Seattle Department of Transportation

2017 FREE-FLOATING BIKE SHARE PILOT EVALUATION REPORT

August 2018

Seattle
Department of
Transportation

ACKNOWLEDGEMENTS

CONTENTS

Note: Appendices can be found at www.seattle.gov/transportation/bike-share

Seattle's Vision and Values for Transportation

At the Seattle Department of Transportation (SDOT), our vision is a vibrant Seattle with connected people, places, and products. Our mission is to deliver a high-quality transportation system for the city of Seattle.

SDOT is focused on creating a safe, interconnected, vibrant, affordable, and innovative city for all. We value:

A Safe City

We will not accept traffic deaths as an inevitable part of traveling together in a safe city. Our goal is to eliminate serious and fatal crashes in Seattle. Safety also means being prepared for a natural disaster by seismically reinforcing our bridges to withstand earthquakes.

An Interconnected City

More travel options doesn't always equate to an easy-to-use, interconnected system. Our goal is to provide an easy-to-use, reliable transportation system that gives you the options you want when you need them.

A Vibrant City

A vibrant city is one where the streets and sidewalks hum with economic and social activity. People meet and shop and enjoy the beautiful city we live in, side by side with goods delivery and freight shipping. Our goal is to use Seattle's streets and sidewalks to improve the city's health, prosperity, and happiness.

An Affordable City

Our goal is to give all people high-quality and low-cost transportation options that allow them to spend their money on things other than transportation. The transportation system in an affordable city improves the lives of all travelers – those with the latest model smartphones in their pockets and those without.

An Innovative City

Demographic changes and technological innovation are radically reshaping transportation. Our goal is to understand and plan for the changes of tomorrow, while delivering great service today. This includes newer, more nimble approaches to delivering projects and programs to our customers.
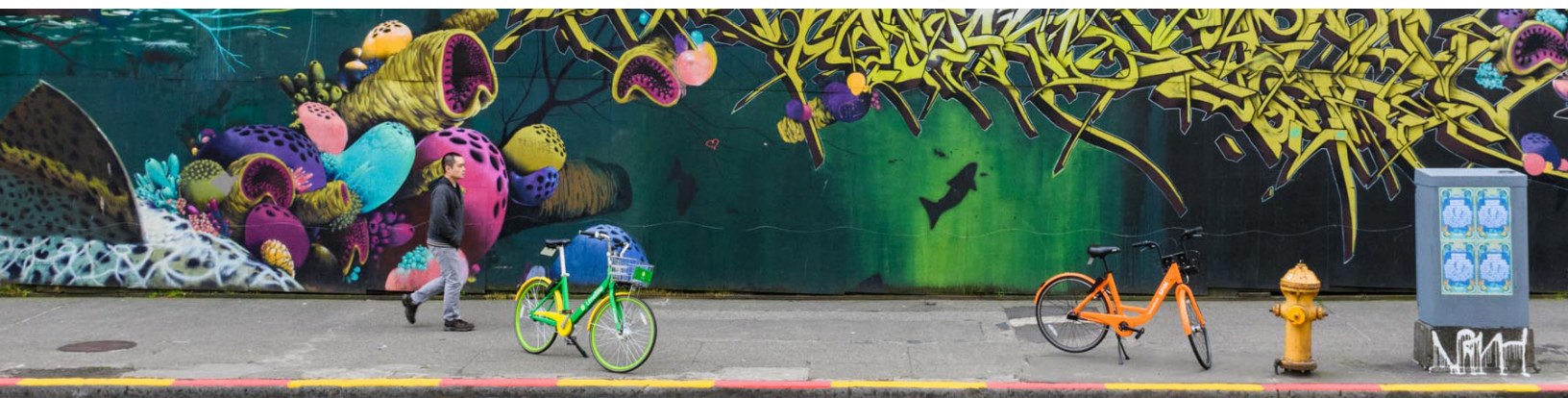
INTRODUCTION

Increasing Options in a Growing City

Seattle is one of the fastest growing cities in the US. With growth, our city entered into a period of dynamic change. Our population, our ability to live affordably, and our daily travel habits are all in flux.

Roughly 36% of Seattle's residents moved here in the last eight years. Over half of downtown's residents arrived in Seattle after 2010. The pace of our growth is accelerating and placing immense pressure on our transportation system. We need a variety of sustainable mobility options to keep our city moving and meet broader objectives related to affordability, access to opportunity, active living, and reducing transportation-related carbon emissions.

To that end, Seattle has grown one of the most robust transportation marketplaces in United States. As we invest in public transit service and infrastructure, private app-enabled mobility services are expanding transportation options to meet people's daily travel needs and supporting walkable, bikeable, and transit-oriented lifestyles. The emergence of app-based mobility services like car sharing, ridehailing, and dynamic carpooling are providing flexibility and further reducing the need to own a car in Seattle.

In July 2017, the Seattle Department of Transportation **introduced the nation's first private free-floating bike share marketplace**, enabling a new, citywide mobility option. The City established an innovative permitting pilot to test this new transportation technology, learn if and how it can achieve mobility and livability goals, and determine how to leverage private sector innovation to meet the Seattle public's interest in a long-term program framework.

This emerging mobility service affords exciting opportunities for active, low-carbon transportation and recreation. As "bike share" evolves to include new approaches, features, and devices, SDOT will structure the Program so everyone can benefit from the upsides while anticipating and protecting against the downsides.

Free-Floating Bike Share

From October 2014 to March 2017, Seattle operated a traditional station-based bike share program known as *Pronto! Cycle Share*. With station-based systems, bike share bikes are kept at docking stations scattered throughout a limited coverage area. Users need to find a station to rent a bike, and then find another to return the bike near their destination. The stations also often serve as kiosks, letting users buy memberships and activate their rentals.

With the newer technology of free-floating bike share, the system no longer needs stations. Users typically use a smartphone app to unlock a bike wherever they're found, and end the ride by simply appropriately parking the bike and locking it. The bikes lock either with a wheel lock that keeps the wheels from rolling or an integrated lock that locks that bike to a bike rack or other appropriate object.

Three companies participated in Seattle's pilot program, all with the wheel lock method that allowed users to leave the bike anywhere the permit parking requirements allowed. Those three companies were:

- LimeBike (green bikes)
- ofo (yellow bikes)
- Spin (orange bikes)

Program Goals

Rooted in our values, SDOT seeks to create a safe, interconnected, vibrant, affordable, and innovative city for all. Our **New Mobility Playbook** describes our principles and strategies for adapting emerging mobility services to meet the needs of our city. The Playbook informed the development of the pilot permit requirements.

Done correctly, free-floating bike share has the potential to meet many of the challenges in Seattle's transportation future. It can offer an affordable and healthy option that bridges gaps in our transportation system. To maximize those benefits while minimizing potential downsides, SDOT developed the following program goals:

1. Support an **active, healthy, and people-first** use of Seattle's streets;
2. Ensure **affordable and equitable** service—particularly for cost-burdened communities of color—while expanding access to opportunities;
3. Fill mobility gaps and improve **connections to transit**;
4. Be **safe** and advance our **Vision Zero** objectives;
5. Provide a **low-carbon mobility option** as part of Seattle's efforts to reduce carbon emissions;
6. **Manage public space** to ensure sidewalks are organized and free from obstructions; and
7. Derive insights into how people use the system, compliance issues, and targeted bike infrastructure investments with **robust data partnerships**.

Seattle's Approach

Developing a new management approach to an entirely new mode of transportation is inherently challenging. Over the past year, SDOT developed and refined a novel method to regulate free-floating bike share companies. This method is now being replicated in many cities across the United States and beyond. **The intent of this management approach is to be flexible** enough to allow the private sector to innovate**, while ensuring the public attains the outcomes that best meet the public interest.** To that end, we will optimize our permit requirements through an iterative process, collaboratively changing requirements as we continue to learn and understand the ongoing shifts in the free-floating bike share technology and business model.

Our general approach to the free-floating bike share pilot program included the following:

Rethink procurement. Pronto!, Seattle's first-generation docked bike share system, is an example of how local governments typically establish a bike share system. Cities are on the hook to identify millions of dollars to fund a system that might not meet the mobility needs of the entire city. In the case of Seattle, that approach and docked bike share did not work. Is there a way to obtain the benefits of a bike share system without spending millions of dollars in capital and operating costs? Our approach seeks to answer that very question by creating a tightly controlled permitting program at no cost to the taxpayer.

Establish a sandbox based on values. Policy innovation and programmatic rule making cannot happen in a vacuum. Guiding what is new requires a north star. We used the City's five core values and the five Principles for New Mobility in the development of the free-floating bike share program and its permit requirements.

Foster a first-of-its-kind data and research partnership. SDOT partnered with the University of Washington's Transportation Data Collaborative (TDC) to ingest and process the permitted vendors' data. This unique partnership was invaluable for the City to aggregate data and support data reporting, while protecting the public's personally identifiable information.

Test pilot permit requirements. SDOT established a set of pilot permit requirements as a way to enable private bike share vendors to provide a service in exchange for public benefits. The permit requirements control for risks while enabling us to learn about this new technology and business model, identify how the system does or does not meet our objectives, and make changes to the permit requirements based on our findings. The aim is to remain nimble, making annual permit changes that allow vendors to innovate while ensuring we are getting the most value and responsibly managing the right-of-way.

Evaluate the program. This evaluation aims to answer the fundamental question: Should SDOT continue to support a free-floating bike share program? The report represents the culmination of a 6-month data collection period, in which we gathered quantitative data from the bike share companies' and public surveys, as well as qualitative data from public stakeholders, residents, and system users.

Our free-floating bike share program will be modified based on this pilot's findings. As with any pilot, there were successes and failures. Our aim is to use lessons learned in the pilot to advance the positive aspects of free-floating bike share, while adapting the system to eliminate the unintended negative aspects.

METHODOLOGY

The following describes our overall pilot evaluation study period and area, data collection and methods, and key metrics.

Study Period and Service Area

Seattle's free-floating bike share pilot launched on July 7, 2017. For the purposes of this evaluation, we defined the study period as July 7, 2017, to December 31, 2017, or approximately 5.5 months of data collection. The study period spanned three seasons (partial summer, fall, and partial winter). With all three operators covering the entire city, the service area is defined as the City of Seattle city limits.

Data Collection Methods

While data was assessed on a rolling and monthly basis in collaboration with permit holders and the TDC, the evaluation will aggregate data across the study period.

Raw ridership data, as specified by the SDOT permit and the TDC, was submitted via Application Program Interface (API) or spreadsheet by the three independent bike share companies. The companies submitted data on a weekly basis directly to the TDC over the course of the study period. Importantly, this data contained unique anonymized Rider Identifiers that allowed the TDC to calculate accurate trip pattern data while not collecting any personally identifiable information. The TDC cleaned and aggregated data across all three companies in order to provide insight on

SDOT and UW data partnership

The University of Washington (UW) approached SDOT in the spring of 2017 about an innovative data-sharing collaborative created in partnership with the UW's Information School and Washington State Transportation Center (TRAC). This partnership was named the Transportation Data Collaborative (TDC). In an effort to leverage new technology partnerships and innovative approaches to data collection, privacy, and reporting, SDOT allowed the private bike share companies to submit data specified in the pilot permit requirements directly to the TDC. This allowed the TDC to serve as a data aggregator and data reporter, bringing third-party analytical and privacy expertise to support the reporting needs of the bike share pilot program.

The data requirements were defined in the permit (Appendix A) and could be submitted via API or spreadsheet (CSV file) to be stored by the TDC. The TDC then created aggregated reports and presented them to the City of Seattle on a regular basis.

our key metrics and research questions. The TDC then produced an analytical report that serves as one of the inputs for this evaluation (Appendix B).

The data fields required by the permit and sent to the TDC included:
- Trip start date, time, location, bike identifier, and anonymized user identifier
- Trip end date, time, location, bike identifier, and anonymized user identifier
- Available bike location, start date and time, and end date and time.

The permit also required that each company issue an SDOT-designed survey to gather demographic and ridership data from bike share users. The TDC coordinated with the three bike share companies to issue this survey and collect responses. These responses included the anonymized Rider ID field, allowing the TDC to tie trip data to survey answers.

Qualitative Methods

To gain a better and more complete understanding of non-ridership-related impacts of bike share, SDOT took a multi-faceted approach.
- We issued 3 surveys:
  - A statistically-valid 4% margin-of-error web-panel survey with EMC Research based on a random sample of 600 Seattle adults with internet access
  - An open community survey through Survey Monkey that received 1,883 responses
  - An open survey focused on people with disabilities with 56 responses
- We hosted a public meeting to learn about the impacts of bike share on disabled people.
- We attended SDOT Mobility Fairs at two Seattle Housing Authority properties:
  - Yesler Terrace
  - New Holly

- We attended, spoke at, and listened at 5 community meetings hosted by:
  - The Seattle Pedestrian Advisory Board
  - The Pedestrian Access Advisory Committee
  - The United Blind of Seattle
  - The West Seattle Transportation Coalition
  - The Squire Park Community Council
- We met with several community partners and advocate organizations, including:
  - The Seattle Housing Authority
  - Entre Hermanos
  - Transportation Choices Coalition
  - Feet First
  - Cascade Bicycle Club
  - Seattle Neighborhood Greenways
  - Outdoors for All
- We collected and recorded 134 emails and phone calls to SDOT that had specific bike share feedback during the study period.

Equity Analysis

To determine if bike share was reaching Seattle neighborhoods where cheap and healthy transportation options are most needed, we first needed to determine a baseline geospatial equity metric. Seattle's Comprehensive Plan, Seattle 2035, includes two indices: the Displacement Risk index and the Access to Opportunity index. We combined the two indices to create our own equity aggregate score.[1] The results of this analysis can be found on page 37.

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[1]. Methodology for combining Displacement Risk and Access to Opportunity indices:
1. We calculated the mean displacement risk score and access to opportunity score in each of our Seattle neighborhoods.
2. To normalize the two scores, so that in both cases a higher score corresponds to higher equity concerns, we subtracted all values in the access to opportunity score from the maximum value of 37.71.
3. To weight access to opportunity and displacement risk evenly, we multiplied the displacement risk scores by 1.95.
4. We added the scores to create a new equity aggregate score.
5. Finally, we divided the scores into five even tiers, so that each tier has the same number of neighborhoods. Tier 1 includes areas with the highest scores, meaning they have the highest displacement risk and lowest access to opportunity, and Tier 5 includes areas with the lowest scores, or lowest displacement risk and highest access to opportunity.

