February-April 2025 Northern Michigan Search Interest Forecast

Author: Dan Shaffer

==

Below are the search interest forecasts for the combined Northern Lower and combined Upper Pensinsula places for February, March, and April 2025. Note that the possible range for historical search interest is normalized to a maximum of 100 and a minimum of 0, but forecasts outside this range are permissible as these values are forecasted to be outside the historical range.

Actuals during 2024 were under forecasts, especially for the Upper Peninsula and this trend has continued into January 2025. Upper Peninsula search interest for January 2025 was similar to 2024; however, weather conditions were also much snowier and more favorable to winter recreation. Without this favorable weather pattern, search interest would likely have been even lower.

In response to these trends I have performed adjustments essentially using the last 12 months trend instead of the average trend over the entire time period. For both peninsulas, December's forecast is in grey and the current January forecast is in red. Due to the change in methodology, these forecasts differ considerably.

Also provided are barcharts comparing the average search interest for the forecast months (February, March, April) to the same months in previous years. The forecast is similar to the last year for the Upper Peninsula and lower than last year for the Lower Peninsula. This is reasonable given the downward trend for both pensinsulas compensated in the Upper Peninsula by higher sensitivity to the favorable weather this year compared to the snow drought last year.
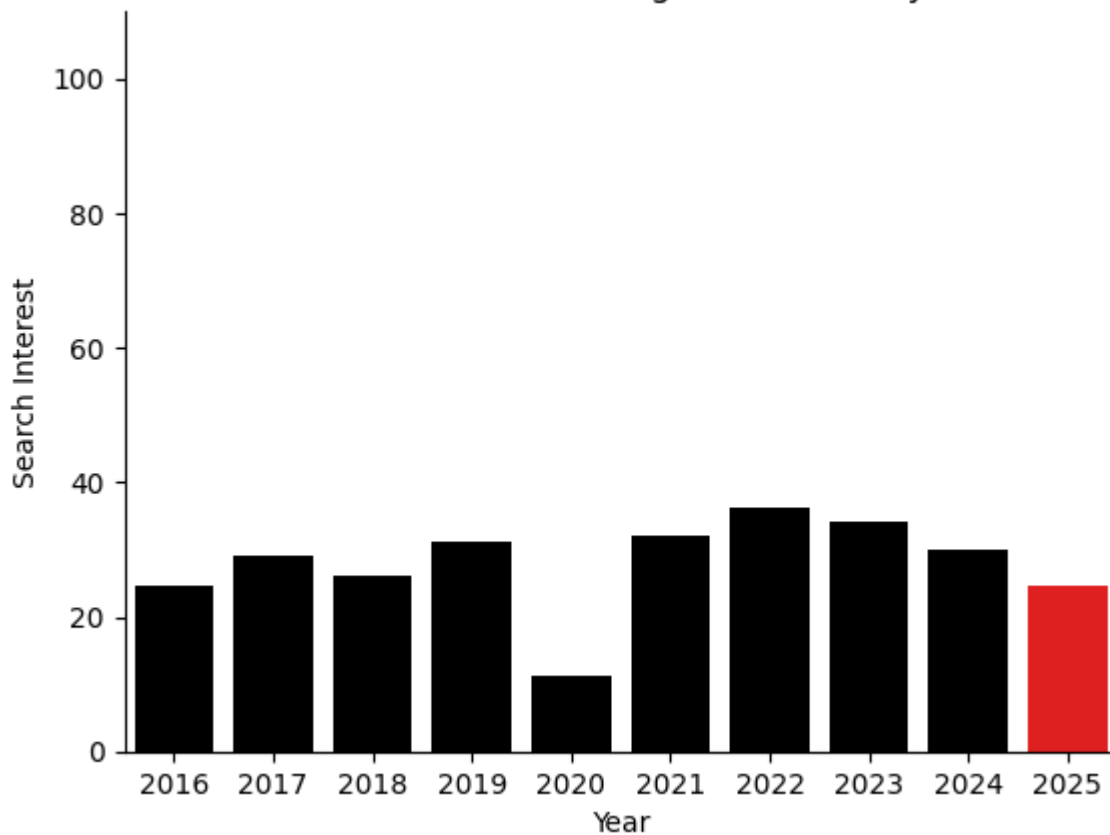
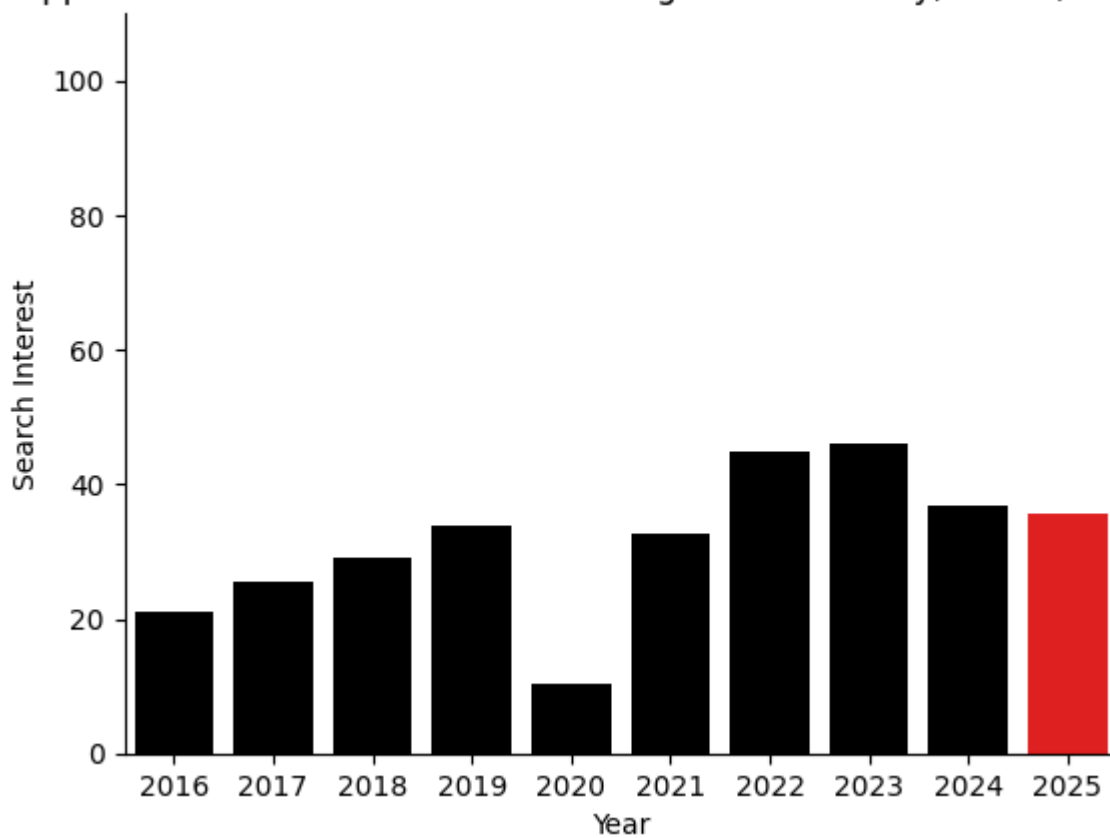Northern Lower Places Google Search Interest Forecast
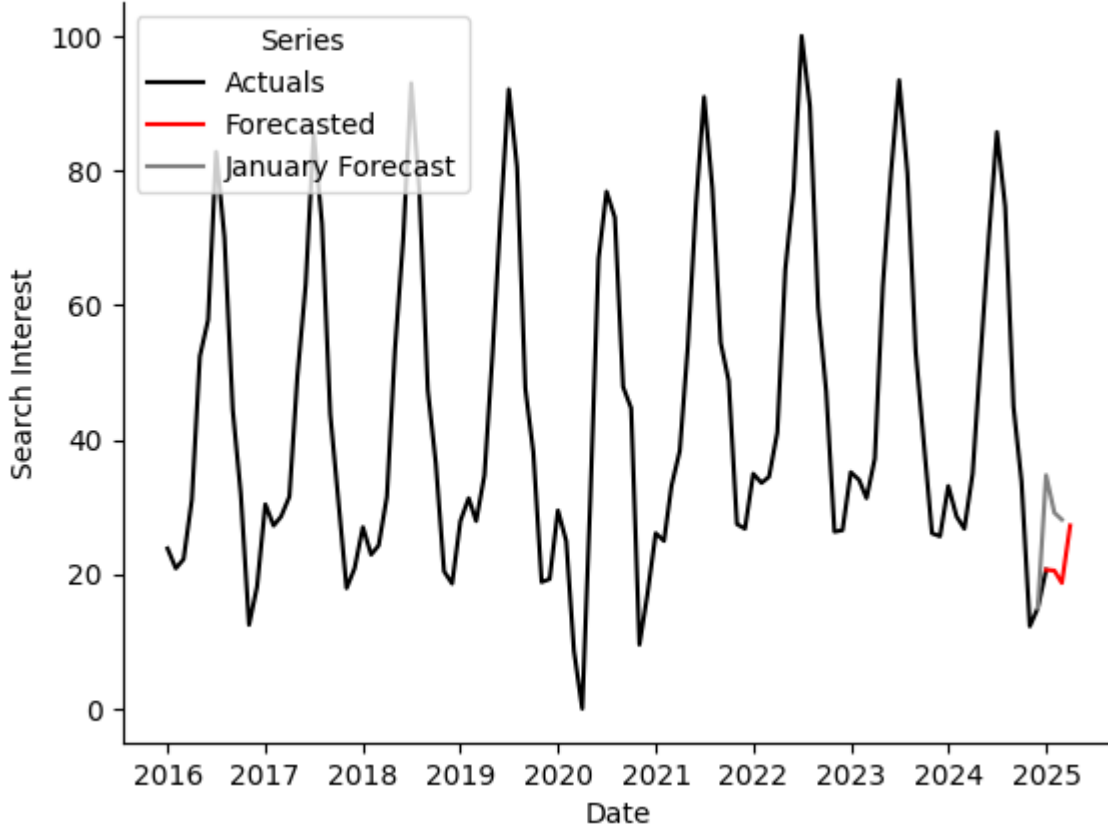
Upper Pensinsula Places Google Search Interest Forecast
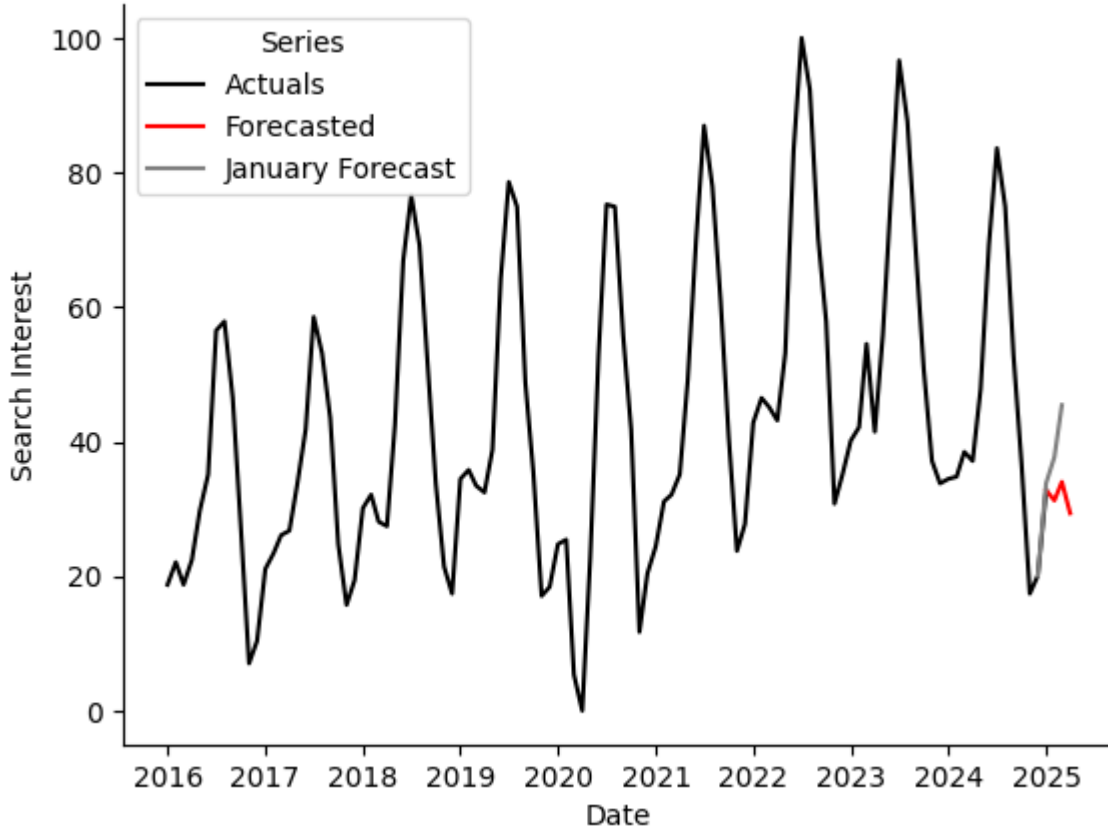
Northern Lower Search Interest Averaged for February, March, and April

