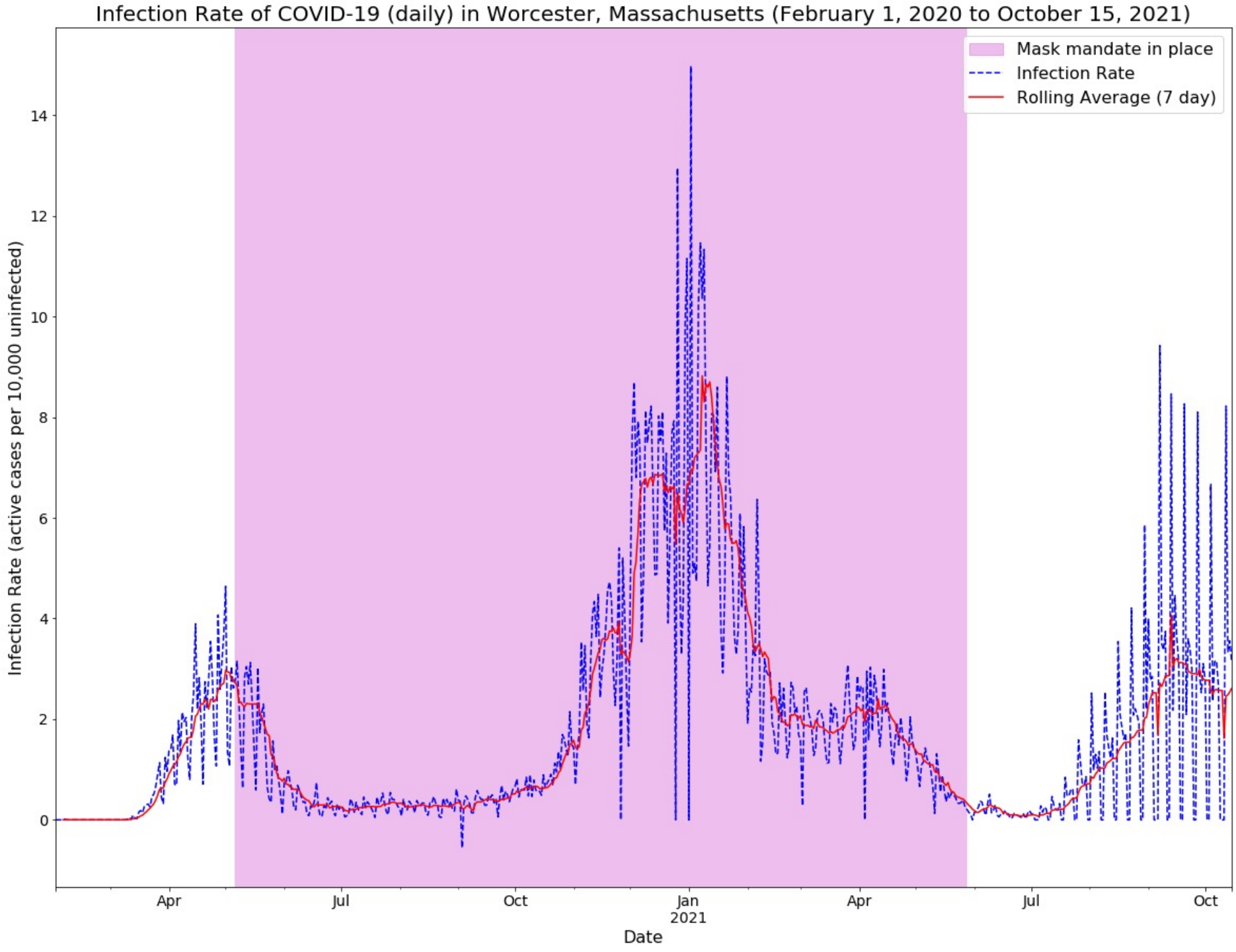

Infection Rate of COVID-19 (daily) in Worcester, Massachusetts (February 1, 2020 to October 15, 2021)
Mask mandate in place
Infection Rate
Rolling Average (7 day)
Infection Rate (active cases per 10,000 uninfected)
0
2
4
6
8
10
12
14
Apr
Jul
Oct
Jan
2021
Apr
Jul
Oct
Date

Investigating **prevailing beliefs** around **weather** and **illness**

Why quantify the role of weather on spread of infectious illness?

