

Covid-19's Effects on Bike Sharing in San Francisco

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Introduction

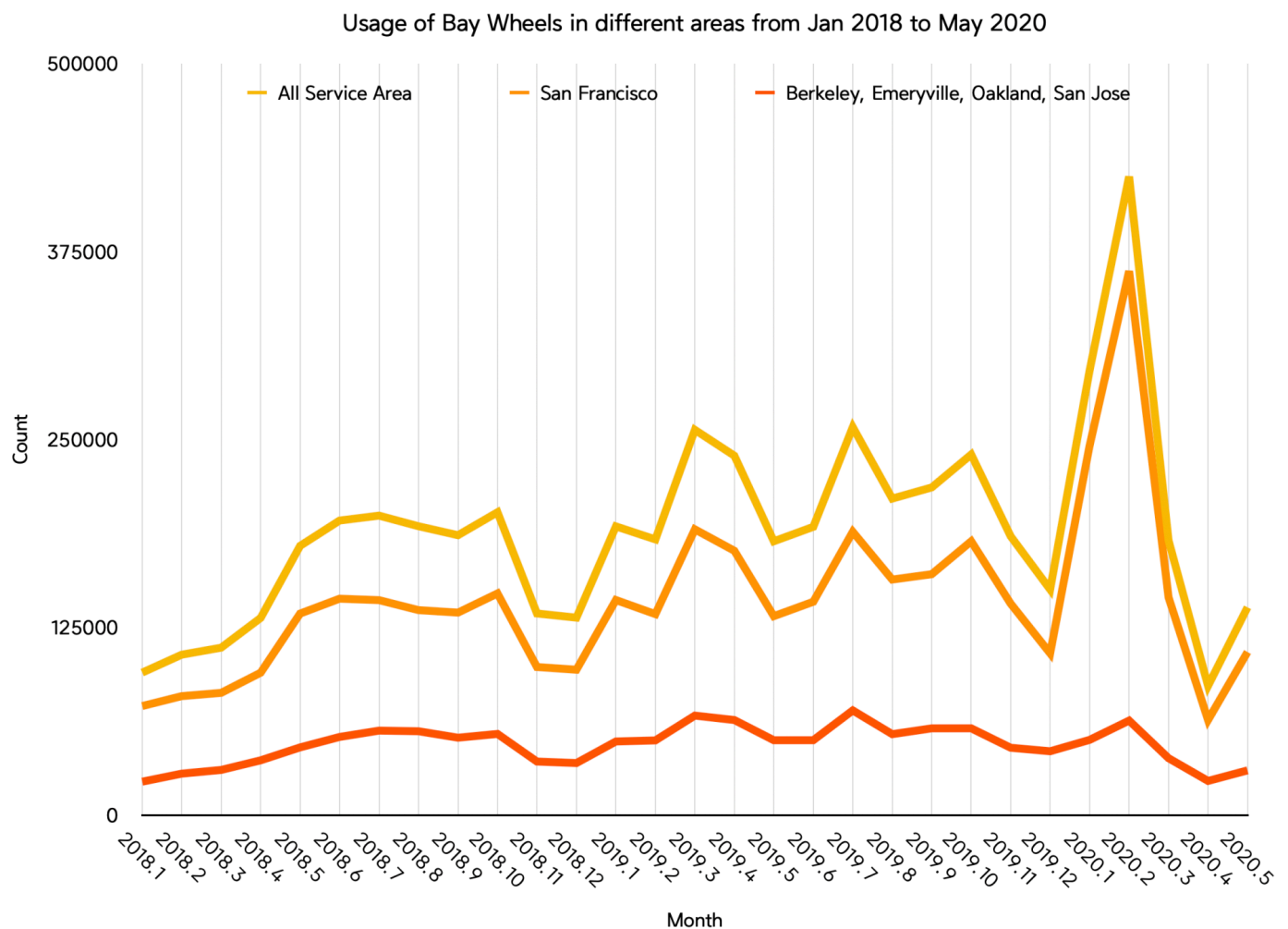
The Bay Area's bike share pilot program was established in August 2013 as Bay Area Bike Share with only a few bikes and stations in operation. The program was later re-launched as Ford GoBike in 2017 and expanded to multiple cities in the Bay Area with over 2,600 bikes. Recently, in June 2019 the bike share program was rebranded to Bay Wheels. Bay Wheels currently operates in San Francisco, Oakland, Berkeley, and San Jose. As of June 2020, Bay Wheels had over 200 bike stations located throughout San Francisco.