Upper Peninsula Search Interest Averaged for February, March, and April

The following table shows the top five places that are forecasted to have the highest search interest compared to the same time period in 2024. We are forecasted to have much more wintery weather this year than last year and generally winter sports have a bigger impact on search interest for Upper Peninsula places. Wolverine is a legitimate town near I-75, but some of the increased interest in the word Wolverine may be due to college sports.

	Place	Peninsula	Difference
0	Rapid River	Upper	15.6
1	Wolverine	Lower	14.3
2	Greenland	Upper	12.6
3	Alpha	Upper	6.5
4	Empire	Lower	6.2

Three things impact the value of the search interest forecasts for each place.

1. The previous year's monthly value for each individual place.
2. While not directly impacting the model forecast, seasonal (12 mo) differencing accounts for the fact that search interest is higher in some portions of the year than others (so previous year actual is impacted).
3. Model difference: based on forecasted weather and gas price changes, the model will predict 12 mo changes from the previous year for each individual place. These levels are adjusted for the previous 12 month trend. Then these new levels are aggregated via regression to the peninsula level series.

The two KDE plots below plot the distributions of the individual place actual values for the months of February, March, April for the previous three years. Note that the values for 2024 serve as the last actual values for 2025. For both peninsulas, the last actuals for 2024 are lower than 2023 and 2022. I believe this shows the impact of a warm winter, little snow, and lack of opportunities for winter sports during 2024.

