# How has COVID-19 affected NYC Subway ridership?

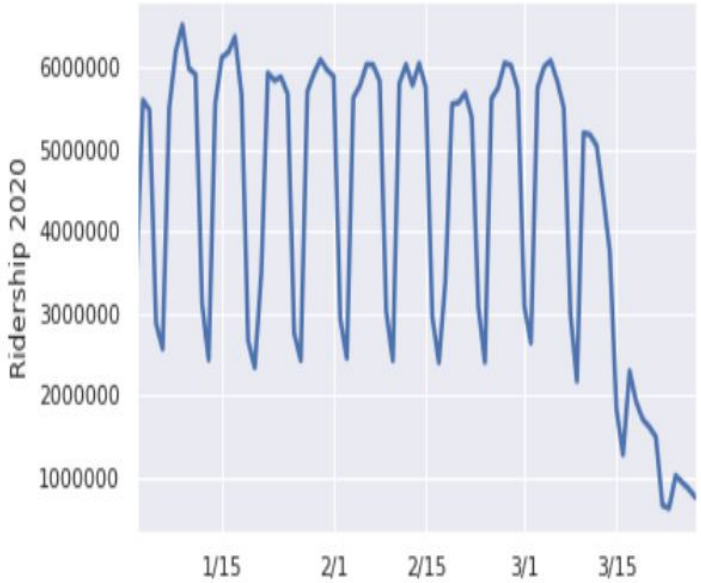
# Introduction

- **Objective:** Investigate how COVID-19 has affected New York City subway ridership
- **Motivation:**
    - Help city government, and public health agencies in particular, determine whether New Yorkers are reducing their travel
    - Inform New Yorkers which subway stations are still heavily trafficked
- **Relevant Data:** Weekly MTA Turnstile data

# Methodology

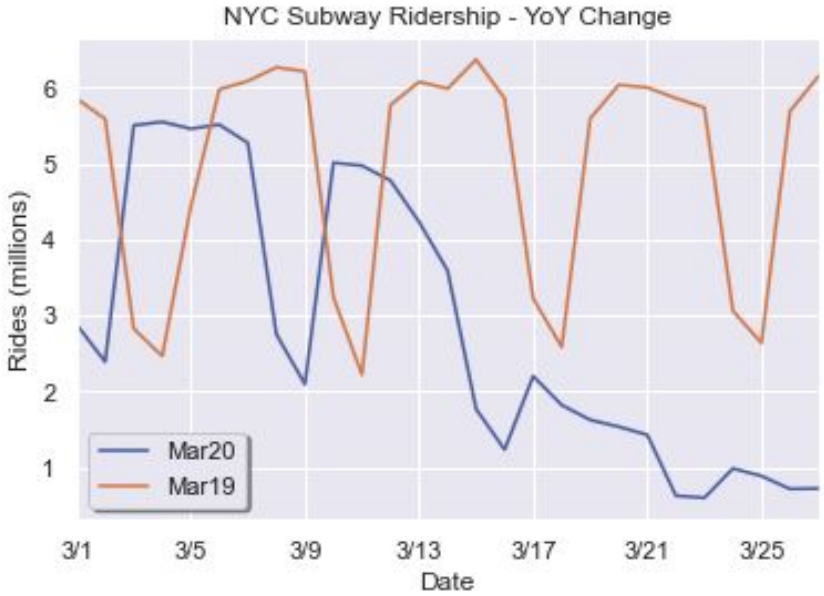
- We compared ridership in March 2020 vs Jan-Feb 2020 as well as March 2019
- **Data sources:**
  - MTA Turnstile Data
  - NY Open spatial data
  - City of New York - Health
- **Tools:**
  - Python
    - Data munging
    - Visualization
  - QGIS