Due to the recent coronavirus pandemic, a shelter-in-place order went into effect in San Francisco on March 19th in efforts to keep people indoors and prevent the spread of the virus. The following report explores the change over time in bike sharing patterns for San Francisco from January 2018 through May 2020. We hope to find changes in bike share usage, travel patterns, and travel locations that occurred after and during the shelter-in-place dates.

Bike Share Usage

Bike sharing has gained popularity as a common means of transportation for San Francisco residents. Since its launch date, the bike sharing program has shown an upward trend in the number of bike sharing trips made. The following graph shows bike share usage from January 2018 to May 2020 by the number of trips made per month. As seen, the majority of Bay Wheels trips are in San Francisco accounting for nearly 75% of all Bay Wheels trips. There is less ridership in Oakland, San Jose, and Emeryville. However, after the pandemic and shelter-in-place orders went into effect in San Francisco and Alameda County, all areas in which Bay Wheels operates, decreased in

ridership with a significant decrease in rides for the month of April 2020.



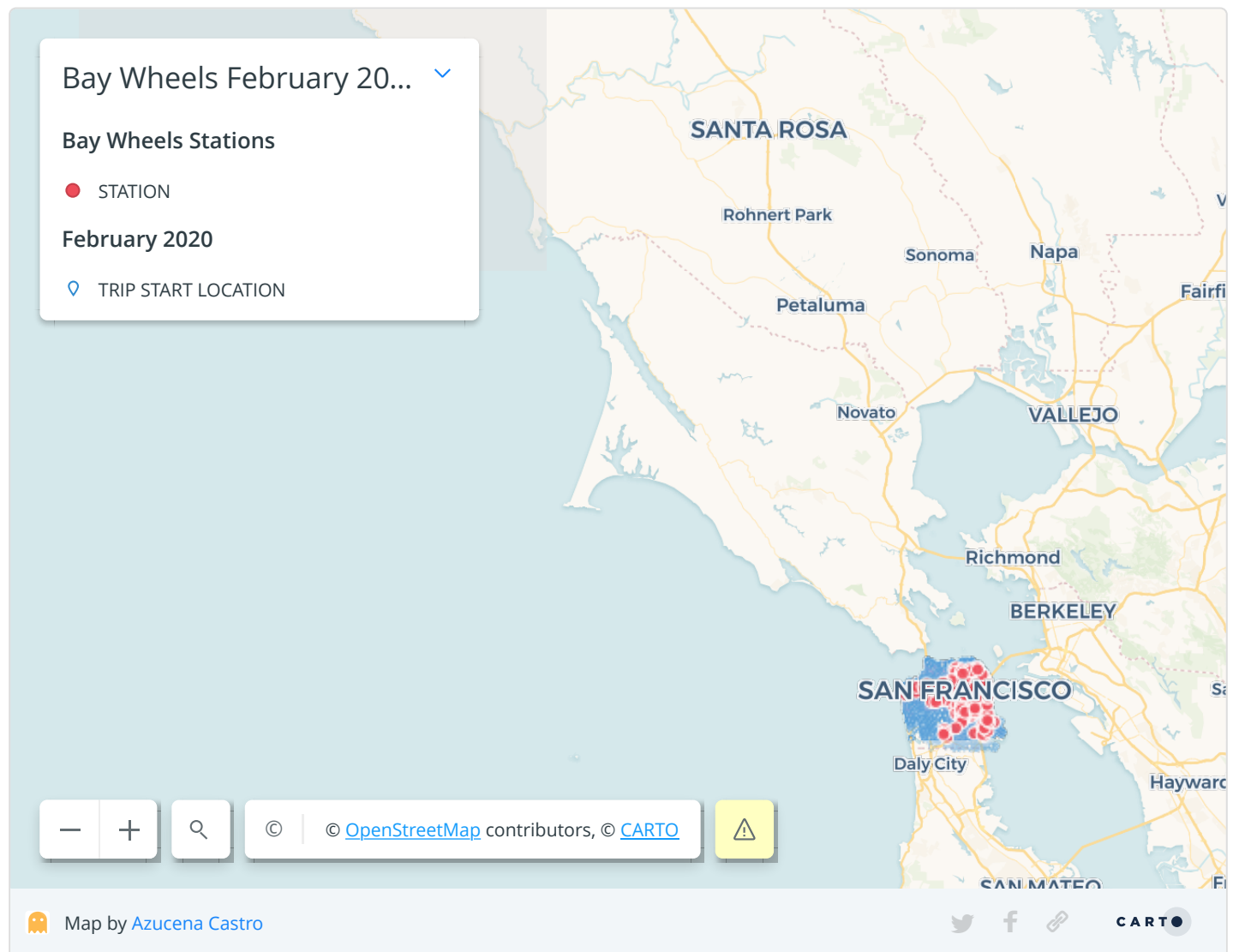
Usage of Bay Wheels from 2018 to May 2020