Hypothesis: Weather alone cannot explain more than 33% of the variability in spread of covid-19

>

NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Climate Data Online Search

Start searching here to find past weather and climate data. Search within a date range and select specific type of search. All fields are required.

Select Weather Observation Type/Dataset

Daily Summaries

Select Date Range

2020-01-01 to 2021-11-30

Search For

Counties

Enter a Search Term

worcester ma

SEARCH

Available Data Types

- Air Temperature
- Precipitation
- Sky cover & clouds
- Sunshine
- Water
- Weather Type
- Wind

Included Stations

- Station List

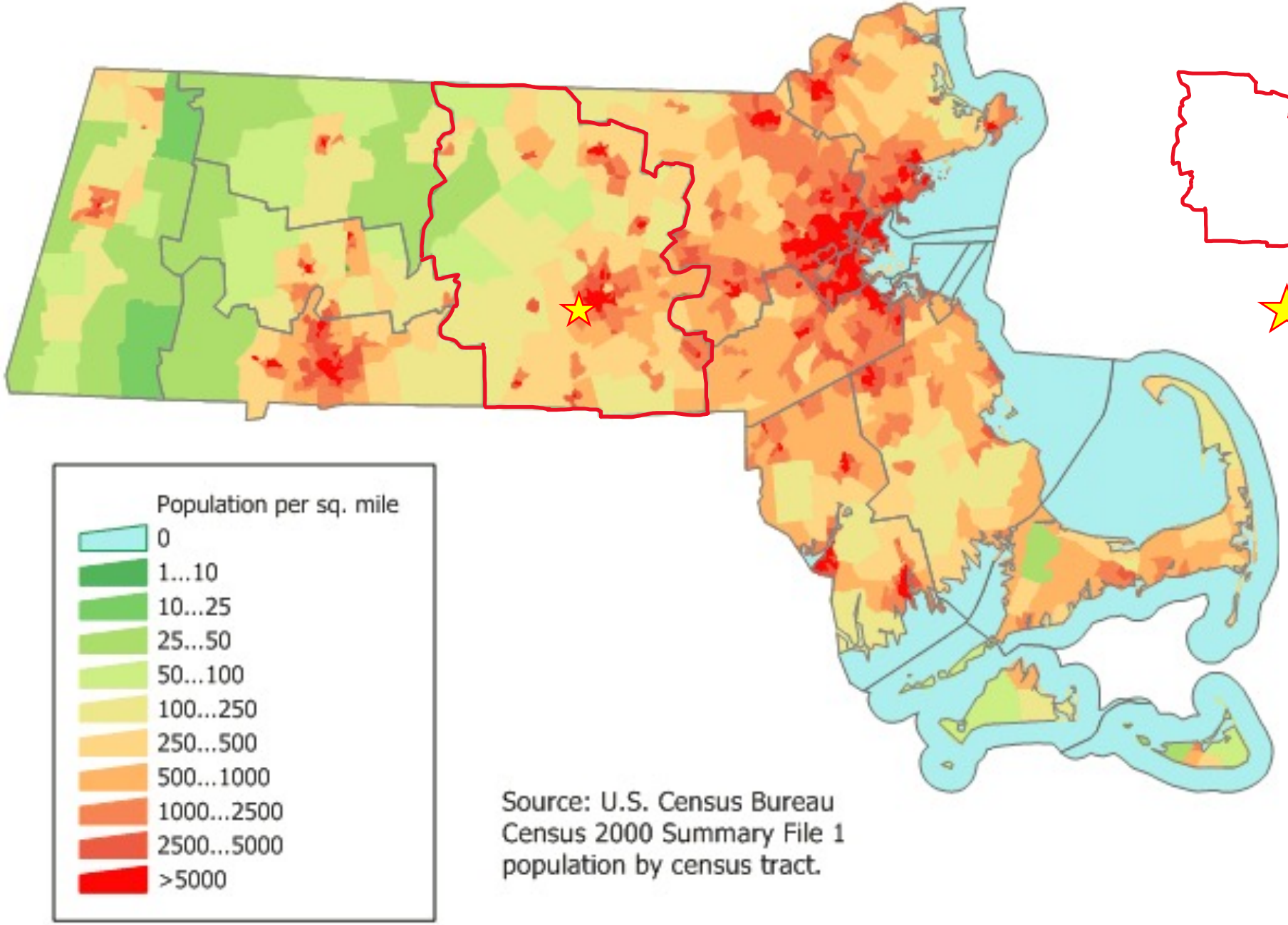
Additional Information

- Documents

STATION NAME & ID	START[1]	END[1]	COVERAGE[2]	