# Covid impact on Ridership - 2020



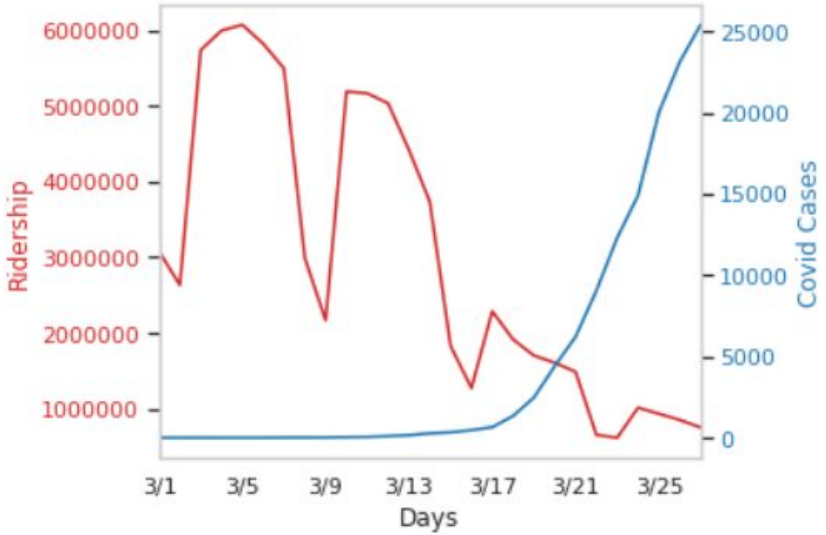

- Weekday/weekend cyclicality
- Steep drop in daily ridership beginning in early March

# Covid impact on Ridership - March 2020 V 2019

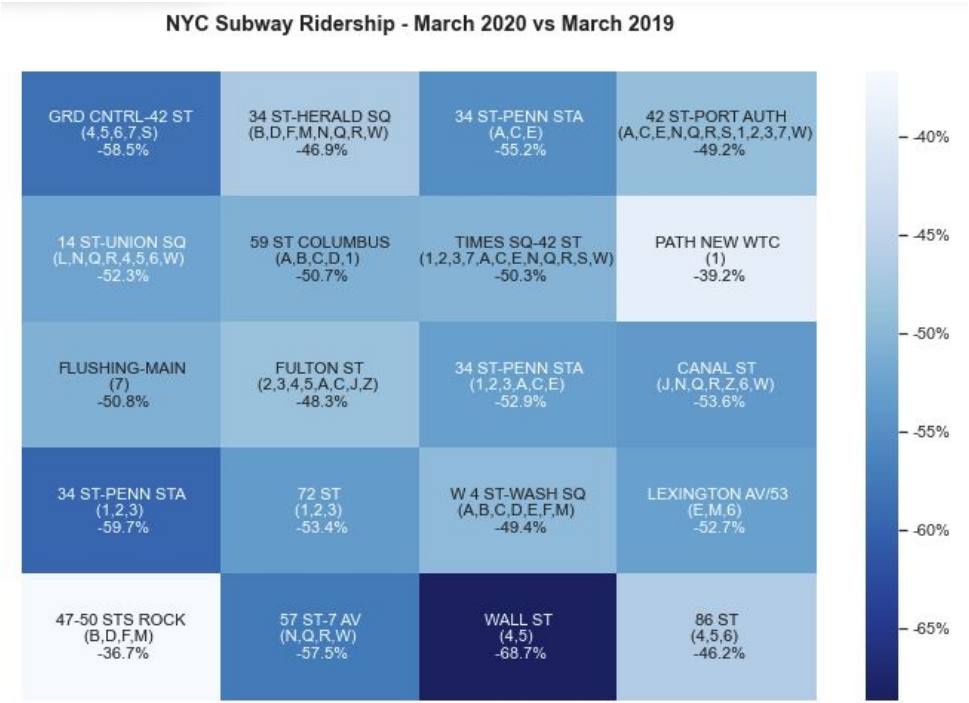



- Year over comparison reduces the noise from seasonality
- Clear downward trend for March 2020
- Weekend drops in ridership attenuated