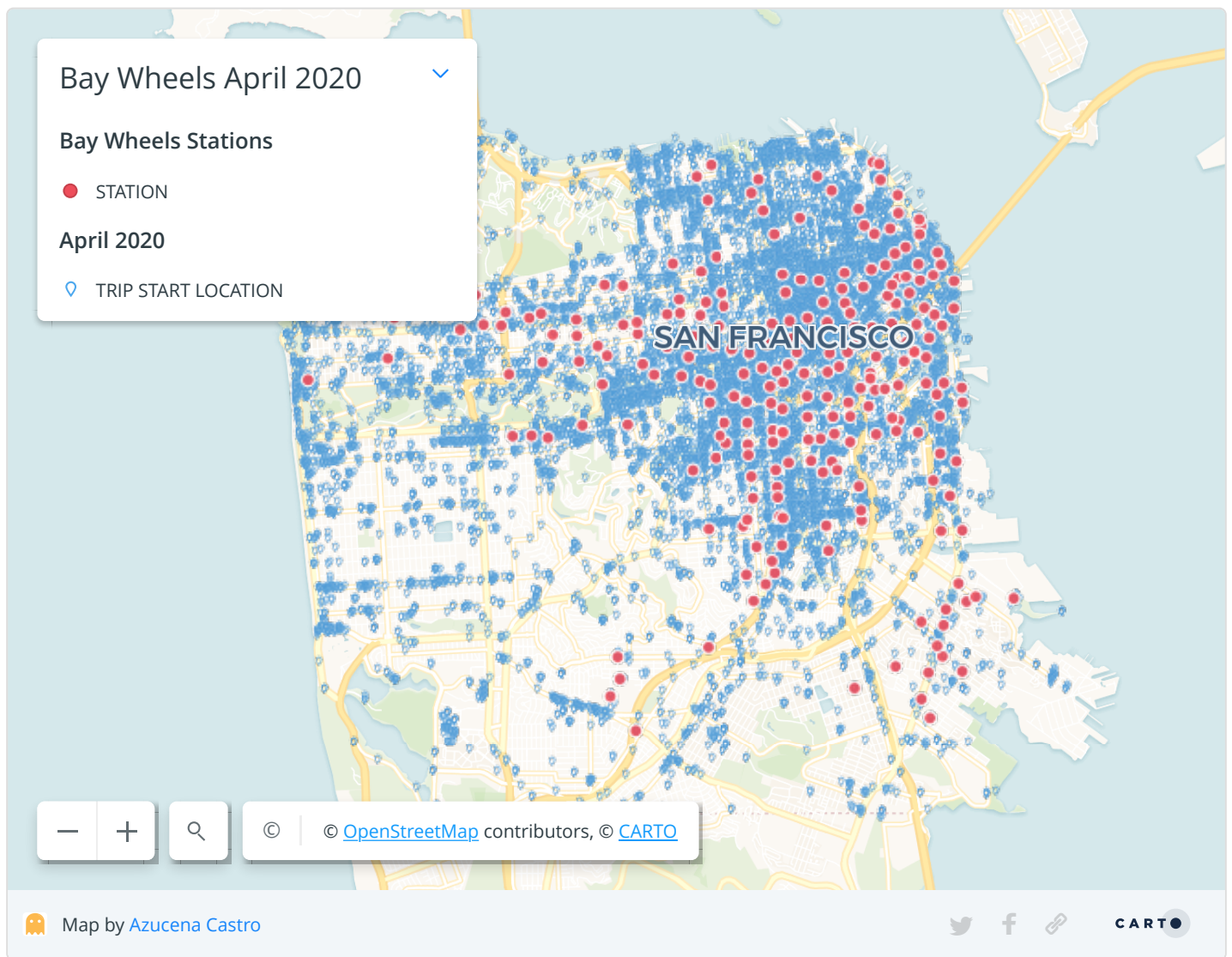
	All Service Area	San Francisco	Percentage
2018	1,863,721	1,362,601	73%
2019	2,506,983	1,852,943	74%
~2020.05	1,127,517	924,246	82%

