributes to the lower numbers we see from Kingston.

**Based on our findings, there seems to be a correlation between warmer, urban areas and the increase in SLF population.**

However, this is an **imperfect conclusion** due to the nature of iNaturalist data. We also noticed that the New York City area’s SLF population (though this could be a facet of the much smaller amount of observations in the Kingston area, with less overall area covered in the squares) were appearing slightly earlier and leaving/dying later in the season. If this could also be observed in other urban vs more rural areas in the United States, we might be able to say that urbanization and the subsequent **heat island effect** (due to high amounts of human activity and heat-trapping from pavement and buildings and lack of vegetation) facilitates the spread of SLFs due to milder weather and being hubs of transport (SLF hitchhiking), as the lengthened active period = more reproduction. It would also be interesting to (in the future) compare the size or other characteristics of lanternflies in rural vs urban areas for possible association with temperature resistance.

## 06. References

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