# Covid impact on Ridership - March 2020

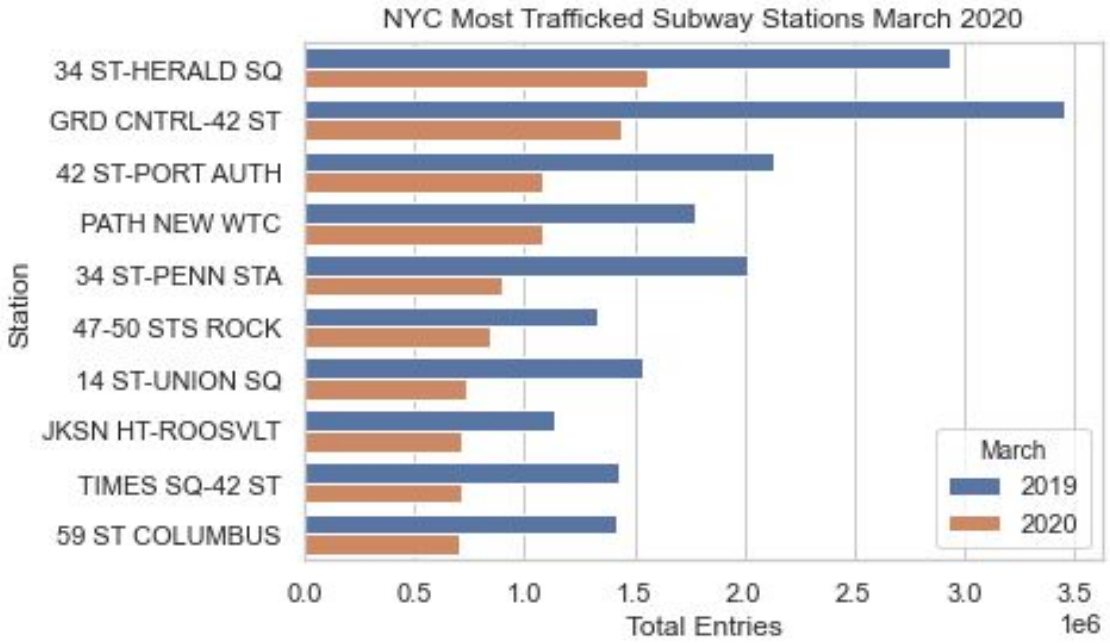



3/1 - First NYC confirmed case
**3/11 - US announces European travel ban**
3/13 - National emergency declared
**3/15 - CDC recommends no large gatherings**
**3/22 - NYC orders non-essential workers to stay home**
3/23 - Stock market bottoms out (-40%)
3/28 - CDC travel advisory for NY region




- Across the most heavily trafficked stations, ridership has decreased between 35-70%

- The 20 stations with the largest drop in ridership account for 25% of the city-wide decrease