Bay Wheels Stations and Starting Locations

After the Bay Wheels program gained popularity, more bike sharing stations were opened to operate. In addition, Bay Wheels is continuing to expand its services to more stations and has several proposed sites to do so. Recently with Bay Wheels' introduction of dockless electric bikes, users can now pick up a bike at not just a station but rather throughout different locations in San Francisco.

The following maps show the start locations for trips made in February 2020, before the shelter-in-place order went in effect in San Francisco and the start locations for trips made in April 2020, after the shelter-in-place order. Both maps have the locations of Bay Wheels stations to show that trips are started beyond where stations are situated. Therefore, these maps show the effectiveness of having dockless bikes since it increases accessibility to areas that lack Bay Wheels stations.





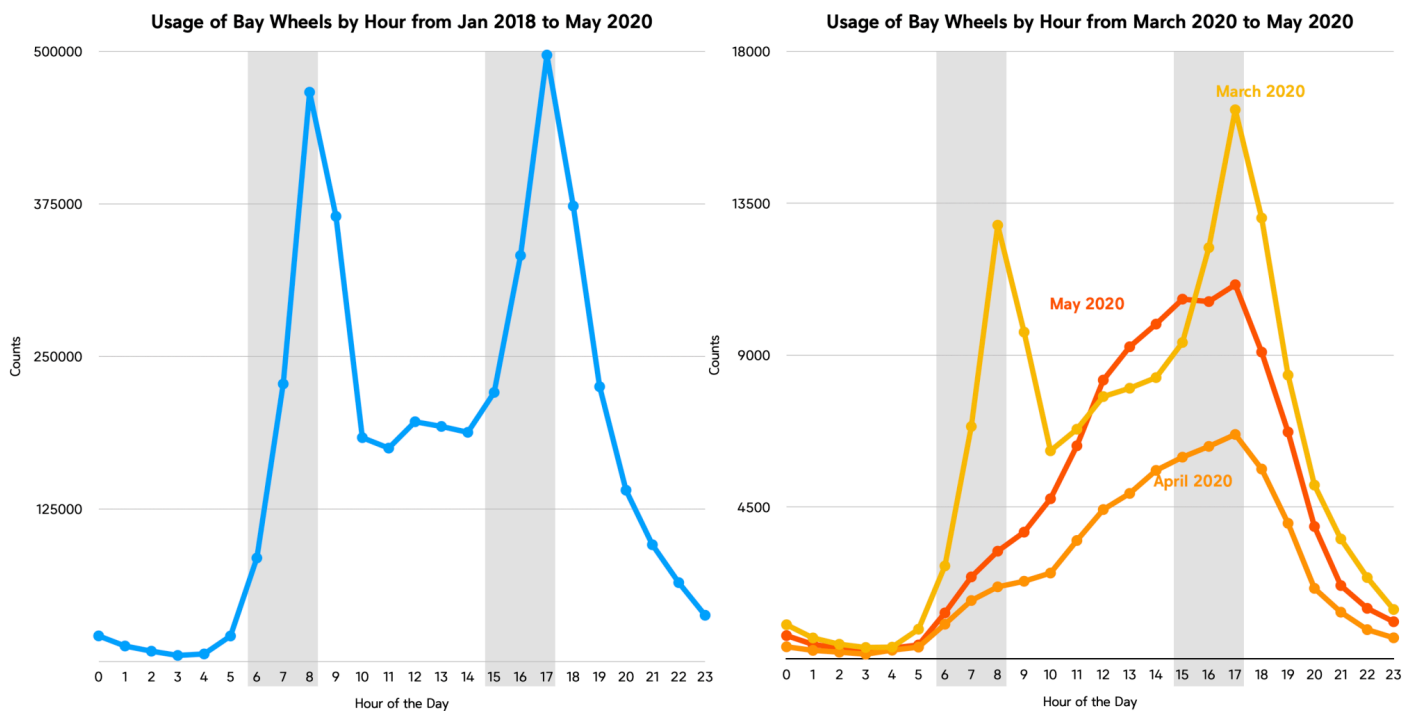
It is evident that the location of trips made in April 2020 compared to February 2020 are significantly less. The concentration of trips that are made in the northeast area of San Francisco decreased in April 2020, and instead there was more scatter towards other regions. The start of the shelter-in-place order affects areas in San Francisco that might not have a bike station near them and also do not have a dockless bike near them since less people are using the bikes.

