Seattle Department of Transportation

2019 FREE-FLOATING BIKE SHARE EVALUATION REPORT

Seattle
Department of
Transportation

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FIGURES

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1. INTRODUCTION

SEATTLE'S VISION AND VALUES FOR TRANSPORTATION

At the Seattle Department of Transportation (SDOT), our vision is a thriving, equitable community powered by dependable transportation. Our mission is to deliver a transportation system that provides safe and affordable access to places and opportunities.

We conduct our work according to six shared values and goals:

Equity

We believe transportation must meet the needs of communities of color and those of all incomes, abilities, and ages. Our goal is to partner with our communities to build a racially equitable and socially just transportation system.

Safety

We believe everyone should be able to move safely throughout the city. Our goal is to create safe transportation environments and eliminate serious and fatal crashes in Seattle.

Mobility

We believe transportation choices are critical to access opportunity. Our goal is to build, operate, and maintain an accessible transportation system that reliably connects people, places, and goods.

Sustainability

We believe environmental health should be improved for future generations through sustainable transportation. Our goal is to address the climate crisis through a sustainable, resilient transportation system.

Livability

We believe transportation is essential to support daily life. Our goal is to manage our streets and sidewalks to enrich public life and improve community health.

Excellence

We believe in exceeding the expectations of the communities we serve. Our goal is to build an SDOT team committed to excellence and equipped with skills to meet the challenges of today and tomorrow.

BACKGROUND

Increasing Options in a Growing City

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

The pace of our growth over the last few years has placed immense pressure on our transportation system. We need a variety of sustainable mobility options to keep our city moving and to meet our broader objectives related to affordability, mobility, equity, and sustainability.

To that end, Seattle has continued building one of the most robust multi-modal transportation systems in North America. As public transit services and infrastructure continue to improve as a result of regional investments, private app-enabled micromobility services have also been expanding to meet people's daily travel needs and support walkable, bikeable, and transit-oriented lifestyles. The emergence of app-based micromobility—and other services such as car sharing, ride hailing, and dynamic carpooling—provides flexibility and reduces the need to own a car in Seattle.

From October 2014 to March 2017, Seattle operated a station-based bike share program called Pronto! Cycle Share. With station-based systems, bike share bikes are kept at docking stations scattered throughout a defined coverage area. Customers rent bikes from stations and return the bike to another station near their destination. The stations also often serve as kiosks, letting customers learn about the system, buy memberships, and activate their rentals.

In 2017, SDOT introduced the nation's first private free-floating bike share program, introducing a new mobility option across Seattle. With free-floating bike share, users walk to the nearest bike, unlock it with an app or code, ride it to where they want to go, and leave it in a safe place for the next rider—no docking stations required. The 12-month free-floating bike share pilot demonstrated great potential for this service to contribute to the City's goals. Our evaluation of the pilot concluded that the system had either met or exceeded all expectations in comparison with the city's previous station-based bike share system, Pronto!, growing ridership almost 1,000% and providing coverage for the entire city. However, there were concerns from the public and SDOT about barriers for low-income people and communities, poor parking compliance, and a lack of adaptive cycles available as part of the pilot. In our first full permit year in 2019, we sought to continue delivering on the bike share program's successes while working to address some of the concerns that arose in the pilot.

Free-Floating Bike Share – Timeline

2017 – Introduction of Free-Floating Bike Share Pilot with three operators: ofo, Spin, and Lime.

2018 – End of the Free-Floating Bike Share Pilot and release of the pilot evaluation report. Spin and ofo exit the Seattle market. Lime granted an extension to operate through 2019.

2019 –Free-Floating Bike Share Permit begins with Lime, Jump (a subsidiary of Uber), and Lyft awarded permits. Lime continues operation from the previous year with a mixed fleet of traditional pedal bikes and e-bikes. Jump launches with a fleet of only e-bikes. In the same year, Lime phases out its traditional bicycles, making Seattle's fleet composed solely of e-bikes.

2020 – Applications for the 2020 Free-Floating Bike Share Permit will open in April.

Seattle' growing population

Roughly 36% of Seattle's residents and half of downtown residents moved here between 2010 and 2018.

Evolution in 2019

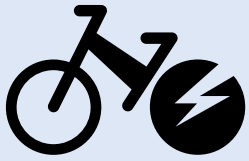
E-Bikes and a Shifting Market

The bike share landscape continues to evolve according to changing rider preferences, industry investment, and new technology. Since our 2017 – 2018 pilot, Seattle went from three bike share vendors (ofo, Spin, and Lime) with traditional bicycle fleets to two vendors (Jump and Lime)[1] with fleets of e-bikes.