Lower Peninsula Place Level Search Interest Averaged for February, March, and April
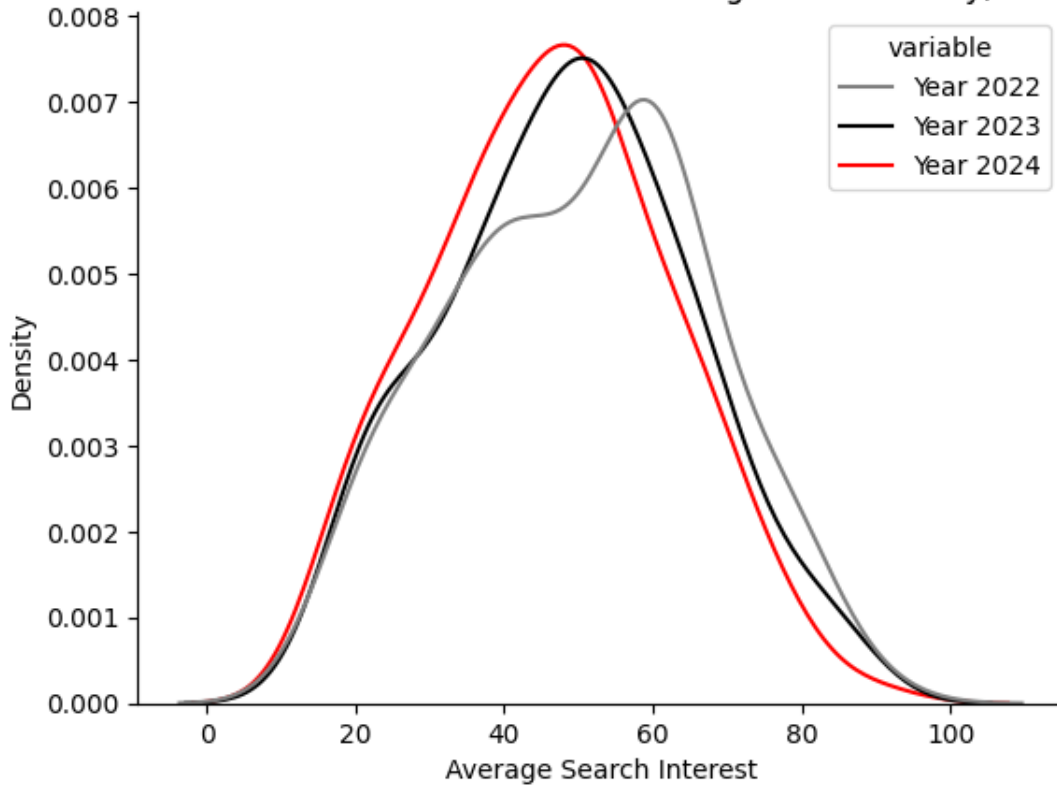
Upper Peninsula Place Level Search Interest Averaged for February, March, and April
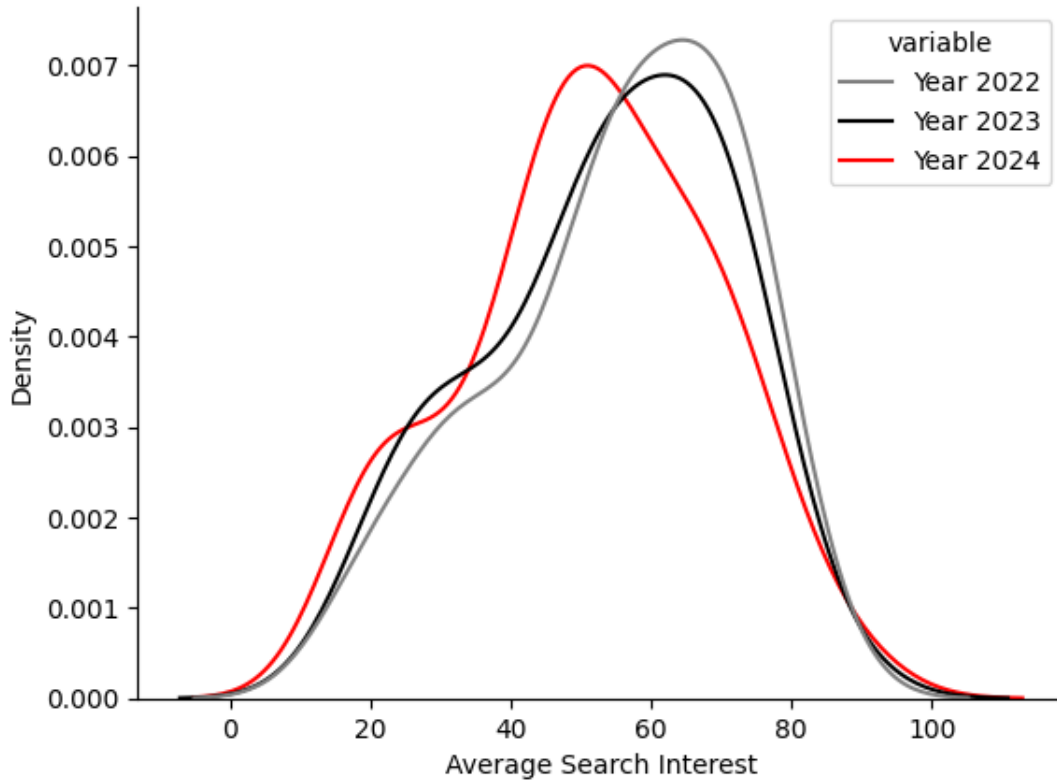
The following figure shows the aggregate average search interest for each calendar month. Both the Upper and Lower Pensinsulas have a seasonal peak in July/August with the Lower Peninsula peak solidly in July. The Upper Peninsula has higher values for January-March likely due to winter snow sports like snowmobiling. For the February-March forecast period, we should see search interest levels motivated by winter sports transitioning into summer search interest.
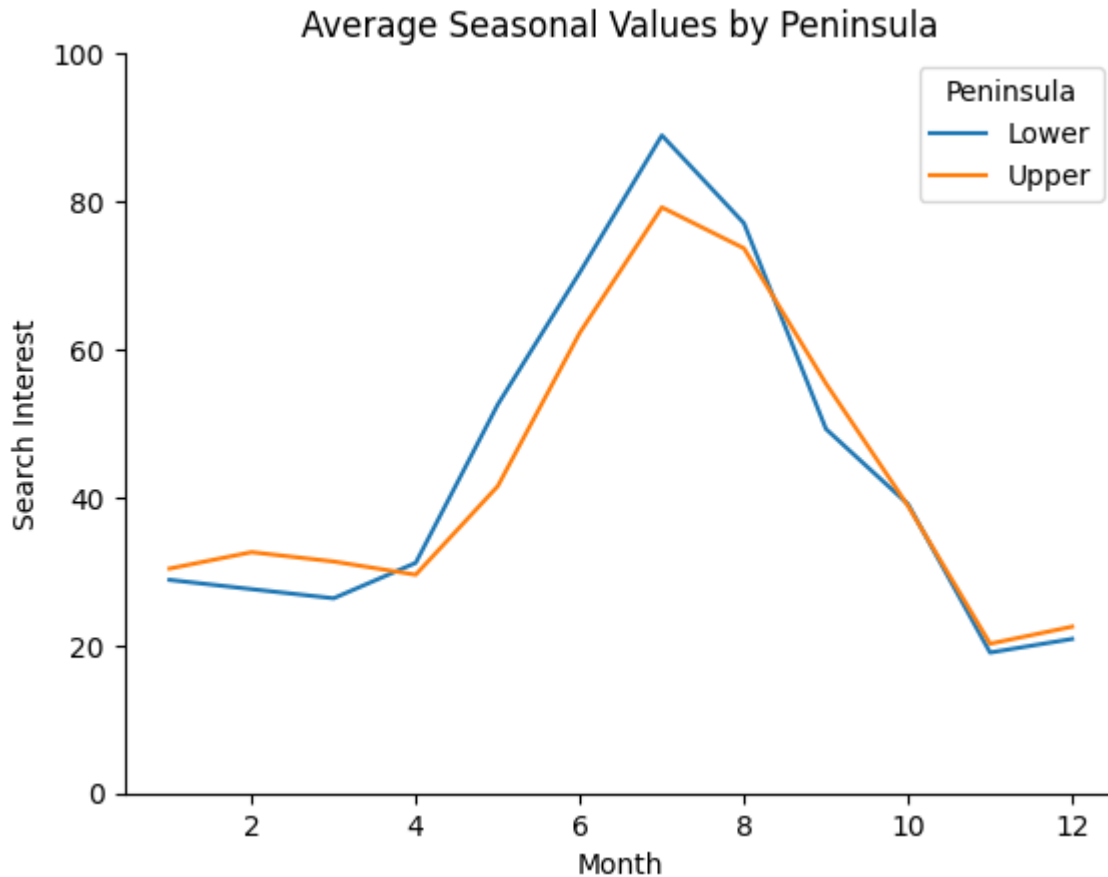
Finally, forecasts are determined by the forecasted place level change from the previous year based on weather and gasoline prices and are adjusted based on the last 12 months of trends for each individual place. For both peninsulas, the most likely forecasted change from the previous year is now negative, because we are now adjusting for the aggregate negative trends during the last 12 months. (Note, however, that the final forecast numbers by peninsula are weighted by the size of the contribution of the place to total search interest.)