Also, we realize there is fewer trip near the Golden Gate Bridge and its park. It's because there was road closure near the park for social distancing and people also feel afraid to go leisure. However, interestingly southwest part of San Francisco has an increased number of bike-share before shelter-in-place and we assume people bike to go grocery shopping because it is a residential area and people want to keep social distance on the way.

Travel Patterns

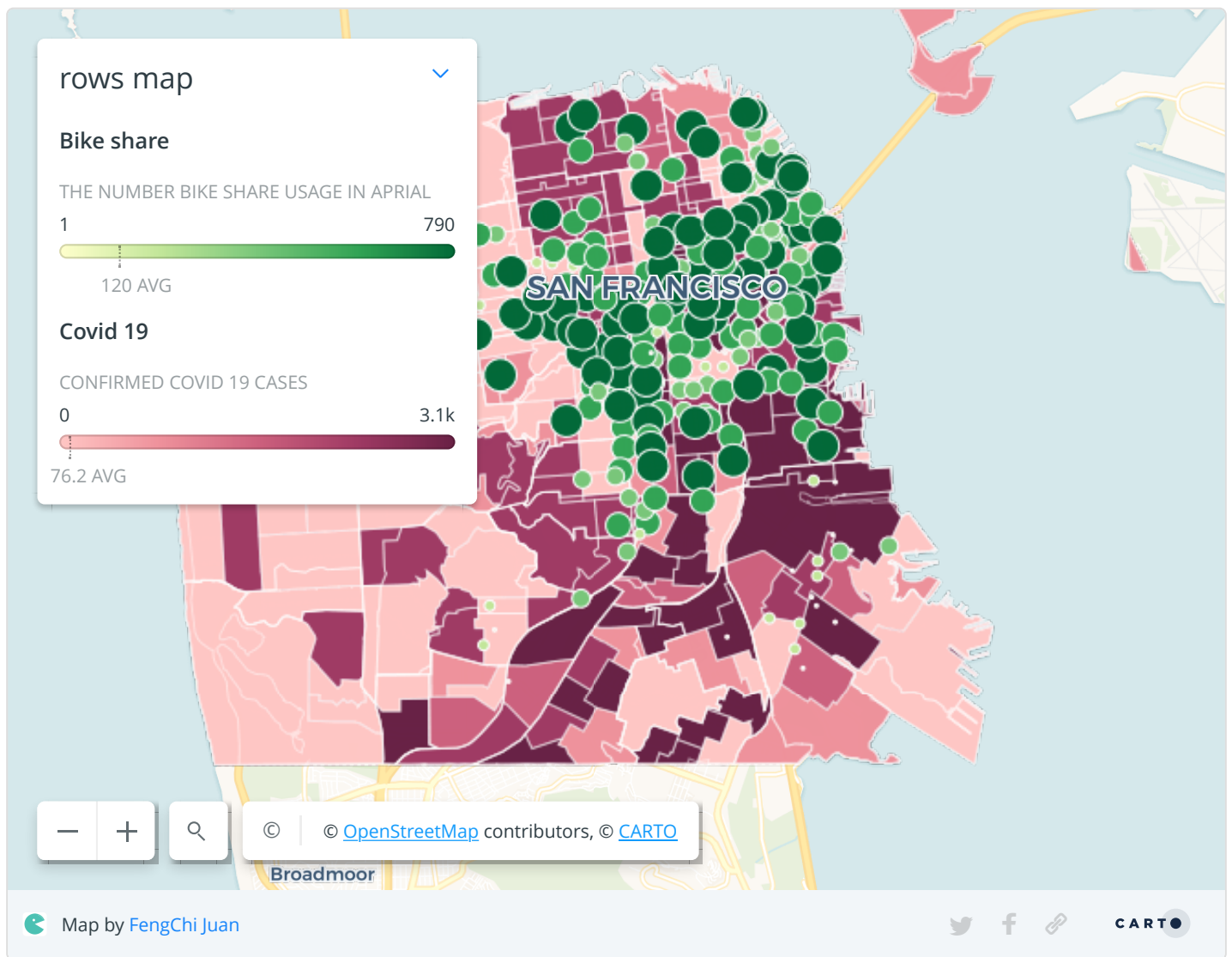
Some of the travel patterns that are tracked by Bay Wheels include the time of day for trips and whether the user is a casual rider or a subscriber. The chart below shows that