Key Metrics

In order to fairly evaluate the free-floating bike share pilot, SDOT identified a set of key success metrics. For comparative purposes, we attempted to keep parity with industry standards for station-based bike share. However, there are a number of differences from standard docked systems that came to light due to the dynamic nature of free-floating fleets. Without a strong precedent or comparison, we created evaluation measures that fall into the following top-line categories:

- **Ridership:** Total trips
- **Geographic Coverage:** Amount of city covered
- **Equity:** Coverage, usage, low-barrier options, and outreach
- **Safety:** Number of collisions per 1 million trips
- **Parking Compliance:** Percent of bikes incorrectly parked and blocking access
- **Disabled Access:** Parking issues and bike availability
- **Maintenance:** Percent of bikes in good working condition and Percent of bikes with safety hazards
- **Public Opinion:** Favorability and issues
- **Cost:** Total public subsidy

In addition to our key metrics, we looked at a number of other data points and findings to comprehensively evaluate this complex pilot program.

Definitions

Definitions were determined through a collaborative effort between the TDC (analyst), SDOT (permit manager), and the bike share companies (permit holders).

Fleet Size: Total number of bikes on the street, including active and inactive bikes. This term was not well-defined early in the pilot (see call-out on page 14)

Trips Per Bike Per Day: Daily average of number of trips started divided by fleet size.

Unique rider: Total number of rider IDs across all three companies. Note that if a rider had signed up through more than one company, they would be overcounted. Conversely, if a rider shared their registration with friends or family, they would be undercounted. Therefore, this number is only a sum of all three companies' unique rider accounts in Seattle.

Total Trip Time: Trip end time minus trip start time.

Total Miles Per Trip: Trip time (fraction of hour) multiplied by average bike speed (6mph). To reduce overestimated trip times as a result of a user failing to end the trip, the TDC discounted all trips over 24 hours in their more conservative estimate and all trips over 3 hours in a less-conservative approach.

Total Trips: Trip starts minus trips under 30 seconds, which were categorized as false starts.

Trips Per 1000 Residents: Total City of Seattle Population (713,700) divided by Total Trips.

Collision: All collisions reported to bike share companies, and all bike collisions reported to SPD where the police report indicates a bike share bike was involved.
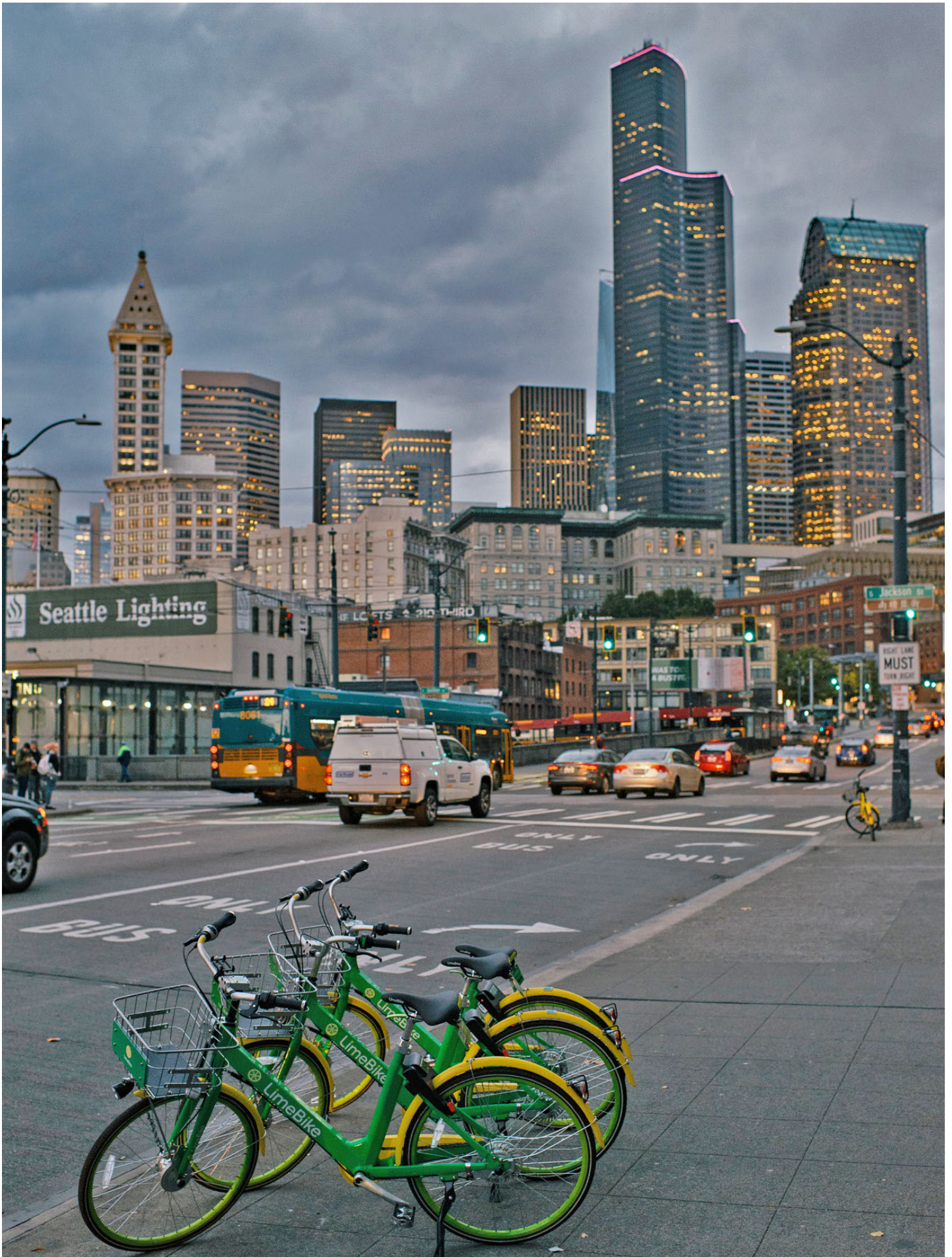
BIKE SHARE BY THE NUMBERS
Measuring bike share's mobility impacts in Seattle

To fairly and accurately evaluate Seattle's free-floating bike share pilot, SDOT analyzed ridership data, parking data, outside studies, surveys, and observations. Ridership data answers the most basic questions about system productivity, use case, and travel behavior, including:

- How much is the system used?
- Where are the bikes used?
- When are the bikes used?
- Who is using the bikes?
- How are people using bike share?

Throughout the pilot, SDOT worked with the Transportation Data Collaborative at the University of Washington to collect bike, trip, and survey data from all three companies, aggregate the data to protect private and proprietary information, verify the data, and report the data back to SDOT to be included in this evaluation.

Where applicable, the evaluation compares performance to successful and unsuccessful dock-based bike share systems, including Pronto!, Seattle's previous, unsuccessful dock-based bike share system and Biketown, Portland's successful hybrid bike share system that is predominantly dock-based, but also allows users to lock to a bike rack for an added fee.

Fleet Size

SDOT allowed the company fleet sizes to grow throughout the pilot period. Figure 1 shows monthly fleet sizes using different counting methods, along with the SDOT cap for that month. The fleet size started at just under 1,000 bikes in the first month and swelled to 9,450 bike by the end of the pilot study period. For comparison, Seattle's fleet surpassed Portland's Biketown system size in the 5th week of the pilot.

Managing any new mobility system, particularly one that has no precedent, will be met with challenges and unforeseen gaps. SDOT identified issues related to fleet size early on during the pilot study period. One company exceeded the fleet cap in August and SDOT also found process delays in reporting. The Lesson Learned call out box to the right explains fleet size data discrepancies and the need to set clear fleet size definitions.

LESSON LEARNED
Define all terms

SDOT found discrepancies in reported fleet size throughout the pilot study period. Without a clear definition of "fleet size" in the pilot permit, companies simply counted the number of available bikes. Meanwhile, the TDC was originally counting all bikes ever deployed and not counting bikes lost, broken, located in bike share company storage, or otherwise removed. SDOT is confident that the actual fleet sizes were closer to the company-reported "available bikes", but a future permit will need a clear definition of this term and the data needed to calculate it.

That definition should account for all bikes on the street regardless of their availability for rent, but not bikes removed from the street or not in Seattle.
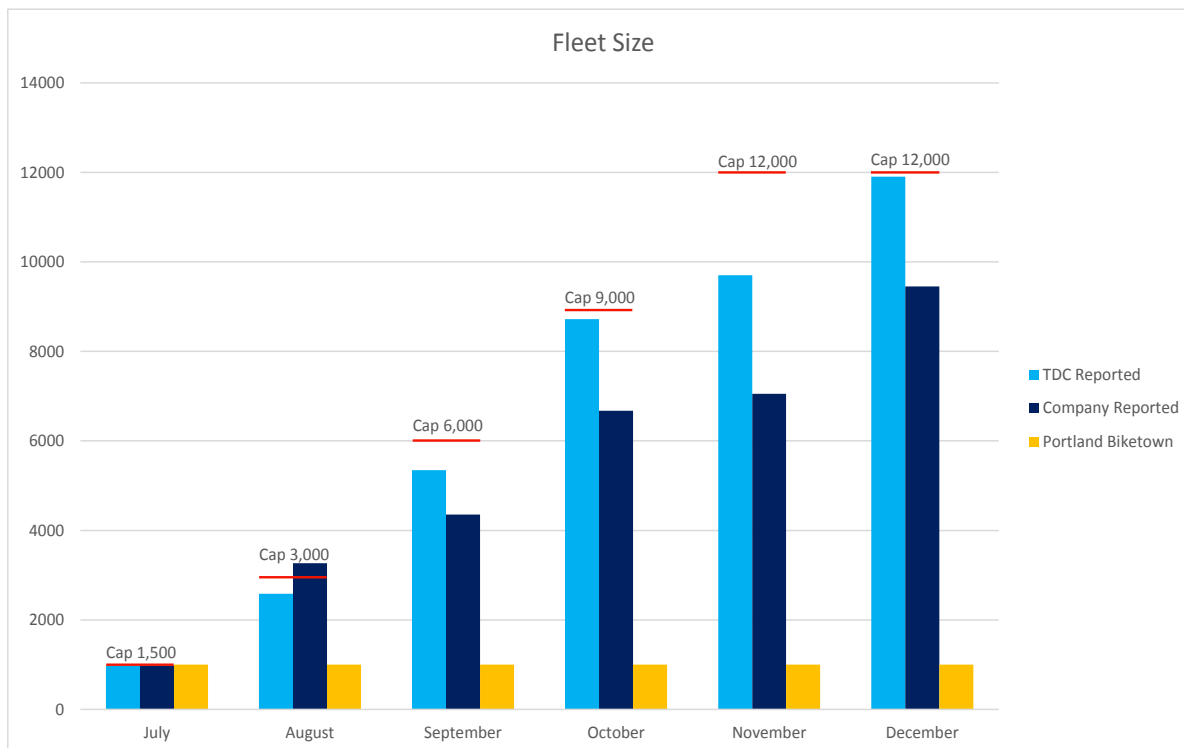

Figure 1: Overall fleet size from July to December, 2017

Total Trips

Across the three companies, 468,976 total trips were taken in the 5.5 month pilot period, averaging 2,791 rides a day. This is almost ten times more trips taken than during the same time frame in 2016 with Seattle's decommissioned dock-based system, Pronto!. Compared to Portland's Biketown, a dock-based system in a comparable climate, Seattle's free-floating bike share pilot counted almost three times the rides during the same period.

Monthly ridership (Figure 3) growth was commensurate with the growth in fleet size until ridership declined along with weather conditions in November and December. However, even during these months of rain, cold temperatures, and short days, users were still taking over 60,000 trips per month. This data suggests that we can expect significantly more trips as bike share fleet size and service area coverage expansion coincide with improved weather.
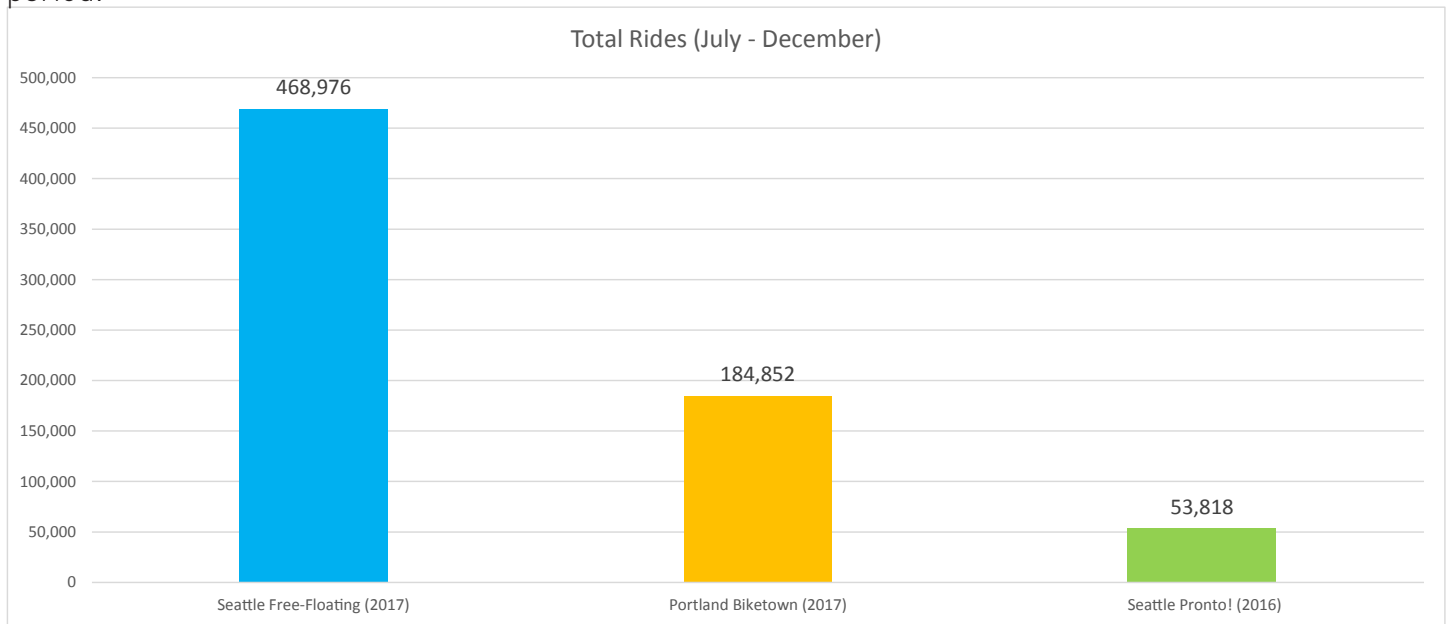