Model Forecasted Change by Peninsula
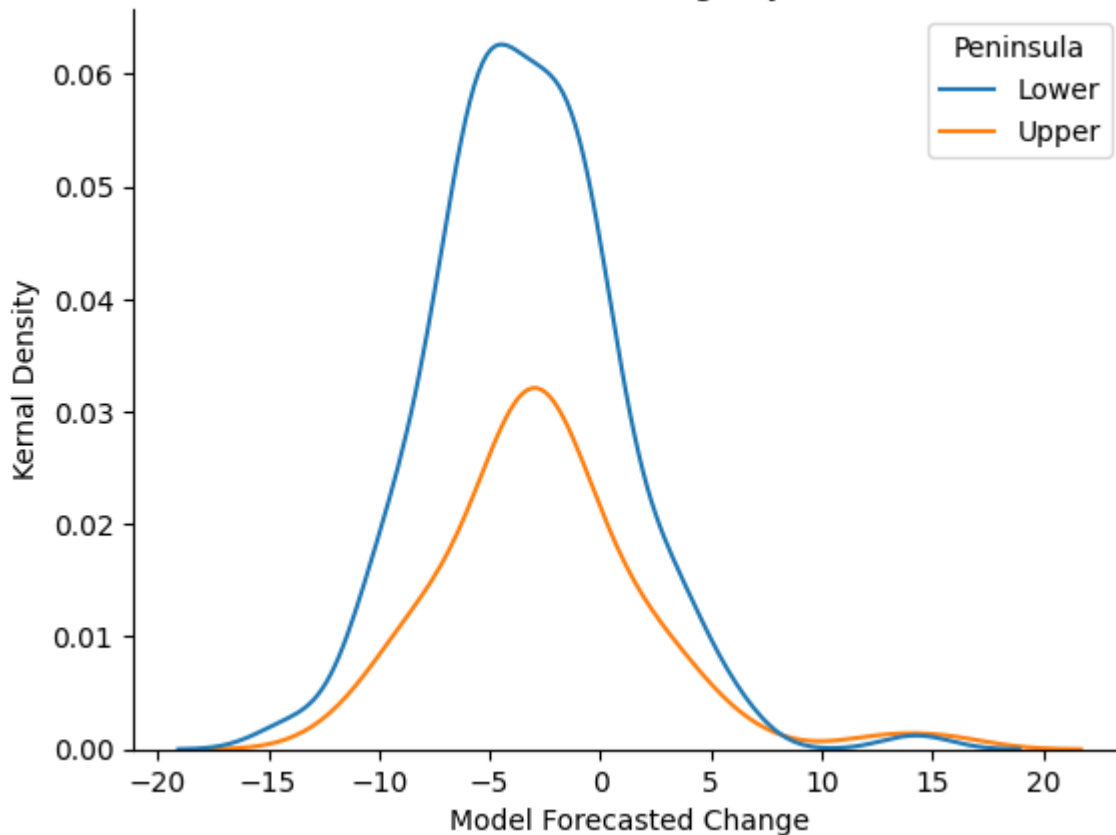
Places Impacted by Weather and Gas Prices

In addition to the above more aggregated analysis, I will now look at places that are impacted by weather and gasoline prices. (Many places are not impacted by these factors in the model and instead have an average increase or decrease year over year.) After identifying the places impacted by weather or gas prices, I then divide these places projected to have higher or lower search interest (on average) during the forecast months from the previous year. This is due to both the impact of weather and gasoline prices and the average trend year over year.

For the Northern Lower Peninsula, 67 of 142 places are impacted by weather or gasoline prices in the model. Of these, 16 are forecasted to have higher search interest during these three months than last year. The remaining are forecasted to have lower search interest than last year. These places are listed and the chart shows their yearly average search interest values for the three forecast months. Here, the verticle line signifies the start of the forecast period.

```
Northern Lower Places with Weather Impact Higher Interest than Last Year
─────────────────────────────────────────
['caberfae', 'sand lake', 'crystal mountain', 'glen arbor', 'luther', 'manistee lak
e', 'buckley', 'lakes of the north', 'free soil', 'hersey', 'jennings', 'wolverine',
'baldwin', 'vanderbilt', 'tower', 'honor']
```

['leland', 'ludington', 'mackinac', 'northport', 'suttons bay', 'traverse city', 'bel
laire', 'lake ann', 'indian river', 'manistee', 'fountain', 'custer', 'harrisville',
'onaway', 'cedar', 'rose city', 'alanson', 'benzonia', 'carp lake', 'alden', 'mesic
k', 'rogers city', 'roscommon', 'omer', 'fife lake', 'standish', 'lupton', 'harriso
n', 'elberta', 'maple city', 'scottville', 'ossineke', 'alpena', 'thompsonville', 'ra
pid city', 'kalkaska', 'cadillac', 'prudenville', 'boyne falls', 'ironton', 'beaverto
n', 'mancelona', 'oak hill', 'reed city', 'pilgrim', 'sterling', 'lincoln', 'advanc
e', 'norwood', 'twining', 'chums corner']