bike sharing is most common during 7am to 9am and 4pm to 6pm. This time period coincides with San Francisco's working and rush hours. However, after the shelter-in-place order went into effect, the most common time for bike sharing shifted to 3pm to 6pm, meanwhile morning time usage rapidly decreased. This change indicates that lots of the users of Bay Wheels have used shared bikes as a way to commute to work, but due to the shutdown in San Francisco after the announcement of shelter in place, many users no longer need a shared bike to commute. On the other hand, social distance may also be a reason why people do not want to use BikeShare. Although bike sharing is convenient, it is also easy to expose users to the crowd, thereby increasing the chance of infection.

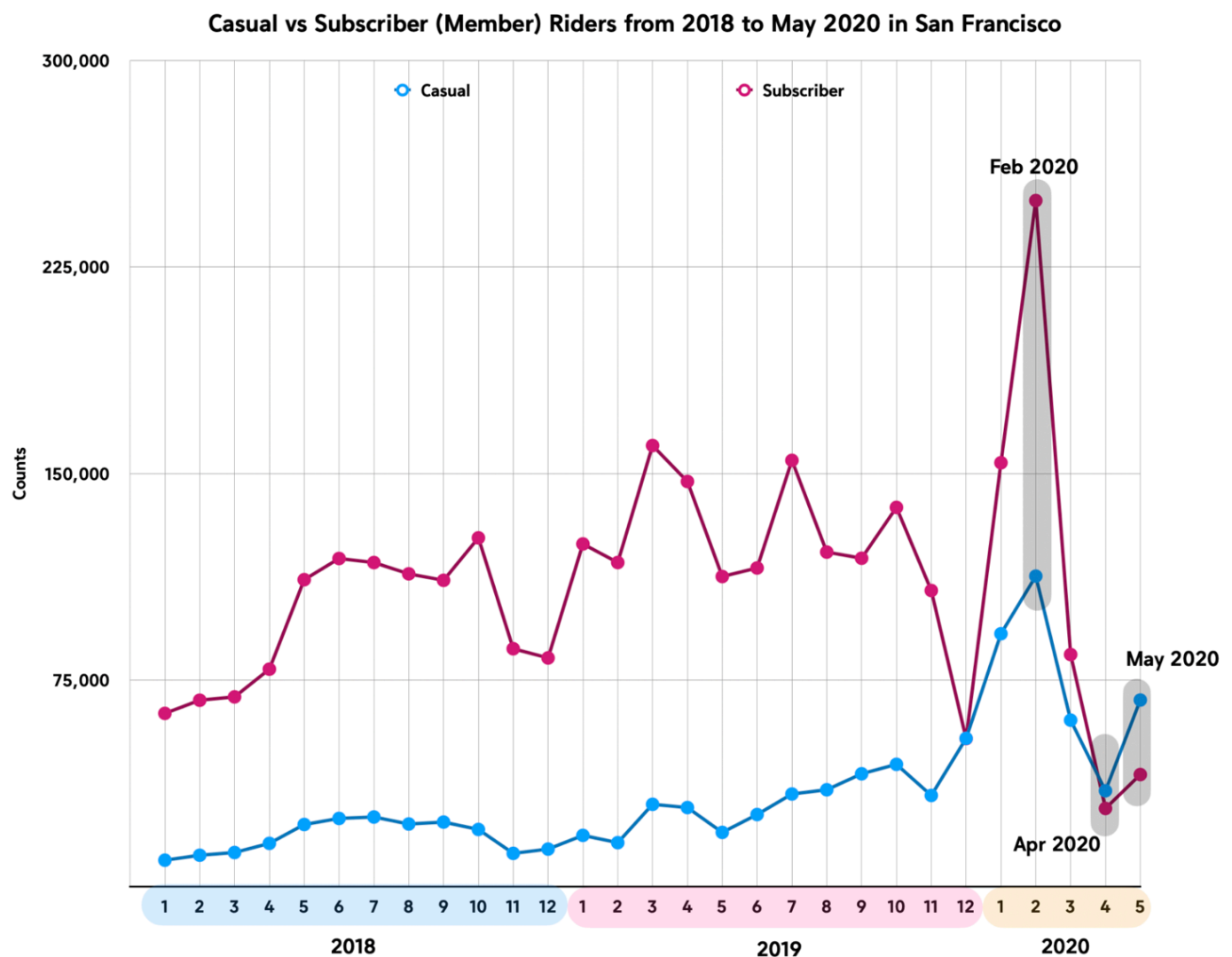


The Impact of COVID-19 on Bike Share

The following map shows the confirmed Covid 19 cases for San Francisco , and it overlaps with the number of the Bikeshare usage. As we can see from the map, COVID 19 has a greater impact on the east of San Francisco than the west, and most of the confirmed cases are concentrated in the southeast. On the other hand, the use of bike share is mostly concentrated in the northwest of San Francisco. Although the usage of bike share partially overlaps with COVID-19, this does not prove that COVID-19 is directly related to the usage of bike share. Bike share usage is mainly concentrated in places with high population density in San Francisco. These places include Union Square, China Town, San Francisco City Hall, and other San Francisco landmarks. However, COVID-19 does affect Bikeshare usage. Starting from the March of 2020, Bikeshare's usage showed an avalanche decline, and the usage in April was even less than a quarter of that in February.

