Sailing Index Executive Summary

OVERVIEW:

Dinghy sailboats, as opposed to keelboats and yachts, are smaller boats typically intended for short sails on lakes, rivers, and bays. Sailing these boats are more akin to outdoor activities like kayaking and other water sports making them more susceptible to weather conditions than their larger counterparts. This project seeks to understand the impact of weather patterns in and around the Delaware River in Philadelphia.

THE SOLUTION:

Create an index based on historical weather that provides a relative comparison between days based on wind, precipitation, and temperature. Report the results in a year-long calendar.

CONCLUSION:

When isolating wind as the sole metric, as that is the primary ingredient to sailing, July through September offer the best wind historically, with August being the peak. When other weather conditions (temperature, precipitation, and fog) are layered in to account for desirability, the season shifts more towards late summer and early fall, with the end of August to mid-October providing the best all-around weather.

DATA DETAILS:

The data was pulled from the BigQuery's public data, and originates from the National Oceanic and Atmospheric Administration's (NOAA) global surface summary of the day (GSOD). Data was taken from the Philadelphia Airport given its proximity to the Delaware River and the overall higher degree of reliability of airport weather data. As the name suggests, each entry is representative of the day's weather. The most recent thirty years (1995-2024) of data were compiled, cleaned, and analyzed in SQL to create indices that were relevant to sailing. Once formulated, a day by day average index was imposed onto the 2025 calendar. The components were of the composite index include wind speed, temperature, and inclement weather.

Since wind typically peaks in the afternoon and drops overnight, max wind speed was selected over average wind speed as it aligned with typical sailing times. A second-order function was formulated to rate the wind speed as advantageous between 4 and 12 knots (approximately 5-14 mph). At the lower end of this range sailing conditions are generally considered leisure, while the upper end is considered to be faster but still manageable for novice and intermediates.

Similar to the wind index, the temperature index is based on a second-order function. For obvious reasons, this function can be subjective not only on a collection of people, but based on geography's impact on the sailing culture. For this study, 60 degrees to 90 degrees (Fahrenheit) was utilized as the optimal range. Again, max temperature was used as it peaks in the afternoon.

The clement weather index is a simple average frequency of precipitation, thunder, or fog on a given date.

These three component indices are combined to create the composite index, which can range between 0 and 1. Although a rating of 1 could theoretically be labeled as "perfect". The variability of sailing preferences, cultures, boats, and of course weather, make perfect quite elusive. Rather these indices serve to illustrate relative trends throughout the year such as what is the ideal part of the season and even what parts of the offseason are favorable.