Northern Lower Weather Impacted Places, Forecast for February, March, and April
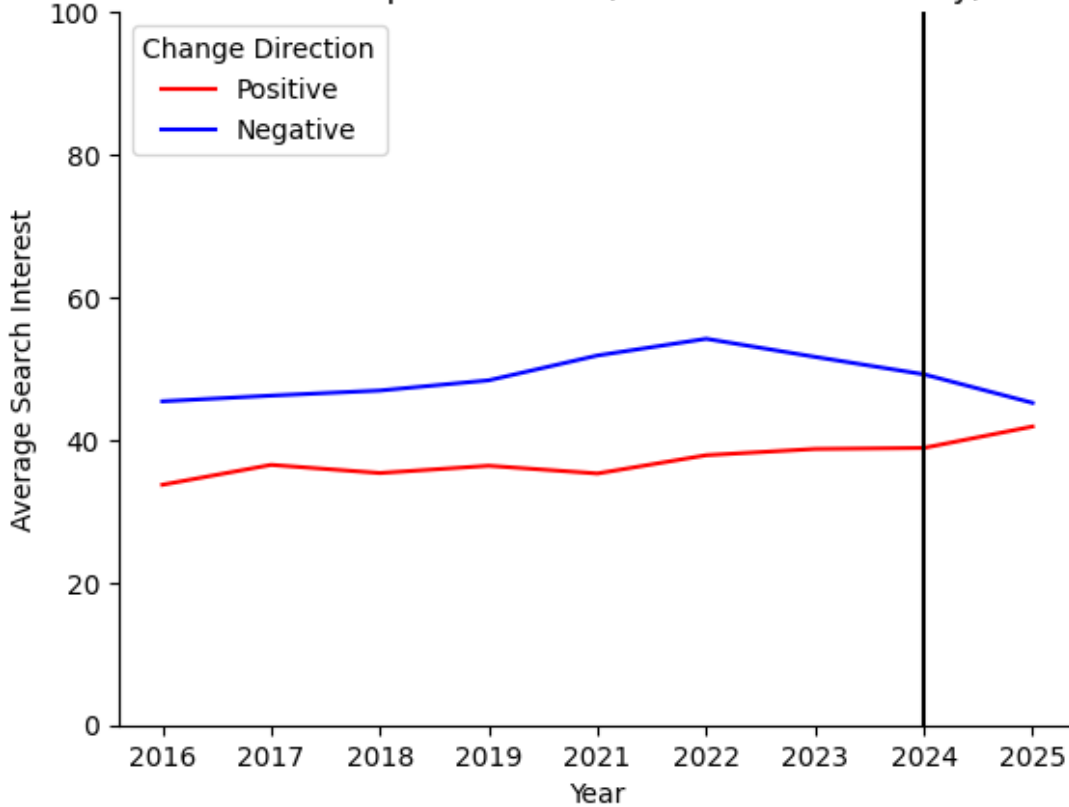
For the Upper Peninsula, 32 of 72 places are impacted by weather or gasoline prices in the model. Of these, 3 are forecasted to have higher search interest during these three months than last year. The remaining are forecasted to have lower search interest than last year. These places are listed and the chart shows their yearly average search interest values for the three forecast months. Here, the verticle line signifies the start of the forecast period.

['eagle harbor', 'rapid river', 'menominee']

```
_____
Upper Peninsula Places with Weather Impact Lower Interest than Last Year
_____
['munising', 'newberry', 'houghton', 'manistique', 'lake gogebic', 'naubinway', 'glad
stone', 'fulton', 'white pine', 'kingsford', 'gwinn', 'mohawk', 'escanaba', 'ishpemin
g', 'watersmeet', 'bergland', "l'anse", 'crystal falls', 'iron river', 'bessemer', 'c
alumet', 'hubbell', 'laurium', 'republic', 'ramsay', 'kincheloe', 'stephenson', 'sout
h range', 'ewen']
```


Upper Peninsula Weather Impacted Places, Forecast for February, March, and April
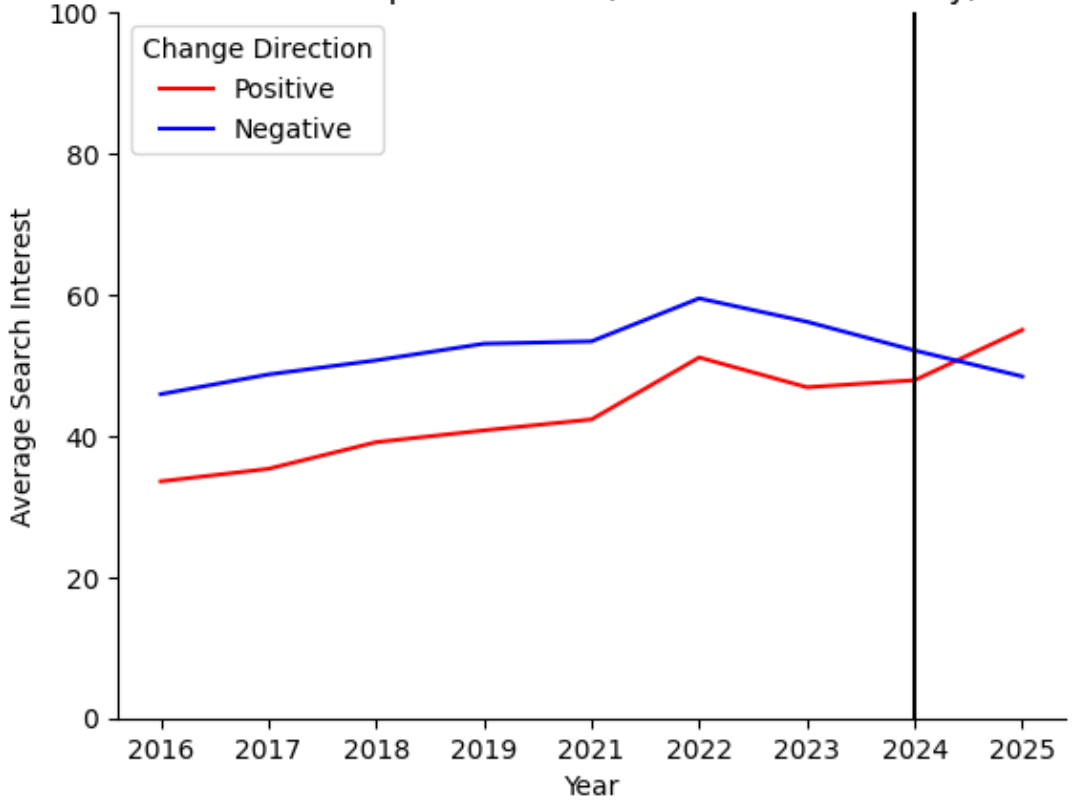