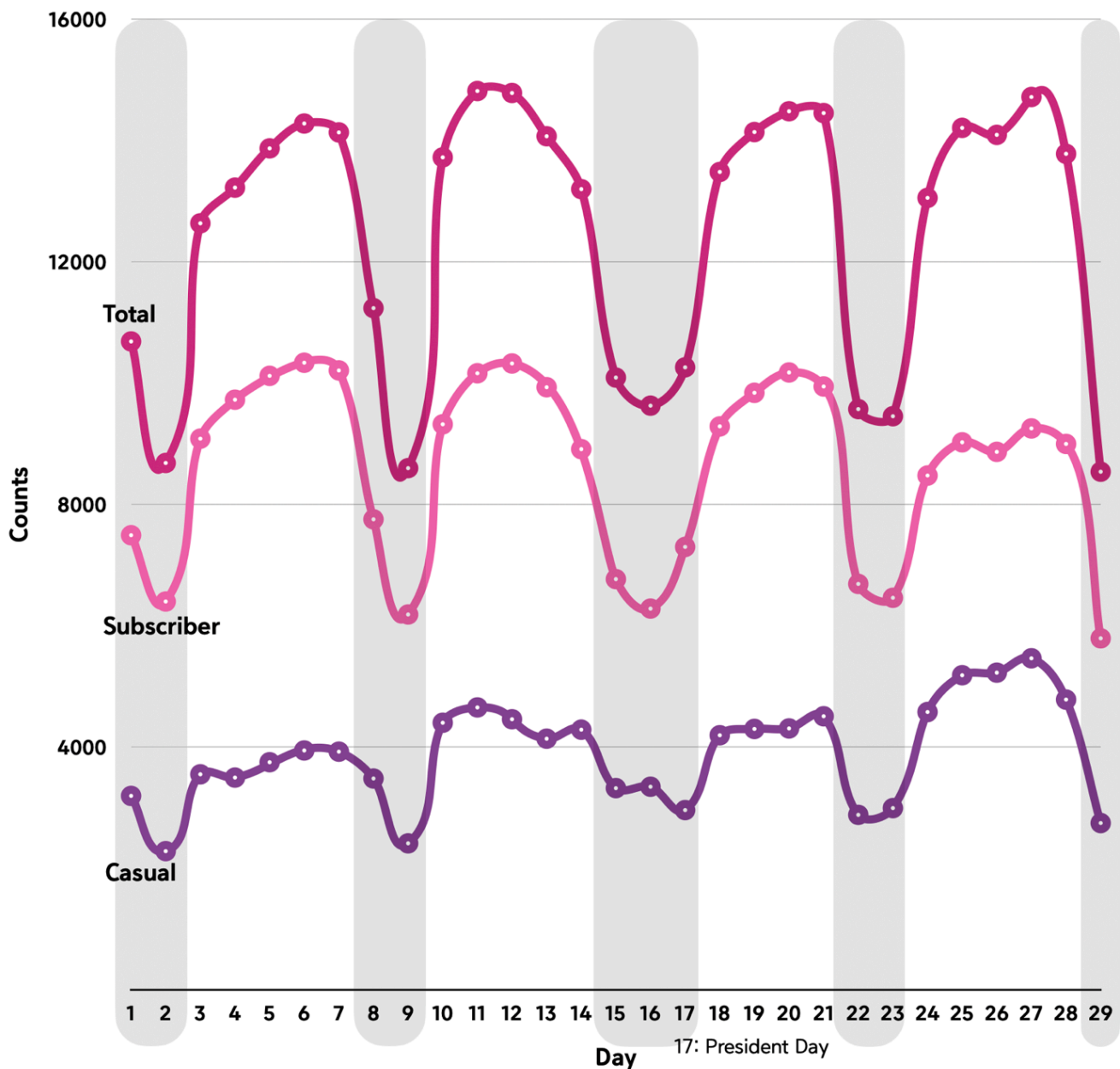


In addition, usage of Bay Wheels has constantly increased from 2018 especially casual members. Then, Bay Wheels membership usage spiked in February 2020 in both casual and subscribed members and recorded the maximum number of counts in the history. However, after the shelter in place announcement, the usage of casual and registered users has rapidly decreased, and the usage of registered users even reached the lowest point in history. One of the reasons that causes this situation is like the one we mentioned earlier, lots of the members register the Bikeshare for commuting purposes, but shelter in place announcements made them no longer need a shared bike to commute. Another reason might be that the policy greatly reduces the number they go out, so the registers are no longer willing to pay for the membership fee.



As we see the casual and subscriber by day in February figure, we figured count of subscribers and casual is normally high during weekdays, but low in weekend and holiday which has shaded area. Not only February but also overly more people use Bay Wheels during the weekdays. Compared with casual users, the usages of subscriber users have a larger gap between weekdays and weekends. This data further confirms the point we mentioned earlier, Bikeshare has become a widely used public transportation for commuting in San Francisco besides MRT, bus, and train. How to shorten the gap between weekdays and weekends is a problem that Bay Wheels needs to face, because this indirectly reflects the excessive concentration of Bikeshare's stations in work-intensive places, resulting in fewer people using Bikeshare on holidays. If Bay Wheels can solve this problem, they can better save costs and increase the number of Bikeshare users.