ASHBURNHAM NORTH, MA US GHCND:USC00190192	2003-10-01	2021-12-03	93%	ADD
ASHBURNHAM, MA US GHCND:USC00190190	1906-06-01	2021-12-04	69%	ADD
ATHOL, MA US GHCND:USC00190257	1930-10-01	1960-09-30	98%	ADD
AUBURN 1.9 ESE, MA US GHCND:US1MAWR0032	2015-10-26	2017-10-11	88%	ADD
AUBURN 2.6 SW, MA US GHCND:US1MAWR0041	2016-03-29	2021-12-05	98%	ADD
BARRE 1.4 NNE, MA US GHCND:US1MAWR0054	2016-11-19	2021-12-05	96%	ADD
BARRE FALLS DAM, MA US GHCND:USC00190408	1959-02-01	2021-11-30	96%	ADD
BERLIN 1.3 WSW, MA US GHCND:US1MAWR0028	2014-04-11	2021-12-03	97%	ADD
BERLIN 2.0 S, MA US GHCND:US1MAWR0077	2020-01-06	2021-08-06	41%	ADD
BIRCH HILL DAM, MA US GHCND:USC00190666	1948-06-01	2021-11-30	95%	ADD

1–10 of 100 >

NOAA link for Worcester County, MA: https://www.ncdc.noaa.gov/cdo-web/datasets/GHCND/locations/FIPS:25027/detail