Data Variation and Weather Forecast Accuracy

In addition to what "should" impact search interest forecasts, there is also variation between search values pulled from Google trends. As I described in the original research for this project, search interest results will vary depending on whether you pull data using the pytrends package or from the Googletrends website. Pertinent to this project, results will also vary if you pull data using pytrends at different points in time. The severity of this difference changes from month to month.

While the most obvious solution to this problem is retaining historical values and keeping them constant, this is more difficult for Google trends data which is internally normalized. Thus, it's much easier to repull the entire series each time. I have a good idea of what my long term solution to this issue is, and I've started to save back each monthly data pull to help make it happen.

Compares Current and Past Month's Northern Lower Data Pull
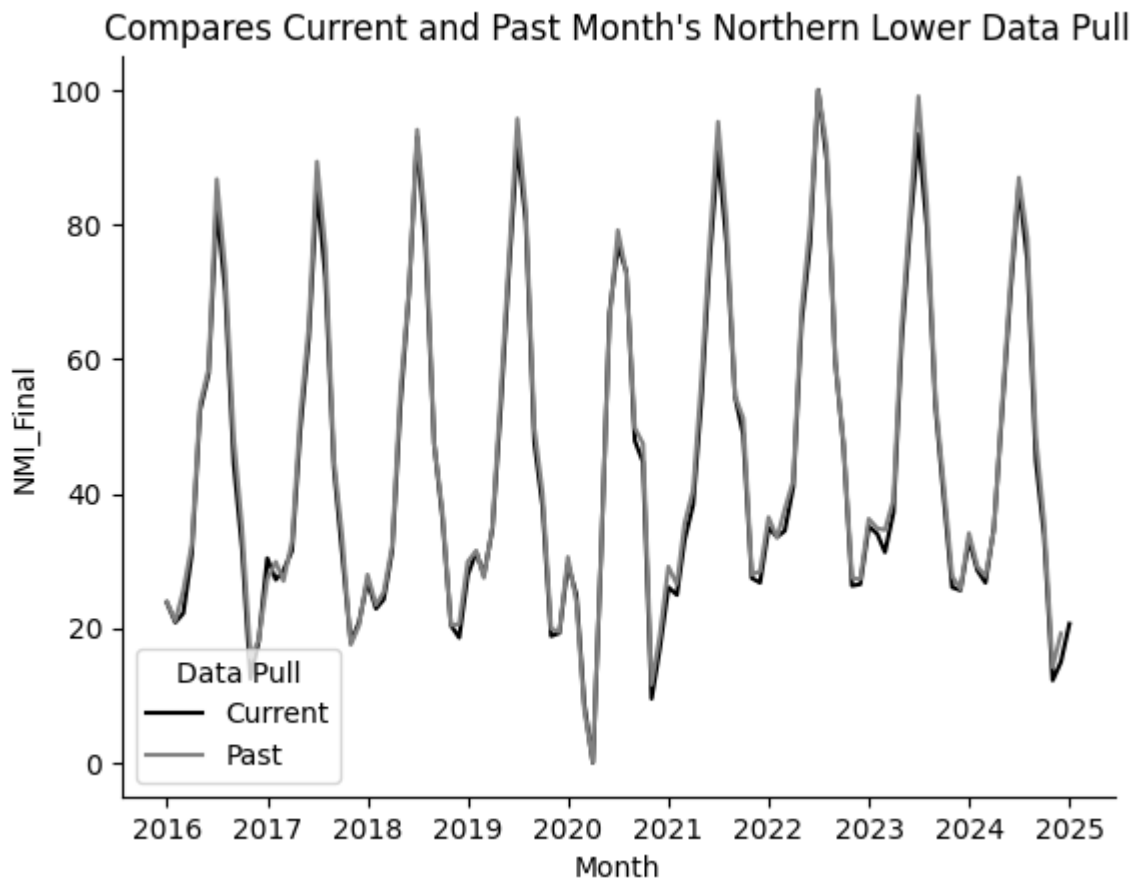
Compares Current and Past Month's Upper Peninsula Data Pull
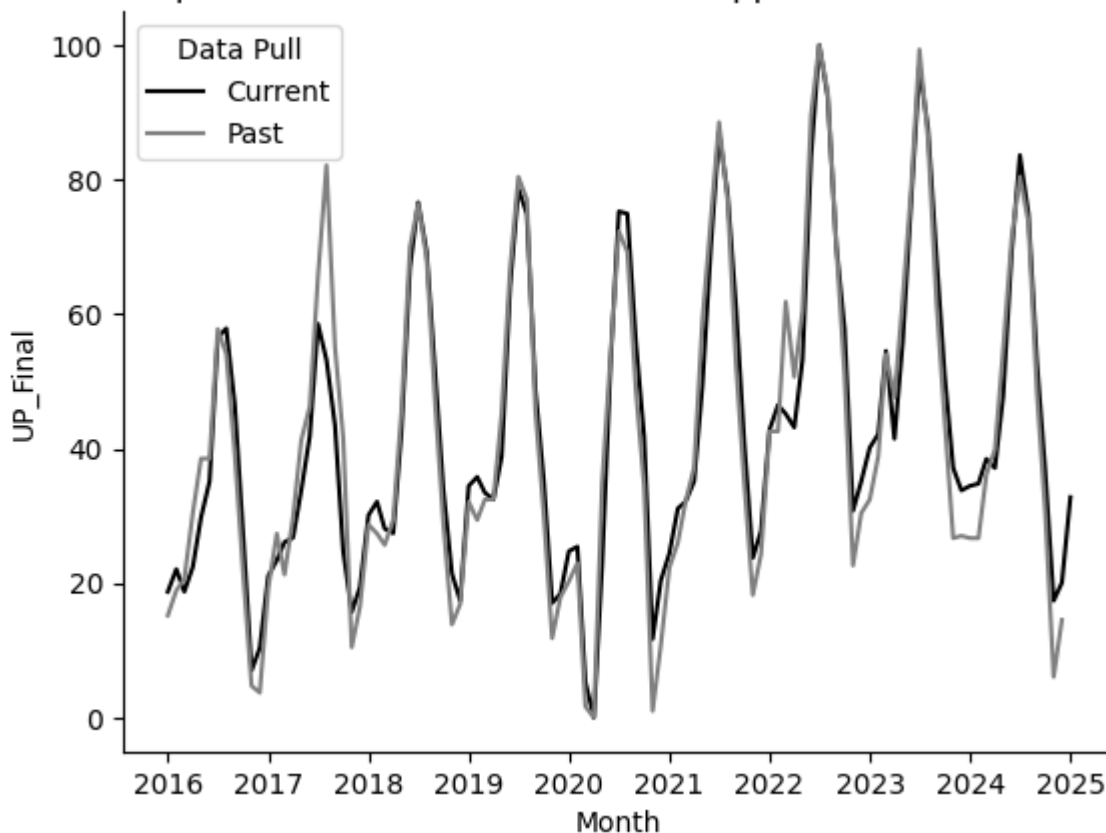
One last factor to consider is my source for weather forecasts, with a focus on temperature. All of my historical weather data used to train my models is from weather.gov. However, I source temperature forecasts from both weather.gov (average of averages) and accuweather (average maximums and average minimums). To some degree, it's difficult to compare these sources because average, maximum, and minimum temperatures are different statistics. Nonetheless, throughout this project, I've found that weather.gov usually forecasts above normal temperatures. To some extent I wonder if forecasts from a government agency are more likely to be high given politics surrounding issues like global warming.