Figure 2: Total rides from July to December across Seattle's free-floating system, Portland's Biketown, and Seattle's Pronto!
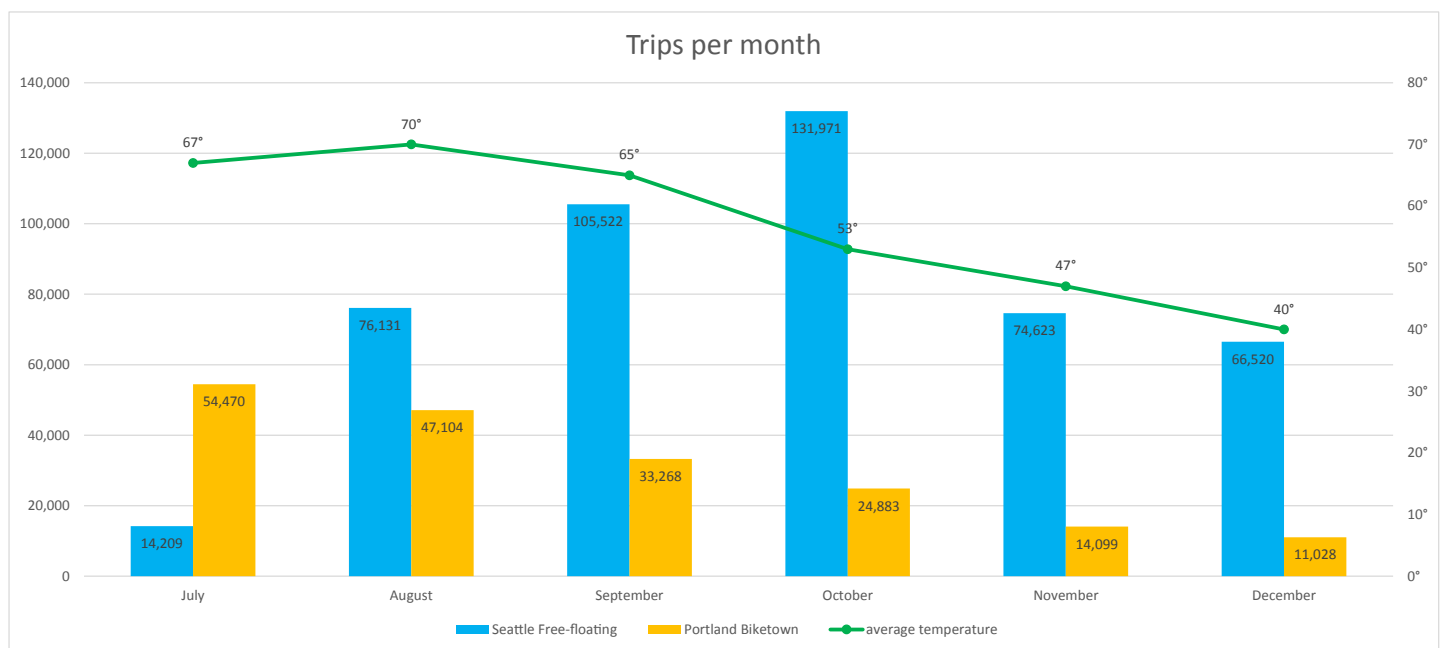

Figure 3: Rides taken per month from July to December, 2017 for Seattle's free-floating system and Portland's Biketown, shown with the average temperature per month
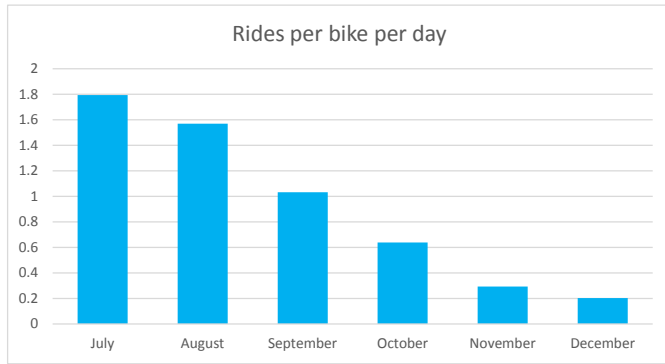
Rides per Bike per Day

Figure 4: Rides per bike per day by month, from July to December, 2017

During the pilot period, the pilot averaged **0.84** rides per bike per day (rbd). This peaked above 2.5 rbd early in the pilot, when the fleet was small and the weather warm, while a cold December day with a large fleet had less than 0.1 rbd. For comparison, Seattle's old dock-based system, Pronto!, saw an average of 0.7 rbd, while the National Association of City Transportation Officials reports that the 2017 nationwide average for dock-based systems was 1.7 rbd.

Average Daily Trips per 1000 Residents

Seattle's pilot averaged **3.9** trips per day per 1000 residents. This number is difficult to compare to cities with dock-based systems, as docked service areas do not typically cover the entire city. However, average daily trips per 1000 residents will be a useful baseline for comparing free-floating usage across cities of different sizes.

1.4 Distance Traveled

Seattle users averaged an estimated **2.2 miles per trip**, or over **1 million total miles** ridden in the pilot period alone.[1]
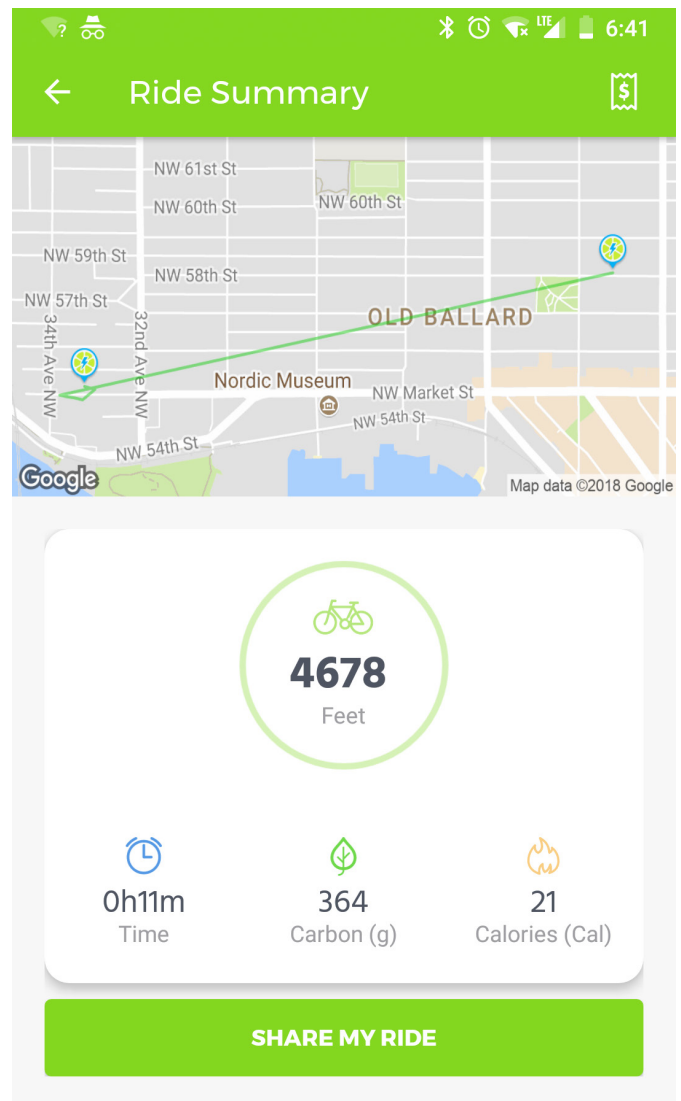
In the next phase, SDOT will capture anonymized waypoint data to calculate, rather than estimate, distance traveled. This method will better measure usage and compare trip distances originating in different neighborhoods, land use environments, and topographies (see Lesson Learned). There is no national standard for estimating bike share mileage[2], which makes this a difficult data point to use as a comparative metric between municipalities.

This ride summary screenshot from the LimeBike app shows an impossible straight line as the route between the origin and destination. This inaccurate route representation demonstrates how rides lacking good waypoint data tell little about which routes users are choosing.

LESSON LEARNED
Request waypoint data

One exciting prospect of GPS-enabled bike share is the potential for city planners to collect and use detailed trip routing data that can tell exactly how long people are riding, how fast, what routes they choose and what routes they avoid. This data is vital to ensure the City understands travel patterns, aligns bike behavior with infrastructure plans, and works to give people more safe, healthy, and low-carbon transportation options. This could also inform a much more accurate "distance traveled" metric than the speed/time extrapolation used by most docked systems and the SDOT pilot.

The bike share pilot permit only required time and location data at trip start and trip end, but we know this mid-trip data is essential to fully understand how people are using free-floating bike share.

[1] This estimate is based on all trips under 24 hours in length and an assumed speed of 6 mph, assuming that trips over 24 hours constitute errors and/or instances where users failed to close their trip. If we focus on trips under three hours, possibly losing some actual trips as well as more false reports, that estimate changes to **1.5 miles per trip.**
2. As an example, New York's Citibike uses 7.5 miles per hour and a maximum of 2 hours or 14.9 miles. SDOT and the UW determined 7.5 mph was not accurate in Seattle, nor was dropping all trips over 2 hours. Many other systems simply avoid reporting this metric.

Crashes, Safety, and Helmets

As part of the pilot bike share permits, each company was required to send weekly reports of bike share-related collisions to SDOT. In addition to this, we read each Seattle Police Department (SPD) report of bicycle-related collisions for any mention of bike share.

Through those two data streams, we found **five total bike share related collisions** from the pilot period. The bike share companies reported three collisions and we found two collisions in SPD reports. None of these reports included serious injury, although the two SPD collisions did include unidentified pain, scrapes, and abrasions.

Researchers at the University of Washington, led by Dr. Frederick Rivara, conducted a parallel study where preliminary reports indicate that of 96 bike-related injuries treated at Harborview Medical Center, only 3 were on bike share bikes. The study team has indicated that these results will not be published.

Although we recognize that this data may not capture all bike share crashes, these findings are consistent with national bike share studies. One study found that although bike share riders used helmets less often and were less experienced than personal bike riders, the collision and injury rates for bike share riders were lower than cyclists using personal bikes[1]. The study found that this may be due to bike share bikes being slower and more stable than personal bikes, and bike share users taking fewer risks than personal bike riders.

Survey responses and direct feedback from the community did identify helmet use as a concern. Even with King County's all-ages helmet law and educational messaging from the bike share companies, our user survey found that only **24% of respondents reported wearing helmets**. SDOT will continue to educate the public about helmet use, encourage companies to provide helmets to users, and cooperate in studies to ensure bike sharing remains a safe mode of transportation.

Surveys show that most users are choosing to ride without a helmet.

[1]Martin, Elliot, Ph.D., Adam Cohen, Jan Botha, Ph.D., and Susan Shaheen, Ph.D. (March 2016). Bikesharing and Bicycle Safety. Mineta Transportation Institute. CA-MTI-15-1204.

Trip Origin by Neighborhood

Bike share served the entire city in the pilot period, with all neighborhoods reporting trip starts. Figure 5 shows the number of trips starting in each neighborhood, with darker blue representing more trip starts, and lighter blue fewer. Belltown had over 35,000 trip starts, while Broadview, in the far northwest corner of the city, had only 46 trip starts. This shows the success the free-floating pilot had in reaching the entire city, with some neighborhoods of high use outside the coverage area of our old dock-based system (outlined in white). However, it also shows a great disparity in use, and more work is needed to make bike share a better tool in the northernmost and southernmost neighborhoods of the city.

Most trips began in the Downtown[1] area and the University District with 21% beginning Downtown and 12% beginning in the University District or on the University of Washington Main Campus. The neighborhoods west of UW along the Burke-Gilman Trail also saw high usage. The far northern and southern parts of the city saw the fewest trip starts, often coinciding with lower-density and lower-income neighborhoods. A future program must work to better serve all Seattle's neighborhoods.

Figure 5: Trip starts by neighborhood

Trip Destination by Neighborhood

Bike share users also ended trips all across the city. Similar to bike share trip origins, bike share destination density is concentrated in Center City neighborhoods, the University District, Green Lake, Roosevelt, and along the ship canal (see Figure 6). Again, trip ends extended far beyond the service area of the previous dock-based system. Trip activity in the Rainier Valley, SODO, and Georgetown demonstrate potential demand for affordable mobility in areas that were previously unserved by bike share.