Worcester County, Massachusetts

Weather Station GHCND:USW00094746* outside the city of Worcester, Massachusetts

*Global Historical Climatology Network daily

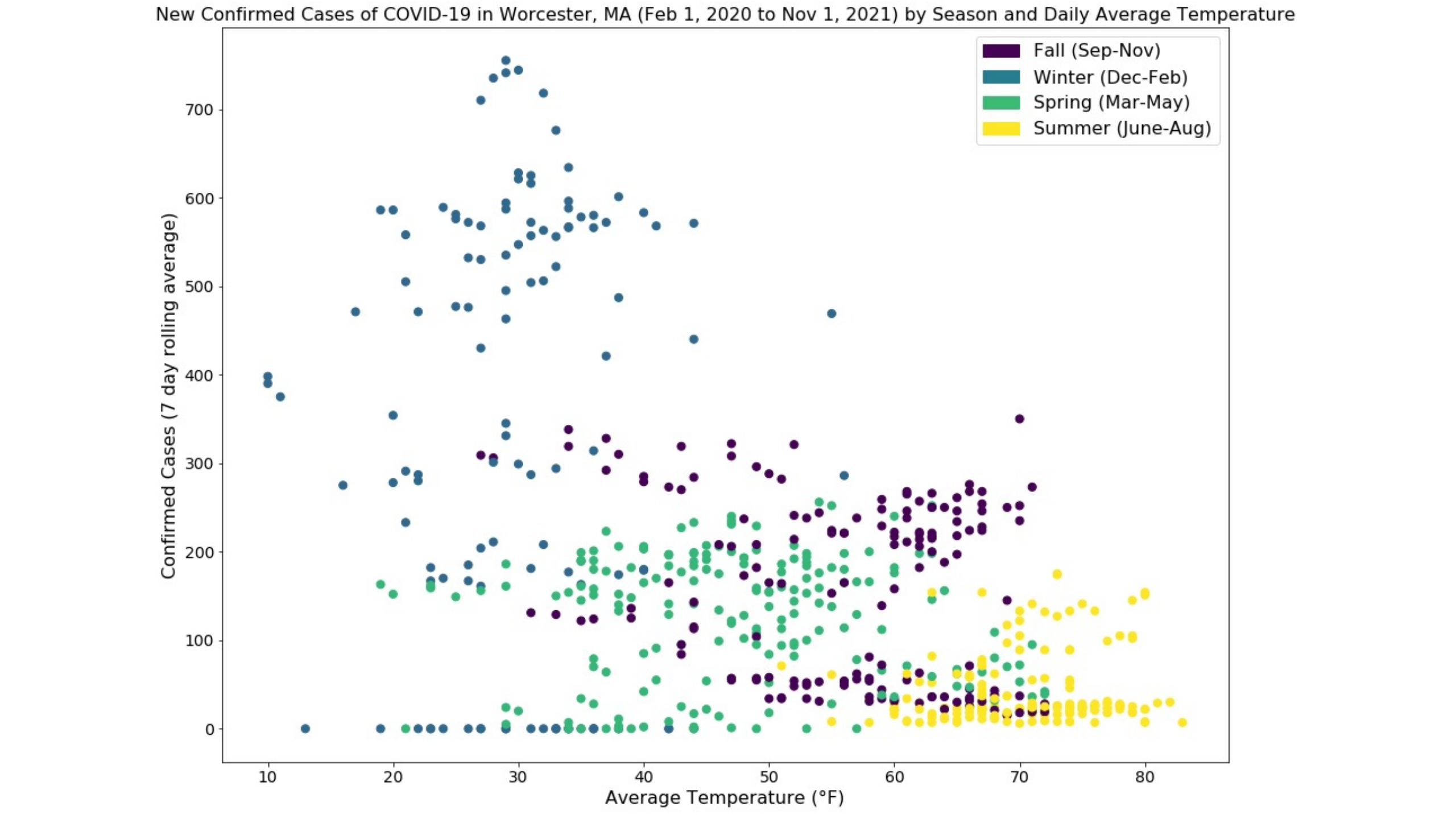
Map credit to https://www.worldofmaps.net/en/north-america/maps-of-massachusetts-usa/map-of-massachusetts-population-density.htm
GHCND documentation: https://www1.ncdc.noaa.gov/pub/data/cdo/documentation/GHCND_documentation.pdf