Nationally, many vendors moved away from providing bikes at all to focus exclusively on scooters, while others have grown into full-service mobility companies that provide bike share, scooter share, ride hailing, and other mobility products. As we observed trends in our peer cities, we witnessed a shift from vendors' fast-paced expansion and growth-oriented investment to a more conservative period of rising customer fees and smaller fleets.

Fewer operators and the private sector's more selective investment resulted in an overall smaller bike share fleet than in the 2017-2018 pilot period, ranging from approximately 3,000 at its lowest point to about 7,000 at its highest throughout 2019 (see Figure 1). In 2019, we also used fleet reductions as one of our enforcement actions, which resulted in vendors' fleet caps being lowered by over 2,000 bikes each. We introduced fleet reductions as an enforcement mechanism after we learned in the pilot that fines alone weren't enough to change vendor behavior.

E-bikes

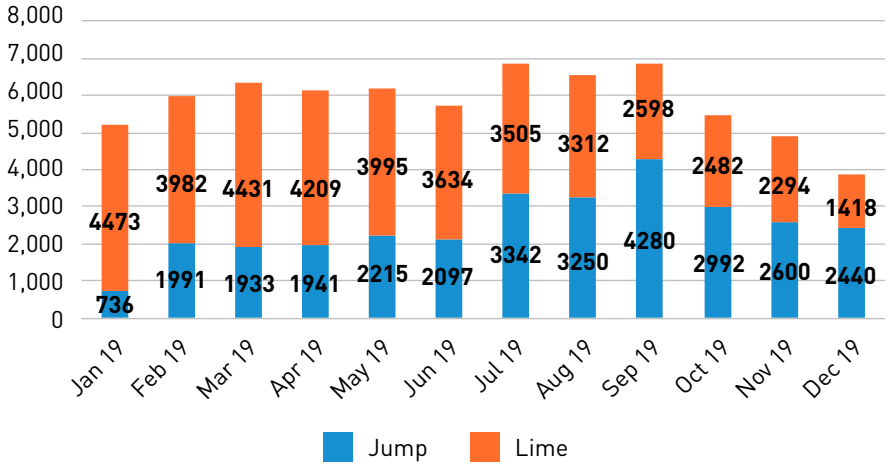


E-bikes or electric-assist bicycles use an electric motor to assist a rider pedaling. In Seattle's bike share fleet, the electric assist cuts off when the bike reaches 15 miles per hour.

Looking Ahead

We understand that the micromobility industry continues to change. Our experience over the last three years has demonstrated the importance of a flexible, iterative permitting approach which enables us to continue learning and adapting alongside changes in the private market. We continue to monitor these trends as we craft a new permit application for the bike share program and upcoming scooter share pilot in 2020.

Figure 1. Median Fleet Count, 2019



Source: Seattle Department of Transportation, Mobility Data Specification, Status Changes, 2019.

[1]Lyft was also granted a permit in 2019 but never launched operations in Seattle.

OUR APPROACH

Rooted in our values, SDOT seeks to deliver a transportation system that provides safe and affordable access to places and opportunities. Our New Mobility Playbook describes our principles and strategies for adapting emerging mobility services to meet the needs of our city, including our approach to the 2017-2018 pilot.

Free-floating bike share has the potential to help solve many of Seattle's current and future transportation challenges. It can be an affordable and healthy option that bridges gaps in our mobility system. To maximize the benefits while minimizing potential downsides, SDOT developed the following goals for the 2019 permit program:

- Goal 1: Support an active, healthy, people-first use of Seattle's streets
- Goal 2: Ensure affordable and equitable service—particularly for cost-burdened communities of color—while expanding access to opportunities
- Goal 3: Be safe and advance our Vision Zero objectives
- Goal 4: Fill mobility gaps and improve connections to transit
- Goal 5: Provide a low-carbon mobility option as part of Seattle's efforts to reduce carbon emissions
- Goal 6: Manage public space to ensure sidewalks are organized and free from obstructions
- Goal 7: Derive insights into how people use the system, compliance issues, and targeted bike infrastructure investments with robust data partnerships
- Goal 8: Make Seattle a world leader in diverse cycling by increasing access to adaptive cycles as a recreation and mobility option

Our approach to meeting these goals in the 2019 Free-Floating Bike Share Program is described in detail below.

An iterative, flexible permit

In 2019, we wanted to maintain enough flexibility to allow the private sector to innovate, while ensuring outcomes that best meet the public interest. The micromobility industry continues to change rapidly, and we hypothesized that an annual permit would provide more flexibility for SDOT to respond and adapt than a more rigid contract, as well as offering more flexibility to vendors in determining how to achieve targeted outcomes.

However, we found that the amount of flexibility we offered in 2019 did not result in the vendors meeting the high expectations we set. In 2020, we plan to experiment with more prescriptive approaches to meeting our desired outcomes.