[1]Downtown neighborhoods include Belltown, the Central Business District, Chinatown / International District, First Hill, Pioneer Square, and Yesler Terrace.
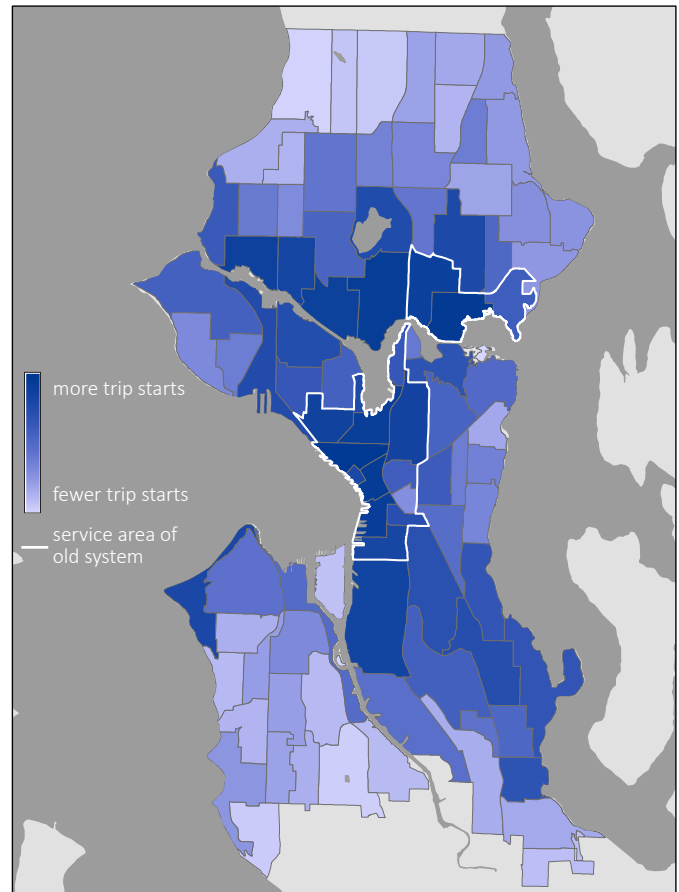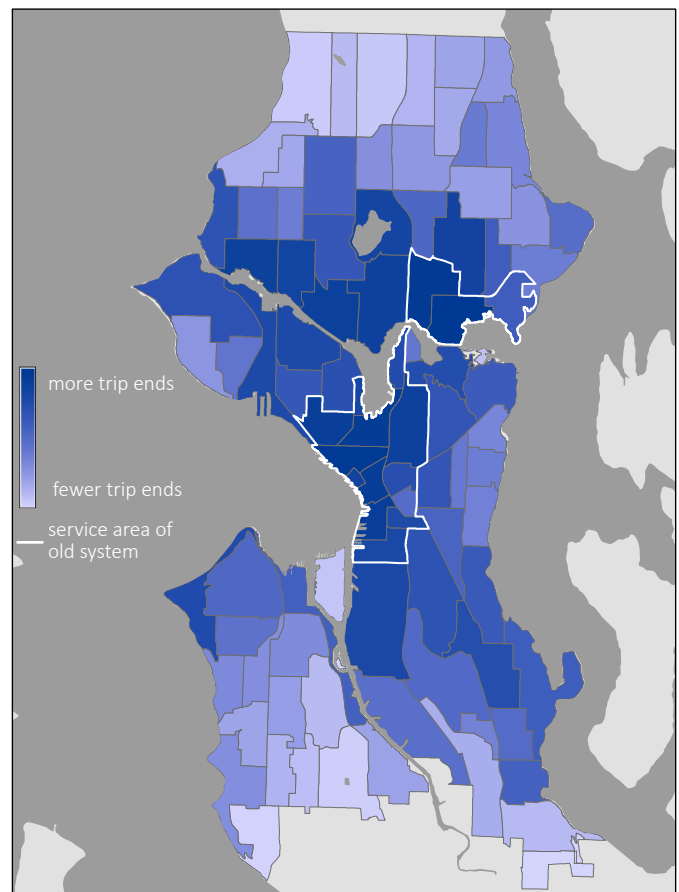

Figure 6: Trip ends by neighborhood

Origins Minus Destinations

Tracking the difference between origins and destinations by neighborhoods can show highly aggregated trip-patterns. Figure 7 demonstrates this difference, with lighter colors showing neighborhoods with more trip ends than starts and darker colors showing neighborhoods with more trip starts than ends. Figure 7 shows that generally, the bike share system was often used to move from the job centers near the center of the city towards the edges. This pattern aligns with weekday time usage that shows more trips happen in the afternoon, suggesting people may be using bike share to leave the job centers during the evening commute.
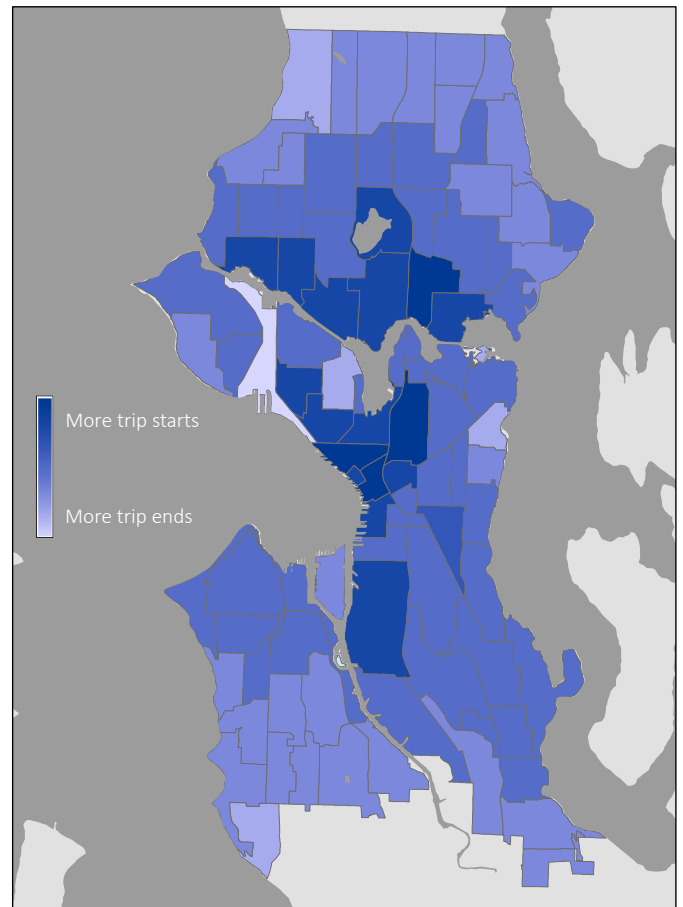

Figure 7: Map showing the difference between the amount of trip starts and the amount of trip ends by neighborhood.

Bike Availability

While trips began and ended throughout the city, we also wanted to understand where available bikes were located. Figures 8 through 12 show the average number of available bikes per day by month.

Early in the pilot, with fewer bikes, bike density was concentrated in the Center City and the neighborhoods north of the ship canal. However, as the fleet size grew throughout the pilot, the bikes spread to outlying neighborhoods and south into the Rainier Valley. This suggests that larger fleets contribute to bike share serving more of the city, including areas that have been traditionally underserved by affordable mobility options.
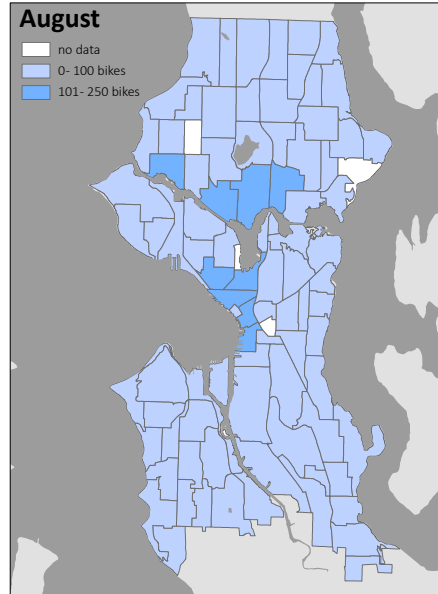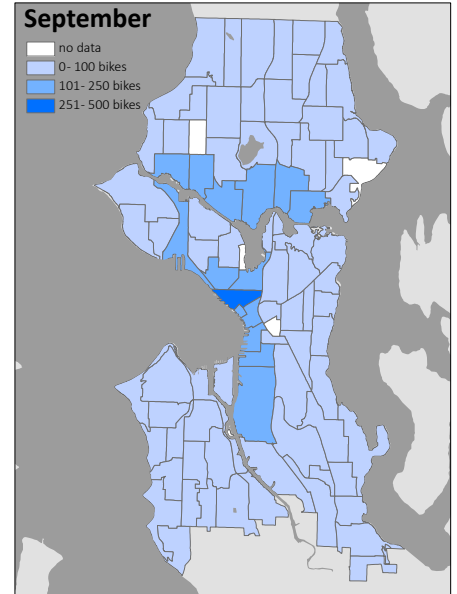

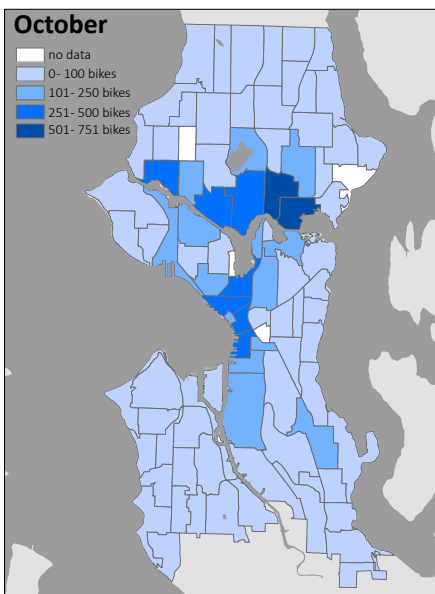*Figure 8: fleet size: 3,265*

Figure 9: fleet size: 4,356

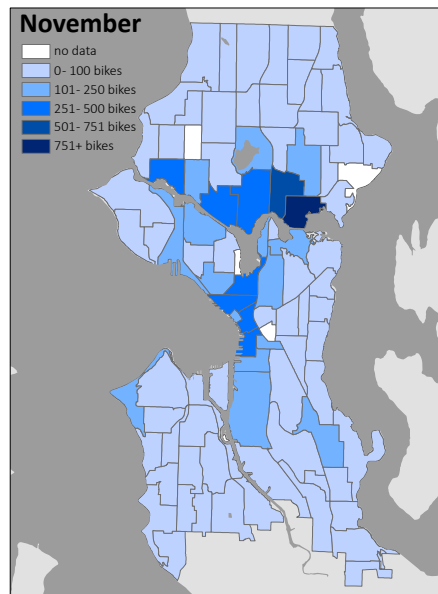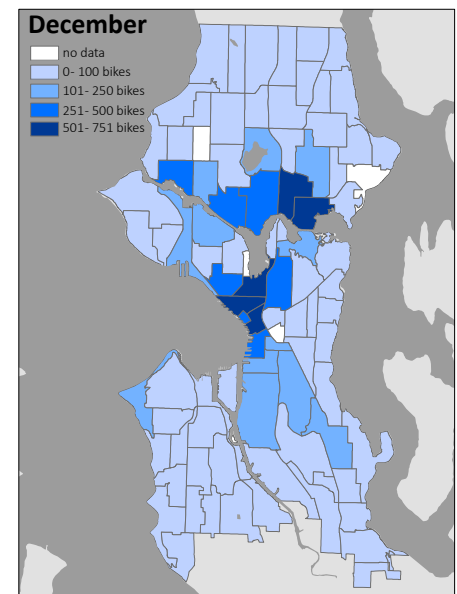*Figure 10: fleet sze: 6,672*

Figure 11: fleet size: 7,095

Figure 12: fleet size: 9,450

Daily Trip Times and Trip Types

Trip and survey data suggest that many people used bike share as a **mobility tool** for **utilitarian trips**, **first- and last-mile access to transit, commutes, and recreational trips**.

As shown in figures 13 and 14, an examination of trip distribution across weekday times and weekend times demonstrates[1]:

- Weekday trips show a **pronounced PM peak** that corresponds with the afternoon commute
- A larger percentage of trips taken in the weekday **AM peak** hours than over the same period on weekends
- Weekends saw slightly more rides than weekdays, with 10% more rides on the average weekend day than weekday

With pronounced afternoon peaks, discernible morning peak usage, and comparable ridership on weekdays relative to weekends, it is clear that the system is being used for far more than as an additional recreation or exercise option.

User survey data confirms this interpretation. Survey respondents indicated they used bike share most often get to **social and leisure activities, errands and appointments, and to commute to work**. Only 6.8% of respondents listed "exercise and recreation" as their only use of bike share.

This diverse use of bike share is important. It demonstrates that bike share is helping people move about Seattle for a variety of reasons, rather than just work commutes or just recreation, and that bike share is a true mobility tool for more of the city.

[1]Note that this data is concentrated on the fall and winter months, and a full year's data including sunnier weather and tourist season may show different usage trends. Also note our survey limitations acknowledged on page 24.

Accessing Transit

User survey data also showed that respondents are using bike share to access Seattle's **transit options**, with almost **75% having taken bike share to access transit** and 33% regularly accessing transit with bike share. By providing easy and convenient first- and last-mile connections to transit, bike share shows its value in augmenting rather than supplanting Seattle's public transportation network.

LESSON LEARNED
Improve access to transit

Our citywide surveys showed that there is room for even more bike share ridership growth by better connecting bike share to transit. Over 60% of respondents said that they would use bike share more if connections to transit were made easy and reliable.