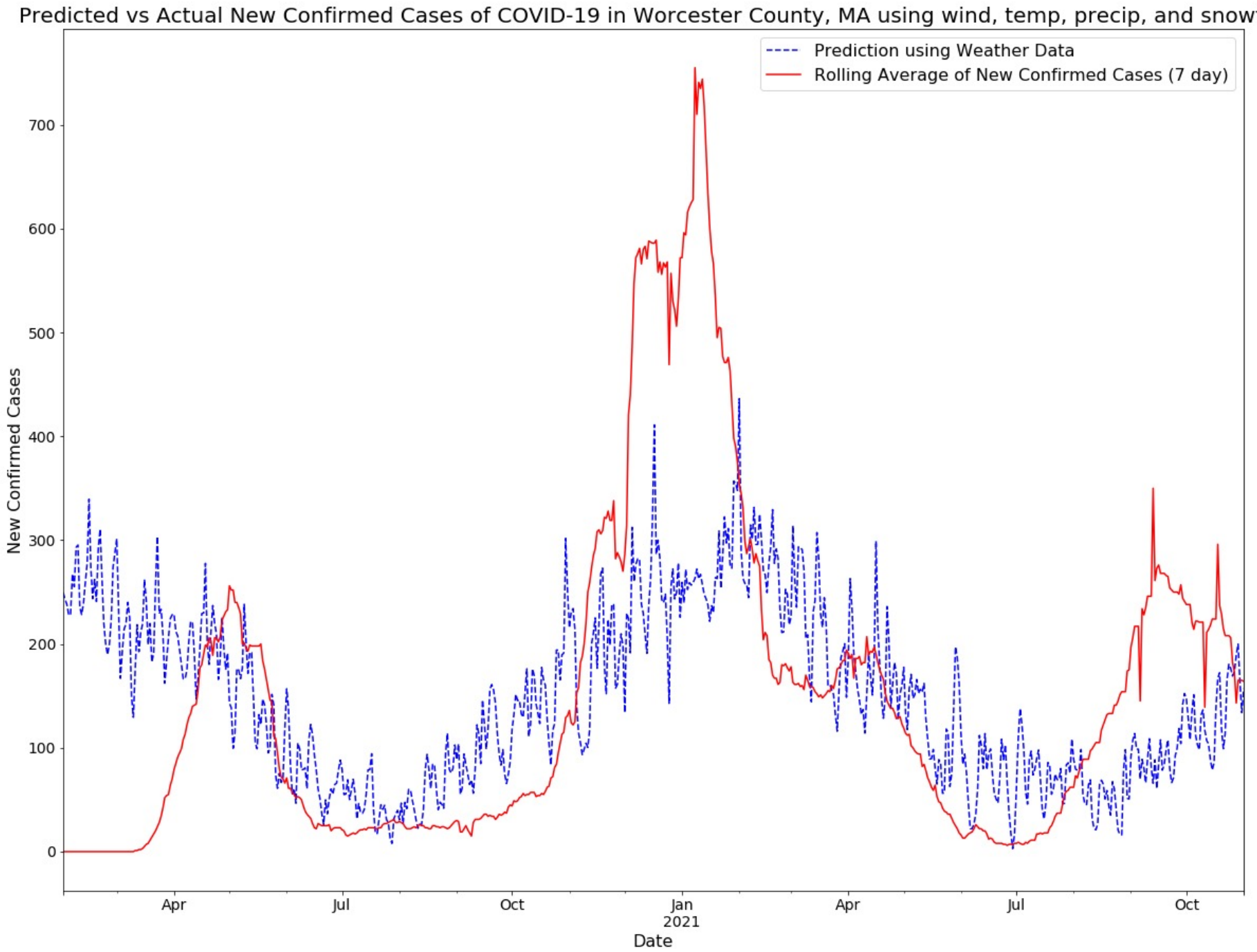
Measurements

- Average daily wind speed, max wind speeds and directions
- Temperature (average, min, and max)
- Precipitation
- Snowfall
- Fog, smoke, haze
- Thunder
- “Rime”, i.e. when ice coats surfaces such as tree branches

Derived Features

- Season
- Average relative humidity
- Average temperature (rolling 7 day)
- Change in average temp week to week
- Average precipitation (rolling 7 day)
- Average snowfall (rolling 7 day)
- Total precip (rolling 7 day)
- Total snowfall (rolling 7 day)
- Change in temperature daily


New Confirmed Cases of COVID-19 in Worcester, MA (Feb 1, 2020 to Nov 1, 2021) by Season and Daily Average Temperature
Fall (Sep-Nov)
Winter (Dec-Feb)
Spring (Mar-May)
Summer (June-Aug)
Confirmed Cases (7 day rolling average)
0
100
200
300
400
500
600
700
10
20
30
40
50
60
70
80
Average Temperature (°F)