Therefore, I will roughly track the one month forward predictive performance of the weather.gov and accuweather forecasts. First, I will look at the previous month's average temperature and determine if it actually was above historical normals. Next, I will compare the previous month's forecasted accuweather average max and min temperatures to actual values.

For January, the normal average temperature is 19.1 degrees for Houghton Lake and 13.1 degrees for Sault St Marie. The actual average temperature values were Houghton Lake 18.1 and Sault St Marie 17.2. So actual temperatures were higher than normals for Sault St Marie but lower for Houghton Lake.

Based on the accuweather forecasts, actual maximums were higher than forecasted. However, actual minimums were higher than forecasted for Sault Ste Marie and slightly lower for Houghton Lake.

Comparison of Average Maximum Temperatures for Previous Month
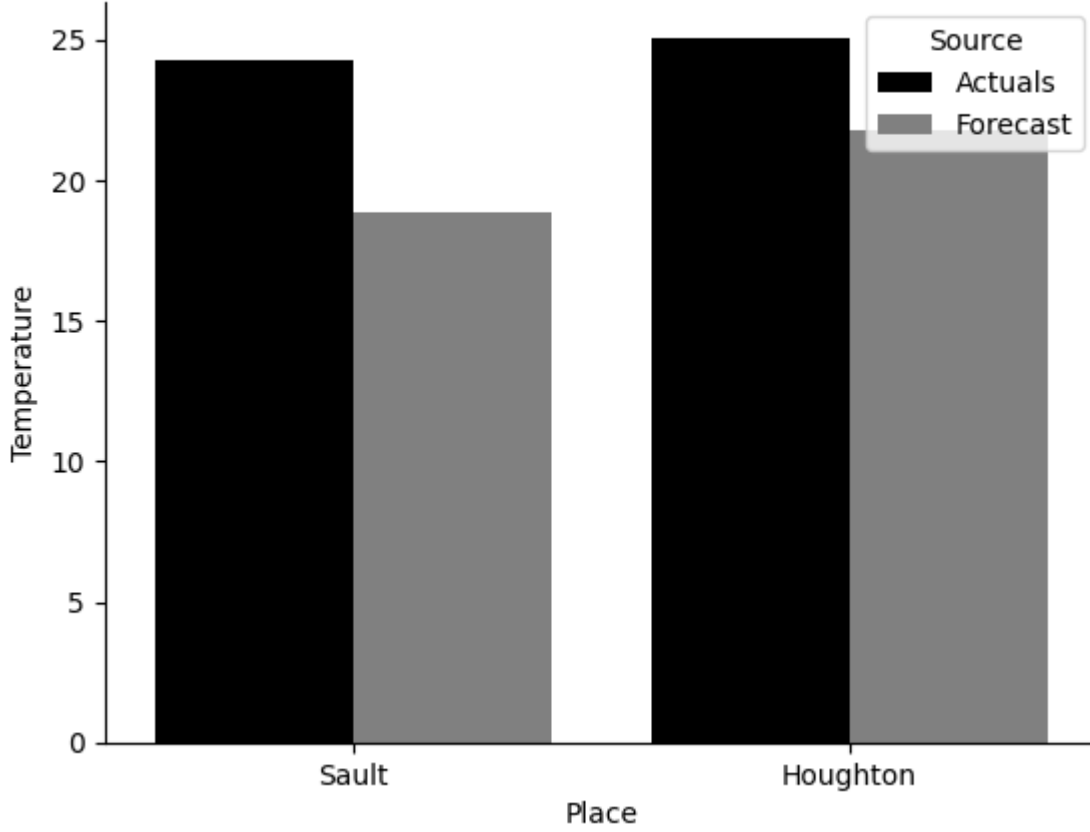
Comparison of Average Minimum Temperatures for Previous Month