A construction professional using bike share
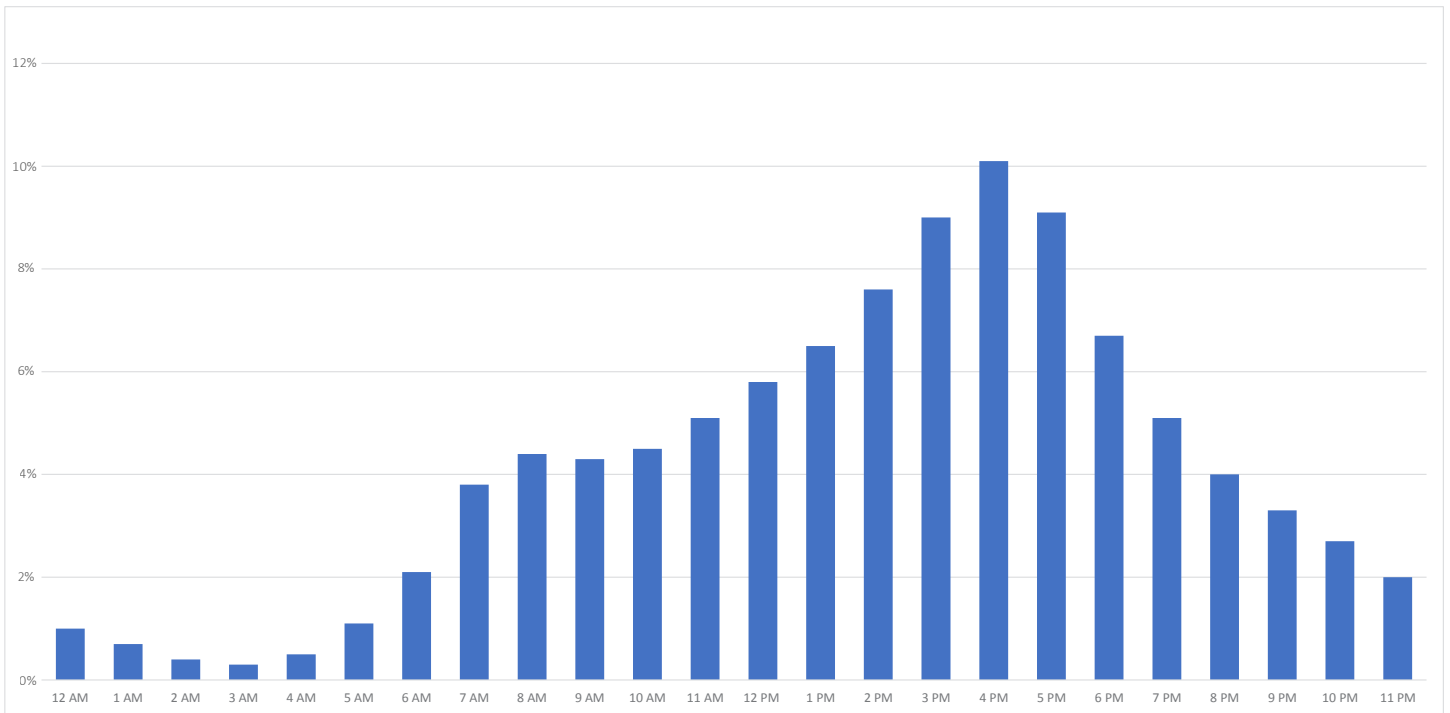
Weekday Trip Times

Figure 13: Weekday trips show a clear PM peak, and significantly more trips in the AM commute time than weekend trips.
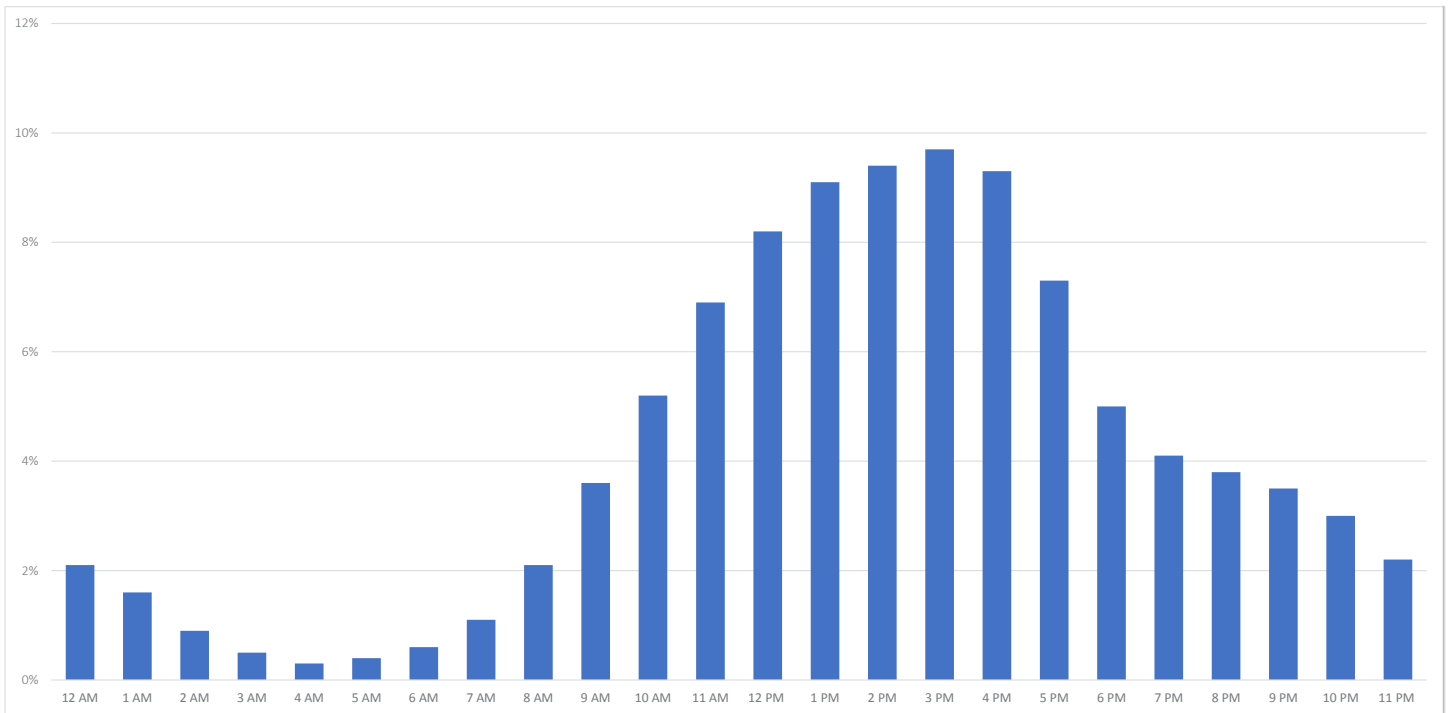
Weekend Trip Times

Figure 14: Weekend trips are more evenly spread through the late morning and early afternoon hours than weekday trips.

User Data

To gather user data, SDOT designed and administered two surveys - a company-issued user survey and a statistically valid city-wide survey of both users and non-users - to better understand who is using bike share in Seattle.

Number of users: The city-wide survey found that **1/3 of the sample had used free-floating bike share**, and 1/3 of non-users were open to trying the system in the future. This shows the pilot's success in bringing bike share to a large portion of Seattle and highlights the potential for bike share to capture even more riders.

Note that the number of unique rider identifications reported by the TDC, **137,214**, cannot be relied upon as a total number of users. We lacked the data to determine if a user used more than one vendor's system, and are therefore overcounted. Conversely, users at times share their account to rent bikes for others, and would therefore be undercounted. In a future evaluation, **more work is needed to estimate the total number of users**.

Gender: Both surveys showed around **2/3 of bike share riders were men** and **1/3 women** (Figure 15). This breakdown is similar to nationwide bike ridership in general. More research is needed to understand how transgender and non-binary people use bike share.

The city-wide survey also showed that, of people who have not ridden bike share, **more women are willing to try it than men**, with 35% of women who had not tried bike share open to using it in the future, versus 29% of men. This indicates there may be barriers that specifically keep women from participating in bike share. Future work needs to identify and lower these barriers and decrease the gender-participation gap.

Age: Both surveys found that the majority of bike share users in Seattle fell between **25 and 44 years old**, showing that more young people used bike share (Figure 16). More work is needed to expand ridership for those over 45. Note that this data was collected before electric-assist bicycles joined Seattle's fleet, and a future evaluation will investigate if e-bikes encourage bike share use to a larger age range.

Race: The city-wide survey found that about 1/3 of Seattle's white population and 1/3 of Seattle's non-white population had tried bike share (Figure 17). While more granular information is needed, this is a good indicator that the pilot bike share program was successful in serving a diverse population of Seattleites.
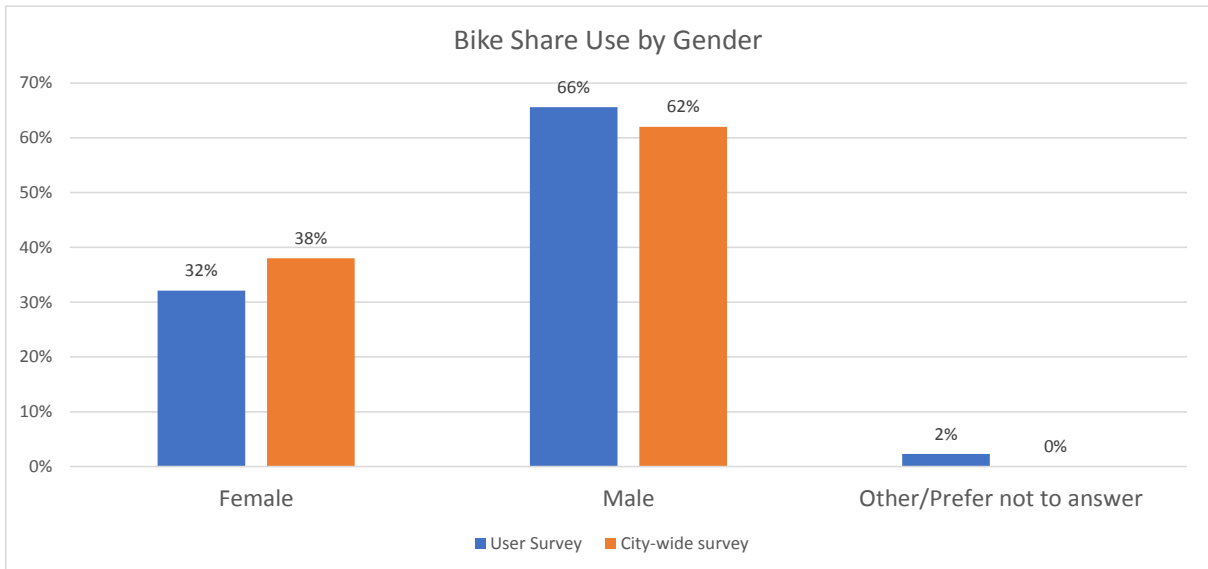
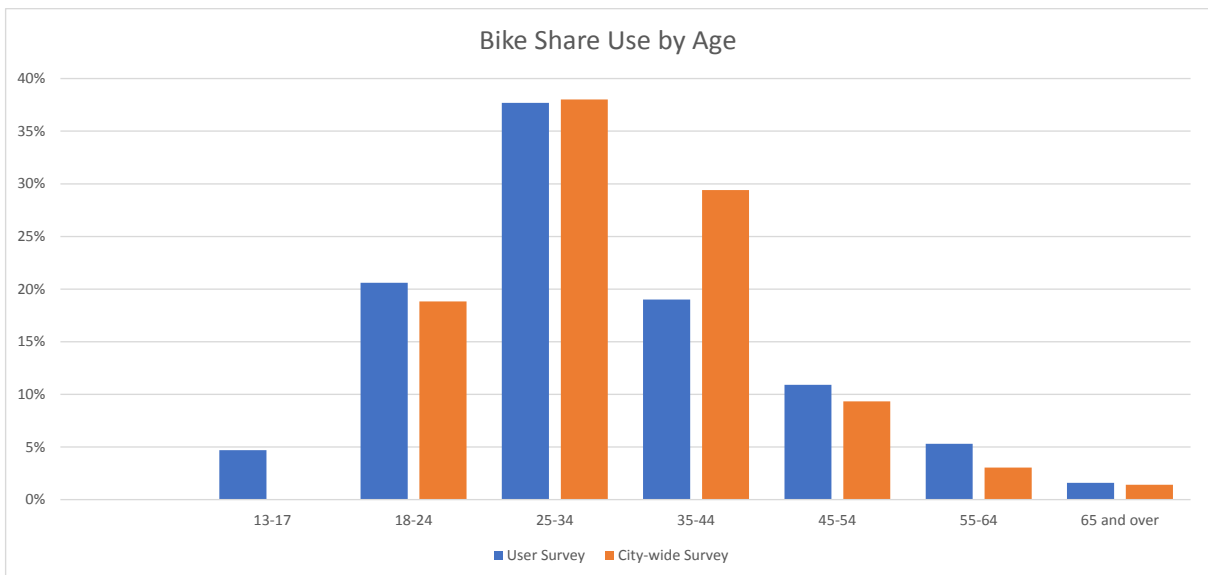Figure 15: Bike share use by gender

Figure 16: Bike share use by age. Note the large discrepancy between the two surveys in the 35-44 age bracket. This is likely related to sampling issues in the user survey
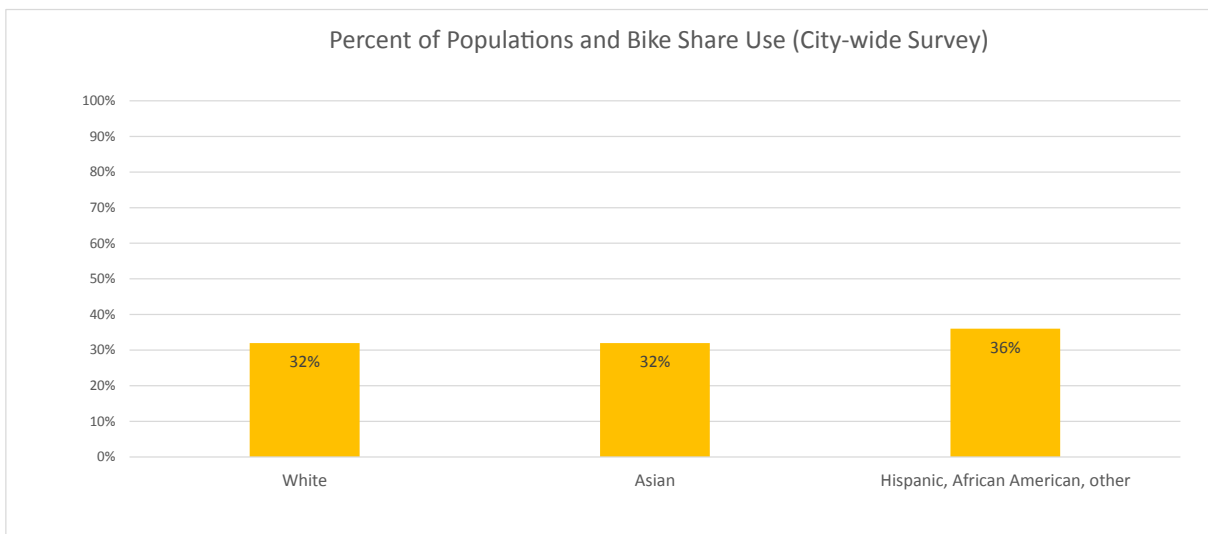
Figure 17: Percent of Seattle's White, Asian, and Hispanic, African American, and other populations that have tried bike share.

Elevation Gain and Loss

Seattle's hills are a significant factor in bicycle use and route selection, and could influence how people use a bike share system. As an example, a system that is used only for downhill trips presents challenges as bike share operators must constantly rebalance the fleet back uphill, and users that need access to bike share bikes in higher elevations may find it difficult to easily find a bike.