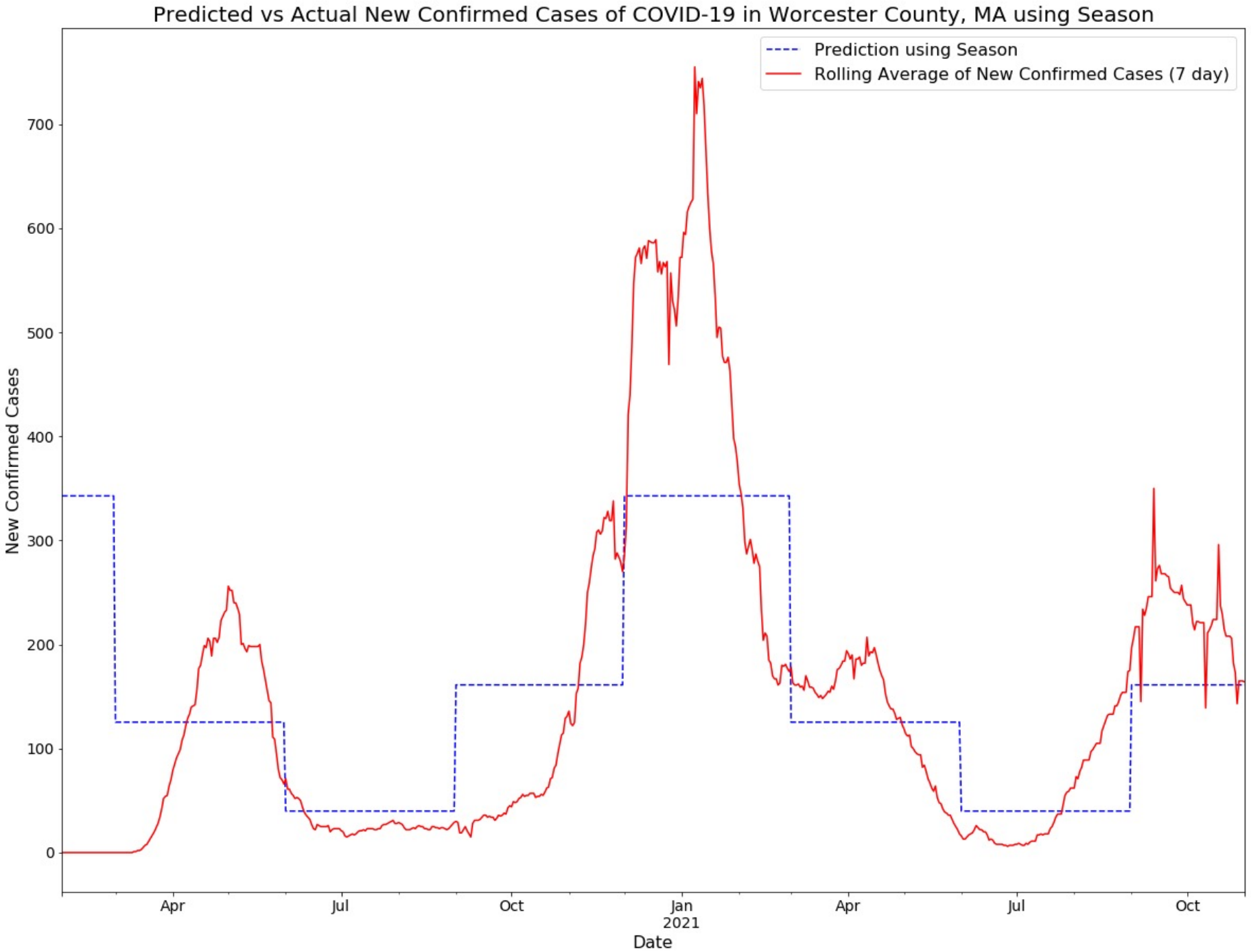


Multivariate Linear Regression using daily weather predictors: average wind speed (mph), precipitation (in), snowfall (in), average temperature (°F)

$R^2 = 0.2668$
Intercept = 399.67 cases

Coefficients =
+0.26 per additional mph of average wind speed
+1.22 per additional inch precipitation
+9.26 per additional inch snowfall
-4.81 per average degree F of average temperature