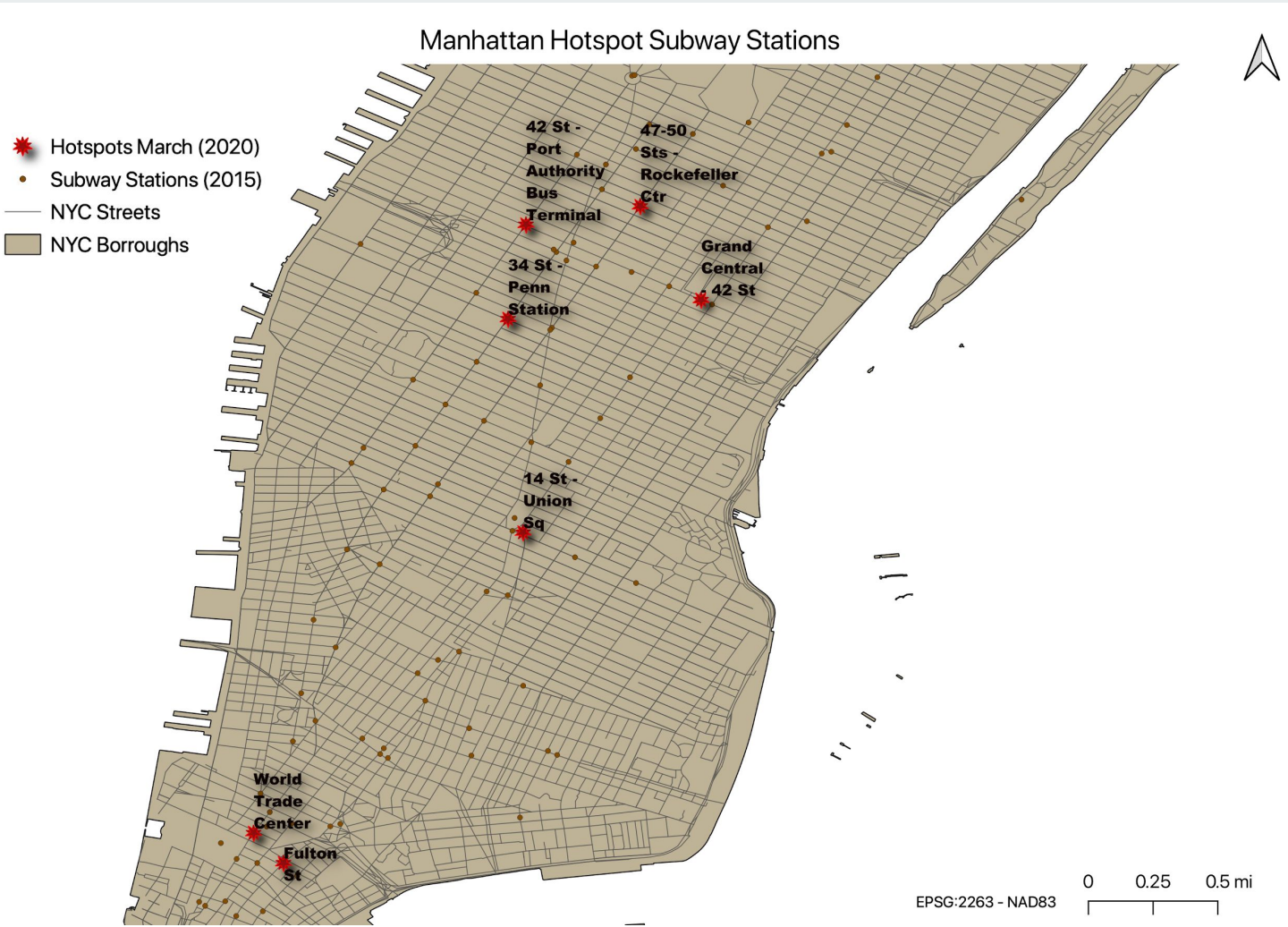

- Change in ridership
- Busy stations

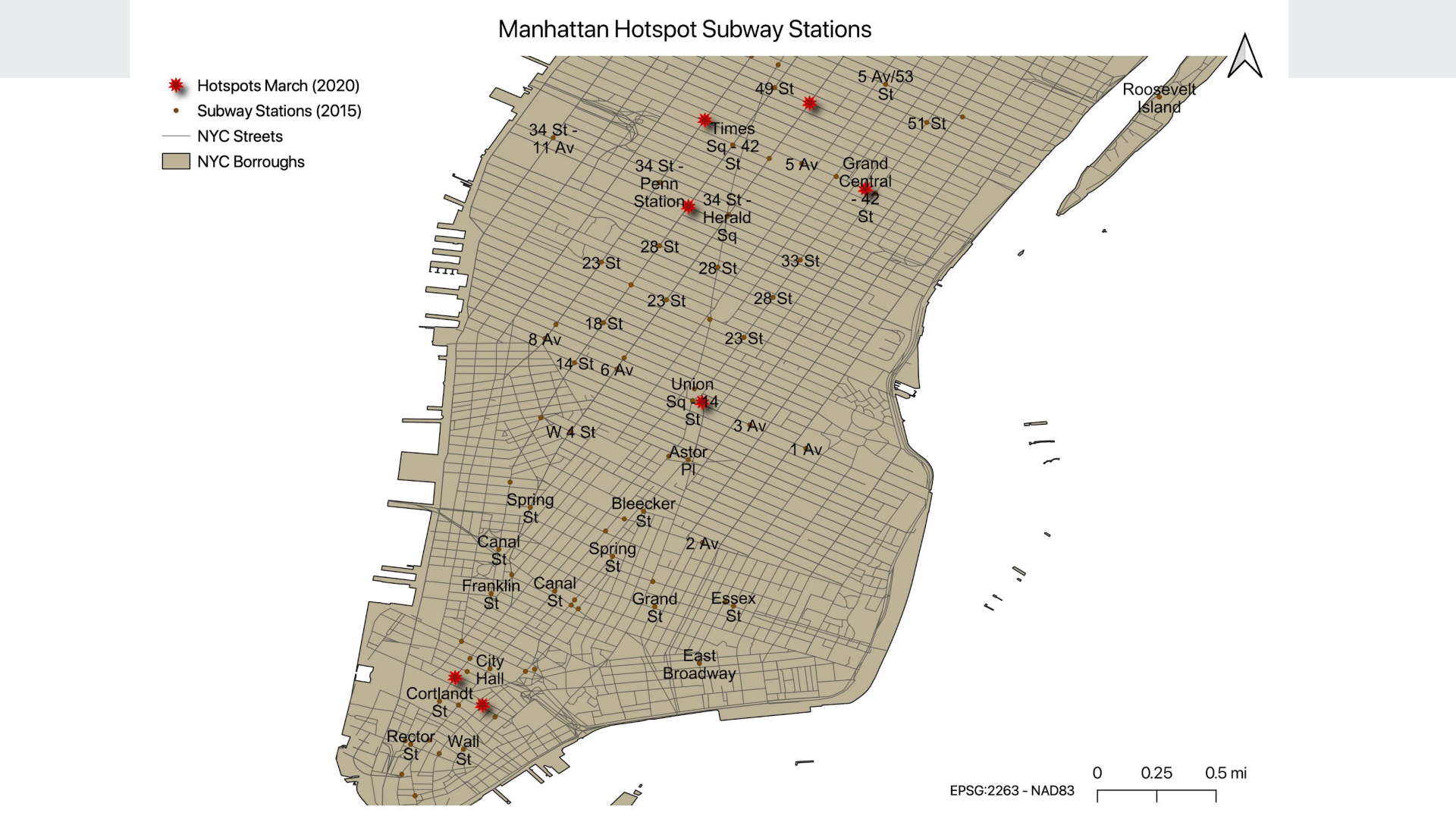
# Results Summary

| | March 2019 | March 2020 | Δ |
|---|---|---|---|
| **Number of Rides** | **133.8** | **76.1** | **-57.7** |

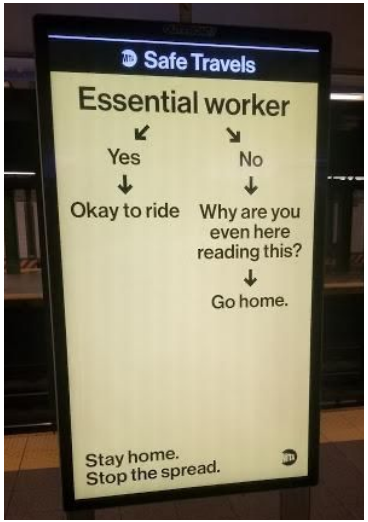
→Total subway ridership is down **43%** year-over-year

**Note:** Number of rides in millions


Manhattan Hotspot Subway Stations
Hotspots March (2020)
Subway Stations (2015)
NYC Streets
NYC Borroughs
42 St - Port Authority Bus Terminal
47-50 Sts - Rockefeller Ctr
Grand Central - 42 St
34 St - Penn Station
14 St - Union Sq
World Trade Center
Fulton St
EPSG:2263 - NAD83
0
0.25
0.5 mi