While many trips were downhill, the average bike share ride was relatively flat, with an elevation change of only -4.7 feet per ride. Almost 70% of trips didn't lose or gain more than 50 feet of elevation. This indicates that people were avoiding Seattle's steep topography and stuck to predominantly flatter routes. While the data indicates Seattle avoided the prevailing "downhill shuttle" scenario, there is still room for improvement, as bike share should be a mobility tool for all destinations in Seattle, and not just those on flatter routes.

Accordingly, LimeBike launched e-assist bicycles in Seattle after the data-collection period. While these bicycles were not included in this evaluation, future evaluations should assess the benefits and use patterns of e-assist bikes. We hope that e-assist will encourage users to tackle hillier terrain, open new routes to bike share users, and extend the benefits of bike share to more people.

2018 RIDERSHIP UPDATE

While this evaluation focuses on the pilot data collection period of July through December, 2017, the bike share companies continue to share data with the UW Transportation Data Collaborative. In June, 2018, the TDC shared a ridership data update with SDOT that is included below.

That update shows **that ridership continued to grow** as the weather improved, fleet management improved, and people became more familiar with the system. After a quieter December, ridership dramatically increased in January and February. By May, there were over **200,000 rides per month**.

Highlights

- Over 1.3 million rides through May, 2018
- Average of over 7200 rides per day from June 1 to June 19, 2018
- Fleet sizes remained static between 9000 - 10,000 bikes
- A rainy April led to lower usage

Bike share rides per month

	July	August	September	October	November	December	January	February	March	April	May
Seattle bike share	14,209	76,131	105,522	131,971	74,623	57,874	92,389	97,143	189,982	139,264	208,849
Portland Biketown	54,470	47,104	33,268	24,883	14,099	11,028	12,648	12,988	22,578	22,636	79,367
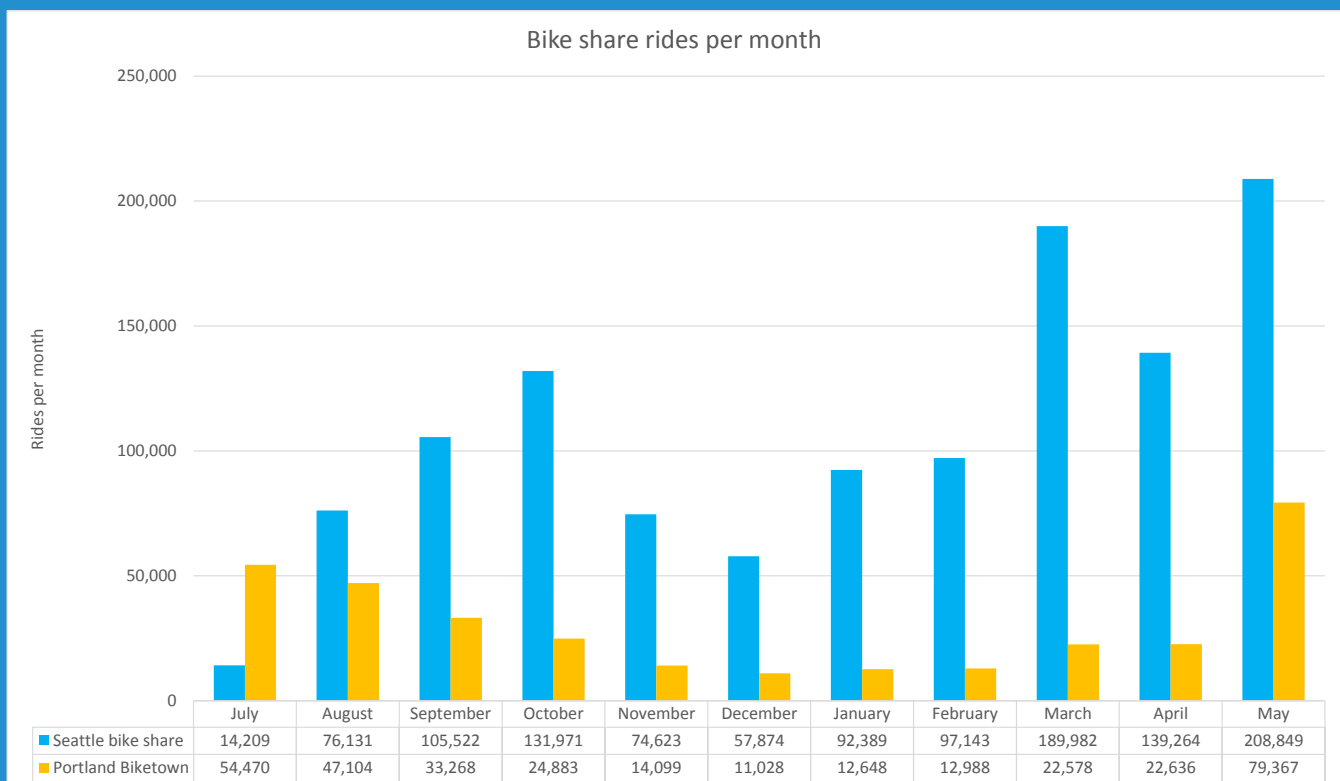
SEATTLE'S BIKE SHARE EXPERIENCE

Measuring impacts to the people of Seattle and Seattle's public realm

The experience of bike share and its impacts goes far beyond the story that ridership and system data alone can tell us. During the bike share pilot program, SDOT pushed to understand those qualities that go beyond the system data, including:

- The impacts of bike share on people's lives, both positive and negative;
- The impacts of bike share on Seattle's parks, sidewalks, public spaces, and privately-owned land;
- The impacts on people with disabilities, both in using bike share and in trying to navigate Seattle's sidewalks; and
- How the program is viewed and used by Seattle's low-income communities and communities of color.

Strengths:
- Almost 3/4 of Seattleites view the bike share program favorably
- Bike share offers an additional mobility option for some people with disabilities
- Bike share reaches all areas of the city, and is widely accepted by Seattle's low-income communities and communities of color

Challenges:
- Too many bikes are parked incorrectly, blocking sidewalks, curb ramps, transit access, loading zones, and more. This is especially hazardous and restrictive to people with disabilities
- Even properly parked bikes can pose a hazard to people with vision impairments

General Public Opinion

As part of the bike share evaluation, SDOT wanted a firm grasp of public opinion surrounding the pilot program. To achieve this, we took a multi-faceted approach, contracting with EMC Research on **a statistically-valid city-wide survey** of adults with internet access (Appendix C), and releasing a shorter version of that same survey on Survey Monkey (Appendix D) to gather even more public opinion. We also compiled and analyzed all emails and phone calls to SDOT on the subject of bike share during the pilot period to understand the main concerns of the people who took the time to reach out (Appendix F).

The two surveys showed that people are overwhelmingly favor bike share, with the EMC survey showing that **almost 3/4 of the city has a favorable opinion of bike share**. The self-selected Survey Monkey survey also showed

strong favorability, but with people more likely to have a strong opinion rather than more neutral opinions or no opinion (Figure 18).

Public comments received tell a drastically different story, with **85% of all comments received voicing an overall negative opinion** of Seattle's bike share pilot program. These comments are important, and they highlight the areas where bike share needs improvement, but it is also important to note that the high percentage of negative comments *does not* indicate that the public as a whole feels negatively towards the program.

While it remains critical to acknowledge and work to solve the negative issues raised in the comments received, it is also important to acknowledge that, for most of Seattle, bike share brings valuable benefits to the community that should be further pushed and explored.
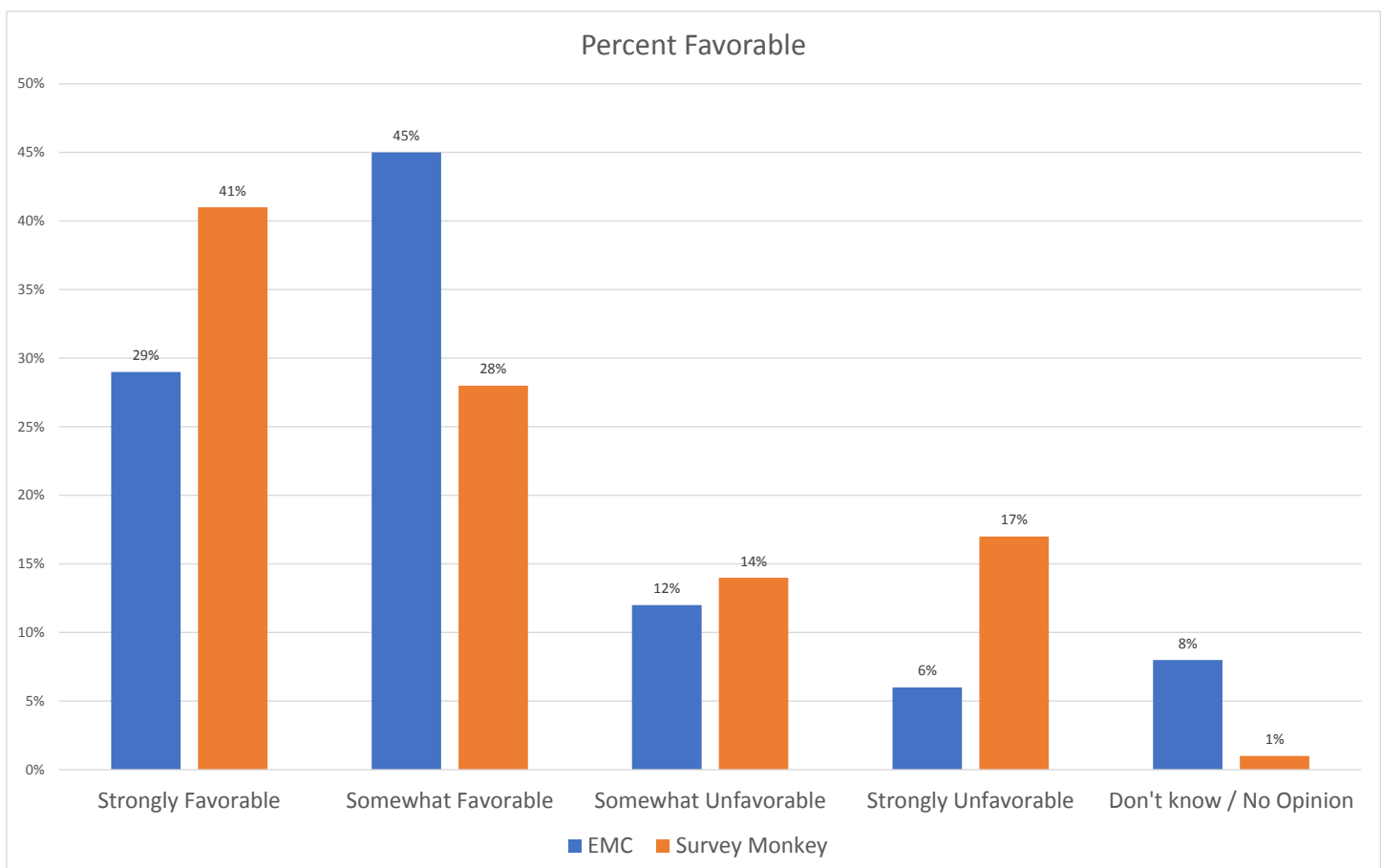

Figure 18: Overall public opinion of the bike share program

Successes of bike share

In addition to learning that people hold favorable opinions about bike share, we also learned why. The EMC statistically-valid survey gives us good insight into these answers.

Eighty-three percent of respondents agreed with the statement that **the bike share program helped reduce carbon emissions**. As the most agreed-to "success" statement in the EMC survey, this suggests the potential of reducing carbon emissions is important to the respondents, and further suggests that they see adding carbon-reducing transportation options as a positive development.

74% agreed that **bike share lets them ride a bike without having to bother with secure storage** or **worrying the bike will get stolen**. An additional 66% agree that it is **easy to rent a bike through the smartphone apps**. These statements indicate that by making biking simpler and worry-free, more people will consider bikes as an option for moving around the city.

Finally, 70% agree that **bike share gives them more options for recreation and exercise**, while 66% agree that **bike share makes it more fun to move around the city**. These strong agreements show the importance of joy, exercise, and recreation in these programs. Seattleites see bike share as sources of healthy fun, and these views should be encouraged along with the more utilitarian benefits of bike share as a mobility option.
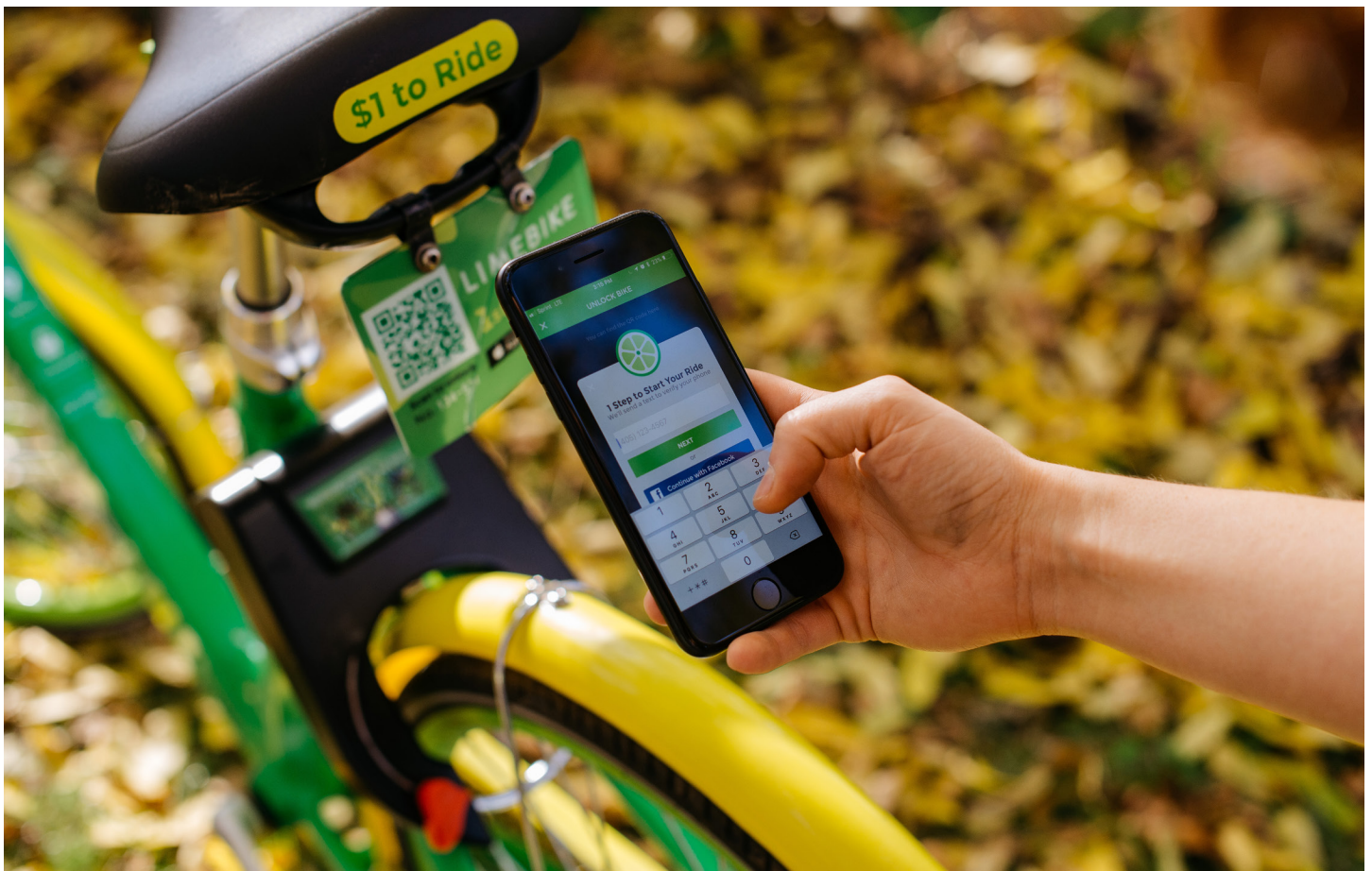
Drawbacks of bike share