Count of Casual vs. Subscriber by Day in February



Conclusion

On March 19, Bay Wheels provided medical workers with a 30-day free plan to use Bikeshare. From the map above, we can find out that most hospitals have a Bikeshare station nearby. Therefore, in non-emergency situations, Bikeshare may be a new way to go to the hospital in a traffic jam. As we mentioned above, COVID -19 not only affects the number of Bike Share usage but also changes the period for users to use Bike Share. Also, Bike Share's station is mainly concentrated in the northeast of San Francisco, this area is the gathering place of San Francisco's business and financial industry, and the neglected southwest may be Bay Wheel's next target. As Dr. Tedros Adhanom Ghebreyesus, Secretary-General of the World Health Organization, mentioned on February 11, the COVID-19 epidemic will continue for a long time. How to increase the number of users under the influence of the pandemic will be the first problem faced by Bay Wheel. Although from our maps and data, Bike Share does not directly affect the

spread of the epidemic, the panic caused by the outbreak has affected all users. And restoring members' confidence in Bike Share is a way to recover losses.

Sources

System Data: Bay Wheels. Retrieved June 10, 2020, from <https://www.lyft.com/bikes/bay-wheels/system-data>

COVID-19 Cases and Deaths Summarized by Geography

<https://data.sfgov.org/COVID-19/COVID-19-Cases-and-Deaths-Summarized-by-Geography/tpyr-dvnc>

Bay Wheels Expansion Map: <https://www.google.com/maps/d/u/o/viewer?mid=1e5LCPpTNmBjo-Iy3DYc6Yw9mfoVRqy1j&ll=37.769785766663325%2C-122.42869452189062&z=13>

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