Manhattan Hotspot Subway Stations
Hotspots March (2020)
Subway Stations (2015)
NYC Streets
NYC Borroughs
49 St
5 Av/53 St
Roosevelt Island
51 St
34 St - 11 Av
Times Sq - 42 St
34 St - Penn Station
5 Av
Grand Central - 42 St
34 St - Herald Sq
28 St
23 St
28 St
33 St
23 St
28 St
18 St
8 Av
23 St
14 St
6 Av
Union Sq - 14 St
3 Av
W 4 St
1 Av
Astor Pl
Spring St
Bleecker St
Canal St
Spring St
2 Av
Franklin St
Canal St
Grand St
Essex St
City Hall
East Broadway
Cortlandt St
Rector St
Wall St
0
0.25
0.5 mi
EPSG:2263 - NAD83

# Recommendations




- Non-essential workers:
  - Stay home
- Essential workers:
  - Avoid hotspots
  - Consider alternatives
- Employers/organizations:
  - Facilitate WFH and stagger start times
- MTA:
  - Ensure safe transportation for essential workers

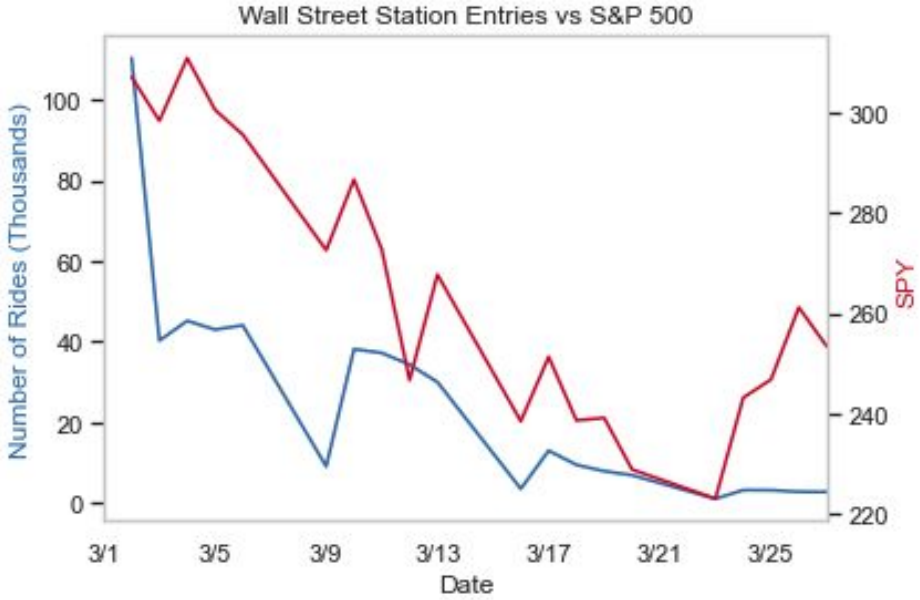
# Future Work


- Reduction in ridership =/= reduction in crowding
- Investigate train capacity to optimize train schedules that facilitate social distancing

# Appendix

| | STATION | LINENAME | ENTRIES_20 | ENTRIES_19 | ENTRIES_DIFF | PCT_CHANGE |
|---|---|---|---|---|---|---|
| **0** | 1 AV | L | 0 | 20223 | -20223 | -100.00% |
| **60** | 191 ST | 1 | 22287 | 190550 | -168263 | -88.30% |
| **42** | 168 ST | 1,A,C | 35611 | 192880 | -157269 | -81.54% |
| **395** | OCEAN PKWY | Q | 45714 | 244700 | -198986 | -81.32% |
| **383** | NEW UTRECHT AV | N,D | 22701 | 111309 | -88608 | -79.61% |
| **148** | 8 AV | N | 24171 | 114440 | -90269 | -78.88% |
| **24** | 14 ST | A,C,E,L | 85754 | 377704 | -291950 | -77.30% |
| **208** | BERGEN ST | 2,3 | 57522 | 249541 | -192019 | -76.95% |
| **362** | MARCY AV | J,M,Z | 100311 | 362585 | -262274 | -72.33% |
| **192** | BAY PKWY | N | 45575 | 159092 | -113517 | -71.35% |

# Ridership vs. S&P 500



# NYC Hospitals and Subway Stations