It is also vitally important to understand what didn't work about the pilot program. The EMC survey shows **three clear drawbacks**: bike parking behavior, bike riding behavior, and bike infrastructure.

1. **Bike parking needs to be improved**. Sixty-eight percent of respondents believe that too many bikes wind up toppled over, littered in parks, and left in other places they don't belong. An additional 60% are concerned that too many bikes are parked in the middle of sidewalks and curb ramps, inhibiting travel for those with visual or physical disabilities. These views were echoed in the comments sent directly to SDOT, with over half of all complaints addressing the incorrectly parked bikes.

2. People also felt that **bike share leads to an increase in poor riding behavior,** with 59% agreeing to the statement that bike share increased the number of cyclists on the road who don't know or follow the rules. Also, 62% felt that too many bike share users ride without a helmet. While not directly echoed in phone and email comments received, over half did mention pedestrian, bicycle, or car safety as a drawback of bike share. Fourteen percent mentioned lack of helmet use and 6% directly mentioned rider behavior.

   Importantly, neither of these statements are because there are more bike share crashes or serious injuries; the data shows that bike share remains a safe transportation option. It does show, however, that better riding behavior is important to people and could reduce traffic stress and the perceived potential for conflicts.

3. Fifty-five percent of people agree that there are **not enough bike trails or protected bike lanes where they want to go**, suggesting that a lack of bike facilities is keeping people from using bike share, and bicycles in general, as a mobility option.

Bikes can end up toppled over and misparked.

Many people choose to ride without helmets.

Bike Share Parking

Surveys, public comments, outreach meetings, and our own observations all indicated that the largest drawback of Seattle's free-floating bike share pilot was a lack of bicycle parking management. Without docking stations, users are supposed to park the bikes in a paved furniture zone area, avoiding the pedestrian path, curb ramps, and corner areas. Additionally, bikes cannot block transit zones, loading zones, or business access.[1] Unfortunately, people did not always abide by these rules, and bikes have been mis-parked, blocking sidewalks, curb-ramps, bus access, as well as dumped in parks, water bodies, on train tracks, and other inappropriate places.

To quantify how people are parking, SDOT surveyed how all bike share bikes were parked in seven Seattle neighborhoods where bikes were frequently parked, capturing commercial, industrial, low-rise residential, single-family, and mixed commercial land-use types. SDOT staff completed the study between October and December 2017.

The study found that, city-wide, **70% of bikes were wholly compliant with permit parking guidelines, 26% were non-compliant but not impeding access, and 4% were non-compliant and impeding access** (see Appendix G for full study). These findings roughly matched two independent studies done in Seattle. Toole Design Group released a November 2017 study that found 76% of Seattle's bikes were parked correctly, and 6% were causing obstructions. And also in December 2017, the Portland Bureau of Transportation studied bike share parking in Seattle and found that 87% of bikes were parked correctly, but with 10% "completely or partially blocking access or pedestrian movement." While methodologies of the three studies differed, **even 4% of bike share bikes blocking pathways constitutes too many**, especially considering that needed ADA-required access may be obstructed. Further work is needed to reduce the number of mis-parked bikes.

Interestingly, SDOT's study found **single-family zones had the highest percentage of mis-parked bikes.** These areas generally lack wide sidewalks or paved furniture zones, leaving the 6' pedestrian path as the only place for people to park. In commercial zones, only 16% of bikes were non-compliant, and only 1% blocking access. These findings suggest that in many instances, users will park correctly if there is space to do so, but end up blocking sidewalks and access if they cannot find suitable parking.

LESSON LEARNED
Vendors need to be proactive in managing parking compliance

To manage parking, the pilot permit required companies to move mis-parked bikes within **two hours** of receiving a complaint or notification during business hours, and ten hours otherwise. Throughout the pilot, all 3 operating companies had difficulty consistently meeting this target time frame. This non-compliance, combined with our findings that too many bikes are blocking access, shows that this reactive, complaint-response approach does not work in effectively managing the right of way.

Even if the complaint-response mechanism worked, mis-parked bikes could still block ADA-required access for up to two hours.
A future permit will need to be more proactive in compelling companies to ensure that bike share does not restrict ADA-required access.

[1]For full parking rules during the pilot period, see the "Parking" section of the Pilot Permit Requirements in Appendix A.

The pilot permit required that bikes be parked upright and on hard surfaces in the sidewalk landscape/furniture zone.

Landscape/Furniture Zone — Pedestrian Zone — Frontage Zone
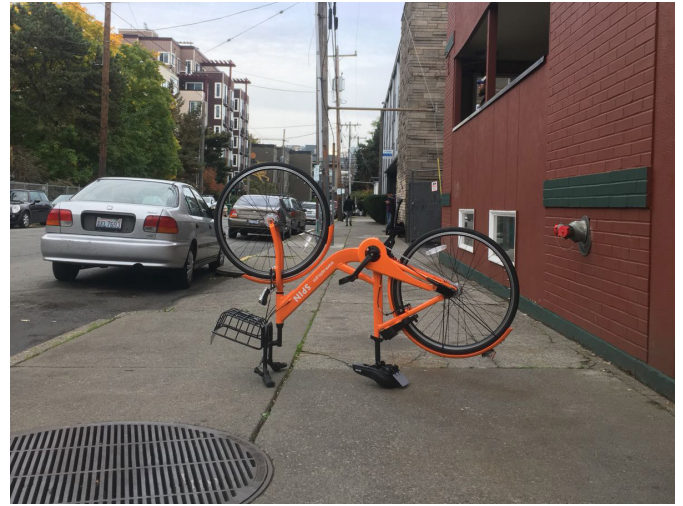
This bike is improperly parked. Not only is it upside-down, thus making it more difficult to move, but it is parked in the middle of the pedestrian through zone and blocking the sidewalk.

These two bikes have been parked according to the permit, and do not block the sidewalks, curb ramps, business, transit, or loading access.

These bikes are mis-parked for several reasons. The nearest bike is not upright and is partially blocking the sidewalk. None of the bikes are parked on hardscape.

This bike, parked at an SDOT bike rack, is properly parked according to the permit.

These two bikes are parked in a hardscape furniture zone, but also in a busy transit loading area, blocking access. Therefore, these bikes are mis-parked.

Impacts to People with Disabilities

Early on in the bike share pilot, we saw that free-floating bike share had the potential to have an disproportionate negative impact on people with disabilities in Seattle. While we've heard that bikes and e-bikes have provided an additional mobility option to many people with mobility challenges, we also know that some bikes can obstruct necessary access, pose a tripping hazard, or block navigation cues used by those with low vision or mobility difficulties.

To better understand how people with disabilities experienced bike share, SDOT issued a survey targeted for people with disabilities, held a public meeting to discuss the issues, and engaged community groups.

The survey, public meeting, and observations all confirmed **that mis-parked bikes can be a hazard for people who have vision or mobility-impairements**. Especially when blocking curb ramps or other constrained areas, a bike that may be a simple annoyance to some can be an insurmountable obstacle to others. Even bikes parked seemingly out of the way can pose a hazard. A bike parked tightly next to a building can **block the path of a person who is blind or has low vision** and uses that building for navigation.

We heard that **requiring companies to move mis-parked bikes is not good enough**. If a bike is blocking someone's path, having it moved within two hours does not help that person reach their destination. Bikes need to be parked responsibly by each user.

However, we also heard that bike share has helped some people with mobility limitations who find that cycling is more manageable than walking or driving. Electric-assist bikes can greatly expand this potential use. Also, we heard that adaptive cycles such as tricycles, recumbent bikes, tandems, and others all have the potential to greatly increase the accessibility of bike share for users of different abilities.

While this bike may appear to allow plenty of room to pass, it still poses a hazard to those with mobility difficulties or low-vision. Placement along the building frontage puts bikes in the path of people who are blind or low-vision and use the building to help navigate.

Adaptive cycles can bring bike sharing to people with diverse physical abilities. Detroit's MoGo system launched 13 adaptive cycles in May, 2018 to bring bike share to a new audience. (Photo courtesy of MoGo Detroit).

Bike Share Equity Analysis

Seattle's recent growth has not only strained our transportation system, it has deepened the income inequality gap along racial demographics and contributed to displacement, especially in communities of color. Transportation is the second largest household expense, thus SDOT is committed to safe, affordable, environmentally sustainable, and accessible transportation options.

Free-floating bike share, at about $1 per ride for conventional bikes, is **lower in cost than most transportation options**, including reduced-fare transit. However, for bike share to be an equitable mobility option, it must accrue economic and transportation service benefits to Seattle's low-income communities and communities of color. This requires ongoing engagement with these communities about the opportunities and the incorporation of their input into the service design, delivery, and operations.

Data collected during the pilot indicates that **bike share reached many neighborhoods that have a high displacement risk and low access to opportunity**, which are two indices Seattle uses to determine equity concerns. With above average ridership through much of Beacon Hill and Rainier Valley, the pilot showed initial success in reaching some of these communities. However, the far south, southwest, and northern parts of the city saw far less ridership in some of the areas of highest equity priority. More work is needed to offer bike share to these outlying neighborhoods.

Likewise, free-floating bike share and the supporting operation that make the system run is **an opportunity for economic inclusion and workforce equity**, so the benefits accrue directly to people of color and high priority equity communities. During the pilot, one company voluntarily participated in local hire programs specifically around veteran and homeless hiring. While the City has limited oversight in permitted vendor hiring practices and operation, SDOT aims to work with permitted vendors to encourage local hire practices among high-priority equity communities.

In addition to our geo-spatial equity analysis, SDOT met with community groups and community partners to determine what barriers were keeping some of the low-income communities and communities of color from using bike share. We found there were seven main barriers:

- **Bike access barriers** - There are simply not enough bikes in some of these neighborhoods for the communities to access or rely on bike share.
- **Technology access barriers** - Not all people have access to both a smartphone and data plan, and although companies offered non-smartphone plans, they were little advertised and little used.
- **Banking barriers** - Bike share use often required a credit card or bank account to participate, adding more barriers to those who may benefit the most from the service.
- **Knowledge barriers** - Potential riders depend on access to marketing or word-of-mouth information that expand knowledge about the potential benefits and uses of bike share, as well as how to use the system. Our community conversations revealed that many people didn't understand the bike share system or how to access it.
- **Financial barriers** - Although conventional bike share prices are relatively low-cost, electric-assist bikes are a growing portion of the bike share fleet and come with significantly higher prices. Bike share must remain a financially accessible option for all Seattleites.
- **Helmet access barriers** - We heard that many people lack access to a bike helmet. Not only is this a safety concern, but it increases the likelihood of police encounters which can be an especially stressful for people of color. Community partnerships, educational campaigns, and ensuring helmet access could lower this barrier.

- **Language barriers** – Bike share companies apps and marketing materials are not available in the broad range of languages spoken in Seattle.

More work is needed to ensure that bike share is addressing the above barriers *and* meeting the needs of Seattle's high priority equity communities. SDOT will need to conduct more thorough and targeted outreach and engagement to determine how to best lower the barriers to bike share usage so that the system can become a viable transportation and recreation option for all of the city. Additionally, there is opportunity and growth potential for the vendors and SDOT to partner with community-based organizations to create educational and capacity building programs, job pipelines, and career pathways in this emerging sector.