Only temperature statistically significant

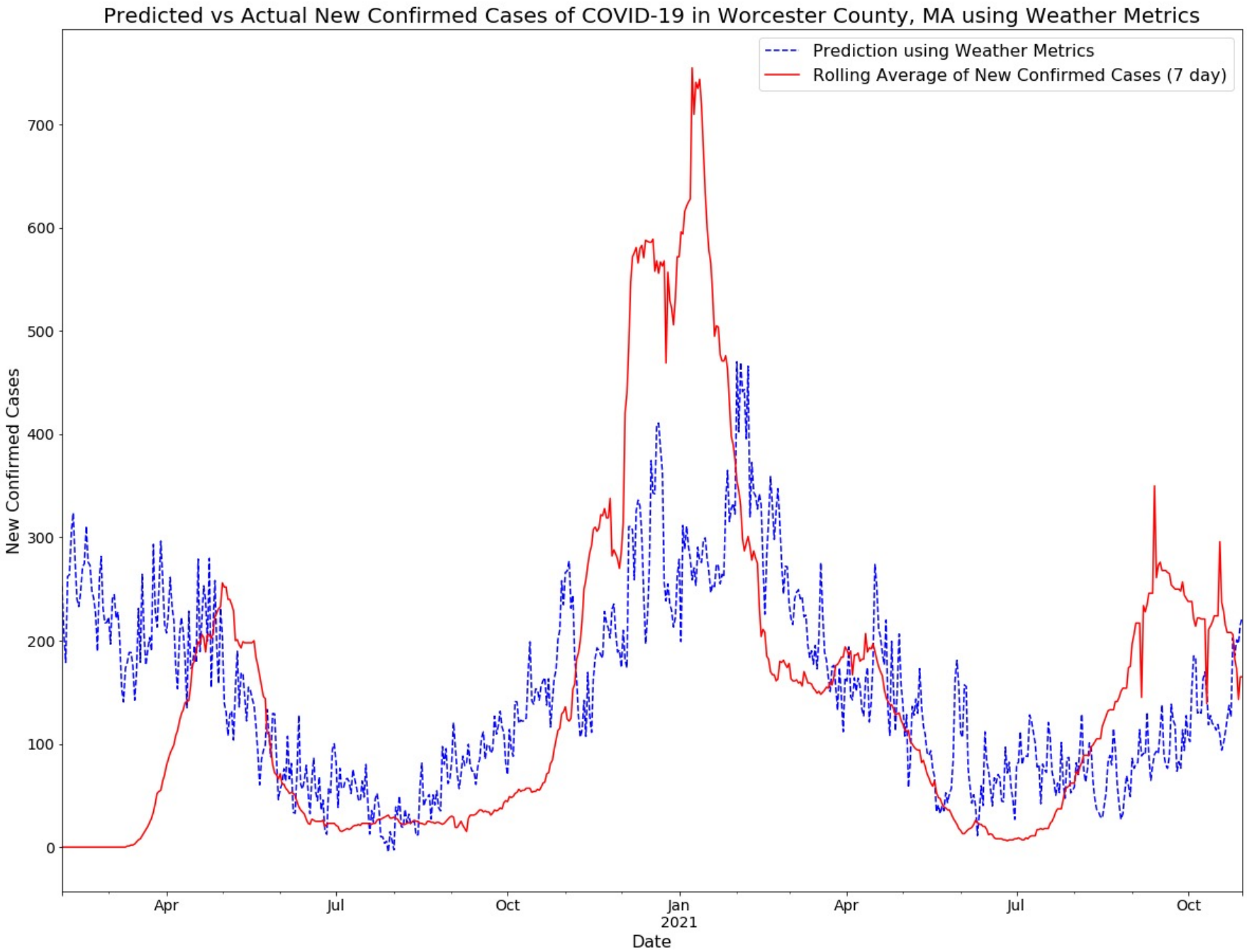


Multivariate Linear Regression using one hot encoding of seasons as predictors: isFall, isWinter, isSpring

$R^2 = 0.407$
Intercept = 39.96 cases (corresponds to summer)

Coefficients =
+121.24 cases in Fall = 161.2 cases
+302.83 in Winter = 342.79 cases
+85.39 in Spring = 125.35 cases

All variables statistically significant with p = 0



Multivariate Linear Regression using derived weather metrics as predictors: Glaze or rime, Avg relative humidity, AvgTempWeek, ChangeInAverageTempWeek, AvgPrecipWeek, AvgSnowWeek, ChangeInTempDay, TotalPrecipWeek, TotalSnowfallWeek

$R^2 = 0.329$

Intercept = 390.87 cases

Coefficients* =

-86.09 cases when 'Glaze or Rime'