LESSON LEARNED
Adjust permit fees to cover a comprehensive and ongoing outreach and engagement effort

Due to a lack of funds, this evaluation does not include a strong enough outreach and engagement component that targeted Seattle's low-income communities and communities of color. While our data-collection and survey efforts give some insight, a future permit and evaluation will require a much more comprehensive outreach and engagement effort to better understand the impacts of bike share on these communities and inform future permit iterations to reflect those lessons learned.
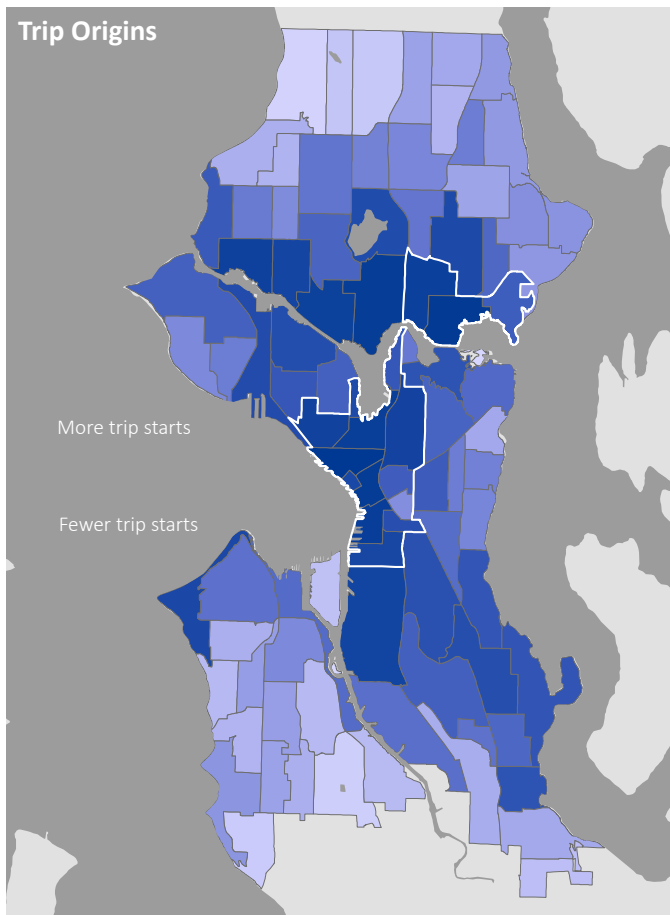

Figure 19: Bike share usage was concentrated in the Center City, but saw significant usage in the southeast area of the city as well. The far north, south, and southwest parts of the city were not well served by bike share.
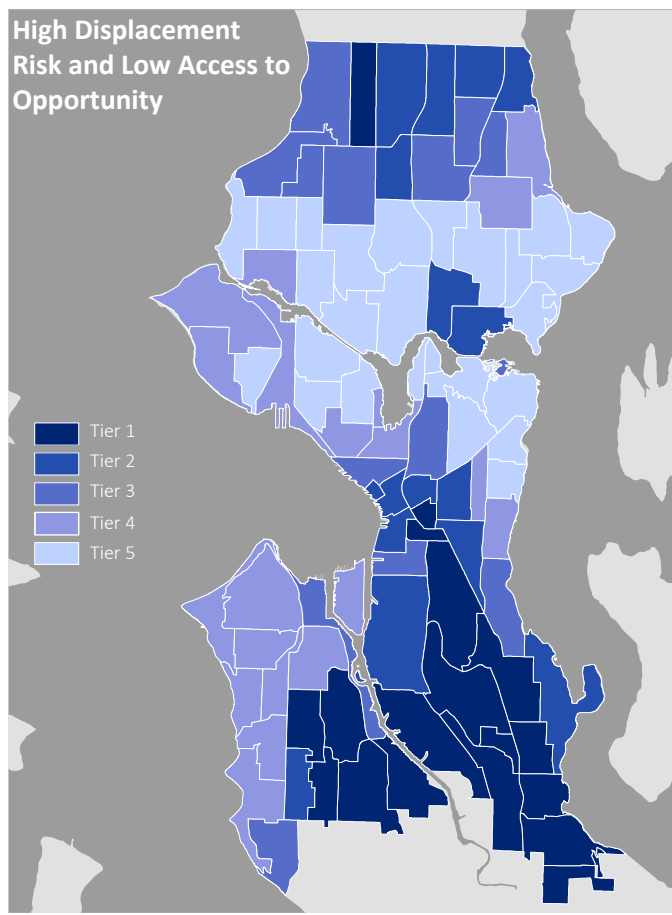

Figure 20: Seattle neighborhoods with a high displacement risk and low access to opportunity (represented by Tier 1 and 2 neighborhoods) are concentrated in the southern and northern portions of the city, with the highest concentration centered around Rainier Valley.

CONCLUSION

Free-floating bike share has revolutionized shared mobility over the past twelve months. What started in Seattle as the first permit program in the country to offer free-floating bikes has since spread to over 30 cities across the country. Being the first permitting program of its kind in the country required SDOT to utilize values-driven permit requirements that put people and data at the forefront. As a result, the program yielded unique insights and quantitative data that will help to inform future iterations of the free-floating bike share program as well as provide innovative leadership for other cities.

This evaluation aimed to answer the fundamental question: Should SDOT continue to support a free-floating bike share program? Based on the findings outlined in the chapters above, the Seattle free-floating program met or exceeded the quantitative metrics of the previous docked program (total trips, miles traveled, number and diversity of users, etc.). While performance of the qualitative metrics was less conclusive, it signaled a generally positive attitude about the program and identified key themes for improvement. Below we summarize key highlights and challenges of the evaluation period and make recommendations for the next iteration of a free-floating bike share program.

People-First Design

By placing an emphasis on people, free-floating bike share served all neighborhoods of Seattle. This coverage ensured that Seattleites and visitors, regardless of where they lived or worked, could potentially access the program. As a result, the free-floating program saw ten times the number of rides in a six-month period than Pronto! did during the same time frame in 2016. Data obtained from the companies showed that trips were indeed originating and ending across the City, demonstrating demand for these services outside of the original Pronto! service area, which included the Center City, Capitol Hill, and the University District. With a people-first approach, SDOT created a **flexible** initial **goal-oriented permit** that did not over-prescribe requirements during the pilot phase. This allowed the City to administer the program at **no cost to taxpayers**.

Survey results found that **free-floating bike share riders were as racially diverse as the city**, indicating that wide geographic access and low-cost led to wide and diverse support. Riders indicated that they used bike share to access transit, get to social outings and appointments, commute to work, or simply ride the bikes for fun. This showed that the people-first approach encouraged users to incorporate bike share into their daily lives, rather than for just a specific trip type. The people-first approach led to a popular program, with 75% of survey respondents from the city-wide survey sharing a favorable opinion of the program and 33% reporting trying out free-floating bike share during the first six months of operation.

Listening to the Public

Taking a people-first approach requires listening to users and non-users alike. Despite overall positive responses in city-wide surveys, 85% of the unsolicited comments that SDOT received on the program were negative. While most customer inquiries for City programs are complaint-based, these unsolicited comments indicate that the free-floating bike share program has room for improvement.

Most of the complaints and suggestions centered on a few themes: **inappropriate bike parking, lack of helmets, poor rider behavior, and education and access**. Inappropriate bike parking impacted people by blocking physical access to critical infrastructure (e.g., bus loading zones, curb ramps, etc.) and causing potential safety hazards for people with disabilities. Even where access issues were not relevant, illegal bike parking elicited a strong responses from some residents.

SDOT intends to reduce bike parking issues through different permit requirements, incentives offered to the companies, and better education and awareness for system users. SDOT is currently experimenting with designated bike parking areas in an effort to limit bike clutter in high pedestrian zones. SDOT understands the importance of building strong community partners to champion the benefits of free-floating bike share across all Seattle neighborhoods, including low-income neighborhoods of color. This should help to close the gap in awareness and access that was evident based on community-driven conversations on this topic.

Data-Driven Results

Seattle's pilot permit required that service providers provide trip data that included origin and destination information, total trips, and available bikes. The permit also required that companies survey their users to understand use trends, perceptions, and attitudes toward the pilot program. As a result, the pilot period yielded rich insights not found in other cities. We received information about where people were traveling to and from by neighborhood, popular days and times of day (weekends and afternoon peak period), and where bikes were available (i.e., density and distribution). Companies were also required to survey users as a part of the permit requirements. Additionally, we commissioned a citywide survey and a parking study to better understand resident perceptions and rider behaviors. This combination of quantitative and qualitative data together painted a cohesive picture of the program and helped SDOT understand areas of success and areas for improvement.

Data Challenges and Opportunities

Collecting data requirements for a new industry did not come without challenges. Docked bike share programs (like Pronto! Cycle Share) with fixed fleets, kiosk-based payment, and station-based maintenance use a consistent set of metrics, which have been truth tested over many years and in many cities. Free-floating bike share systems are fluid and dynamic by design, requiring new ways to measure success. Thus, established docked system metrics do not align perfectly with free-floating success criteria. For example, docked systems measure efficiency using rides per bike per day to maximize rides on a limited number of bikes (tied to dock parking). However, in a free-floating system, availability and distribution are better measures of reliability and access. SDOT seeks to design new metrics to capture these unique characteristics.

The unique data partnership established for this pilot—including SDOT, UW, and the permitted companies—struggled to align on a definition of "fleet size," as free-floating fleets have a larger number of unavailable bikes (i.e., non-revenue or broken bikes) than docked fleets. The next iteration of the free-floating bike share permit will address this issue with more clarity around "available bikes" and other metrics.

The emergence of app-based mobility services ushered in new transportation options, but also new data and privacy considerations. Cities are leveraging these services' data collection capabilities to access insights such as routing and origins and destinations. This data can help SDOT better understand travel behaviors and align infrastructure investments in a strategic way. SDOT will continue to balance the need for these insights with customer privacy considerations and commit to evolving our permit over time to align with new industry standards and regulations. SDOT is also working closely with other city leaders to align on standardized free-floating bike share metrics to allow for better comparisons between city programs.

MEASURES OF SUCCESS

Measure of Success	Metrics Used	Score Needs Work ———— Successful	Justification
Ridership	Total trips	●(green, right)	With **468,976** rides in the pilot period, ridership showed the utility of a free-floating system.
Geographic Coverage	Amount of city covered	●(green, center-right)	Bike share **covered the entire city**, with good ridership in many areas dock-based failed to cover. However, the **far north and south portions saw little ridership and few bikes**.
Equity	Coverage, usage, low-barrier options, and outreach	●(yellow, center)	The evaluation showed that the system covered the entire city, but more work is needed to **reduce barriers** to access and ensure that bike share is an equitable system.
Safety	# of collisions per 1 million trips	●(green, right)	With **0.01 collisions per thousand trips** and **no reported serious injuries**, bike share is a safe mobility option.
Parking Compliance	% of bikes incorrectly parked and blocking access	●(yellow, center-left)	While our surveys showed most bikes were parked correctly, **4% were blocking hazards**. This is too many blockages.
Disabled Access	Parking issues and bike availability	●(red, left)	**Too many bikes block access**, and while bikes, and especially e-bikes, can be an option for those who have difficulty walking or driving, **no adaptive bikes were launched** in the pilot.
Maintenance	% of bikes in good working condition, % of bikes with safety hazards	(?) (center)	With limited operating funds, SDOT did not independently survey fleet maintenance. This will be an important piece of future evaluations.
Public Opinion	Favorability and issues	●(green, center-right)	Our surveys showed that **74% were favorable** towards the system.
Cost	Total public subsidy	●(green, right)	**Permit fees** collected from the companies **covered all city costs**, keeping bike share free of public subsidy.

RECOMMENDATIONS AND NEXT STEPS
Shaping an iterative approach

Based on the successes and lessons learned in the pilot program, SDOT is making high-level recommendations to include in the next iteration of a permit. Those recommendations fall into two broad categories: **permit structure** recommendations focused on shaping the permitting approach, and **permit requirements** that address overall operational lessons learned.

Permit Structure

Recommendation: Stay flexible and continue to learn and adjust. In January 2017, free-floating bike share did not exist in the United States. Only 12 months later, over 44,000 bikes were spread across over 25 cities. Over the next 12 months, we expect that pace of change to continue or accelerate, and that is why SDOT is committing to an **iterative annual permit**, giving us the flexibility to learn and adjust as the city and the industry evolve.

Recommendation: Establish a regional approach to bike share management. SDOT's bike share pilot showed that people used the bikes to not only travel throughout Seattle, but also into neighboring communities. To allow bike share to be a region-wide transportation option, SDOT is collaborating with neighboring cities to make bike share permits as consistent as possible from a user perspective.

Recommendation: Consider allowing more companies. In an evolving field, it is important that SDOT builds competition and resilience into its permitting structure. Competition will likely continue to lower prices, ensure the availability of well-maintained bikes, and foster technology developments. Additionally, multiple vendors give the system needed resiliency if companies consolidate or fail as the market matures.

Recommendation: Right-size the fleet to meet unmet demand. The pilot evaluation showed that there was unmet demand for bike share, with ridership rising with fleet growth through October. Additionally, as the fleet grew more bikes were available in outlying neighborhoods. To encourage continued ridership growth and coverage growth, SDOT recommends allowing controlled fleet growth.

Permit Requirements

Recommendation: Compel companies to improve parking behavior. SDOT's bike share evaluation showed that too many bikes are parked incorrectly, blocking sidewalks, curb ramps, and transit access. In future permits, SDOT will require that companies submit comprehensive parking plans with permit applications. Companies with superior plans will be more likely to receive a permit.

Additionally, SDOT will enforce parking requirements in a proactive manner by continually auditing parking compliance by each company, and taking enforcement actions against vendors that do not meet minimum standards. By setting clear goals and parking standards but allowing companies to design methods and programs for meeting those goals, SDOT will be able to test different methods that will inform future permit iterations.

Recommendation: Build capacity for all bikes including shared bikes and personal bikes. While bike share companies need to do much more to ensure good parking behavior, SDOT can build clarity and capacity for bike parking by **installing designated bike parking areas**. These locations, prioritized in high-use areas and near transit, will add the needed capacity for free-floating bike share without negatively impacting the public realm. Before bringing these spots to communities, SDOT will work with the local communities on siting and design to maximize the benefits while minimizing negative impacts.

Recommendation: Ensure that bike share serves Seattle equitably. The pilot evaluation demonstrated that free-floating bike share did far more to serve Seattle equitably than our previous dock-based system, but more needs to happen to ensure that bike share is an equitable transportation option. SDOT's future permit will require citywide coverage and that bikes are available in areas with a high displacement risk and low access to opportunity. Additionally, SDOT will require that companies have low-income access plans and plans to allow people that lack smartphones, data plans, credit/debit cards, and/or bank accounts to use the system.

Recommendation: Clearly define all terms and data standards. In the brand-new industry of free-floating bike share, there is a lack of cohesion and understanding around regulatory terms and data standards. For instance, a "fleet size" can mean any bike within the city, even if the bike is in warehouse storage or undergoing maintenance, or it can mean only those bikes deployed on the street and available for rent. These terms and data standards need to be agreed upon and defined in a bike share permit.

Seattle
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