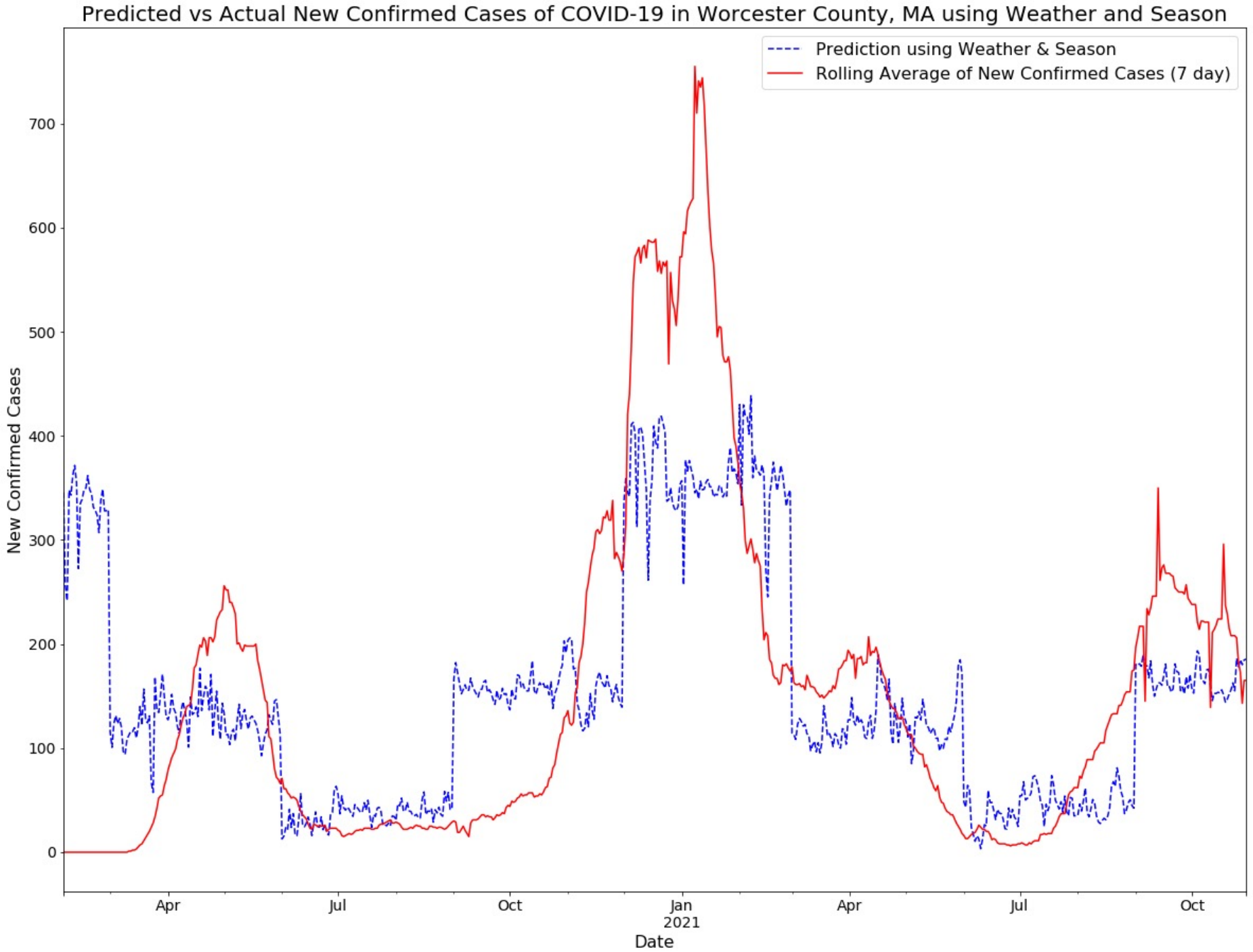
+0.92 cases per additional 1% humidity

-5.00 case per additional degree average weekly temp

+49.46 per additional inch average weekly snow

-2.79 per additional degree of change in temp daily

* Only showing statistically significant variables $p < 0.05$



Multivariate Linear Regression using derived weather metrics and one hot encoding of seasons as predictors.

$R^2 = 0.452$
Intercept = 10.16 cases (corresponds to summer)

Coefficients* =
-104.9523 cases when 'Glaze or Rime'
+28.67 cases per inch of average snowfall in the week
+118.86 cases in Fall
+318.08 cases in Winter
+103.36 in Spring

* Only showing statistically significant variables $p < 0.05$