Adopting the Mobility Data Specification (MDS) and bringing program data processing in-house

In this year's permit cycle, we decided to bring all data processing in-house by adopting the Mobility Data Specification (MDS), a new international standard for mobility data sharing, and requiring vendors to share certain additional data beyond MDS requirements. We were one of the first cities to take this step, pairing MDS with additional data sharing requirements to support our needs.

From the data we collect through the permit program, we can:

- **Ensure permit compliance** – We collect information to determine if vendors are complying with requirements set forth in the permit. We use device status data to calculate vendor fleet sizes and ensure vendors are operating within their maximum and minimum fleet limits. Additionally, we use parking report logs to determine how quickly vendors are responding to reports of improperly parked bikes and see if they are meeting their compliance targets.

- **Evaluate the program's overall success at advancing SDOT's goals** – We collect trip data to assess the program's ability to meet its overall goals, which are broader than the specific permit requirements. For example, we use trip data to determine how much mobility the bike share program is providing, if it is facilitating connections to transit, and whether our attempts to expand access are successful. Incident logs (records of vehicle crashes and injuries) provided by vendors help us to understand safety issues and if we are meeting our Vision Zero objectives.

- **Inform city transportation planning** – We also use information collected through the permit program to inform our broader investments aimed at furthering SDOT's overarching vision and goals. For example, we use trip data to determine locations with the greatest need for additional bike lanes and bike parking spaces.

Data Requirements through MDS

For the 2019 permit cycle, we required vendors to share data using the Mobility Data Specification (MDS)[2]. MDS is a set of Application Programming Interfaces (APIs) for sharing protected data about vehicles and trips from a private mobility vendor to a government agency or jurisdiction, and for government entities to share data back to vendors. First developed by the Los Angeles Department of Transportation (LADOT), MDS is now used by over 50 cities to manage dockless bikes and scooters that operate in the public right-of-way. Further information on data handling and guidelines is discussed in a section below titled "How did we protect customer privacy?"

MDS requires vendors to share specifically defined, structured data on:

- **Current location** of available bikes
- **Trips** (exact routes with timestamps; non-real time)
- **Vehicle status** (i.e., whether it is available for use or not)
- **Vehicle events** (e.g., deployed, free, removed)

In 2019, the Open Mobility Foundation (OMF), an organization including cities and transit agencies across the United States and private organizations, came together to govern the continued development of MDS and other open-source mobility tools. The City of Seattle is a founding board member of OMF and has played an active role in shaping the organization and in advancing the case for open data and open source technology solutions in transportation.

Additional Data Sharing Requirements

Some, but not all, of the data sharing required by our permit is provided through MDS. The 2019 permit also required that vendors share the following data not currently collected via MDS to ensure permit compliance and support program evaluation:

- **Parking Report Data** – Vendors must submit a log of all improper parking reports to which they have responded.
- **Maintenance Data** – Vendors must provide data on devices in good working order and those that are unsafe to operate.
- **Incident Logs** – The vendors must collect data on all incidents: collisions, injuries, and property damage. Any incident resulting in injury must be disclosed to SDOT within 24 hours of the vendor receiving notice.
- **Aggregate Rider Data** – Vendors must provide the number of unique riders who use their devices for one or more trips in and around Seattle in a given period. Vendors must also distribute a rider survey designed by SDOT.

[2] https://github.com/openmobilityfoundation/mobility-data-specification

Building out bike parking infrastructure

In 2019, we focused on using a large portion of permit fees to build new bicycle parking infrastructure throughout the city to support a bike share fleet of up to 20,000 devices. We met our goal to provide 1,500 bicycle parking spaces in 2019, providing 1,515 in total. This figure is especially impressive because it represents the number of spaces that SDOT had previously targeted to deliver over a nine-year period. We expedited the process by attaching some bike parking installation to street and curb projects already underway. Additionally, we used trip data provided through the permit requirements to identify hotspots for new bicycle racks and corrals.

Figure 2. Bike corral at 4th and Wall

Bike corrals provide more space for people to park free-floating micromobility devices properly and allow for more pedestrian visibility at intersections (at Wall St. and 4th Ave.)

Figure 3. A sidewalk bike share corral (Ballard)

Audits, compliance, and enforcement

To ensure vendors' compliance with permit conditions and to ensure that the program was advancing the city's goals, we developed a robust, first-of-its-kind auditing and enforcement program. We performed audits of the data we received from vendors as well as on-the-ground audits of the bike share fleet to monitor bike parking and maintenance. When vendors were found to be out of compliance, we took permit-specified enforcement actions by reducing vendors' maximum-allowed fleets.

This first-of-its kind audit methodology made use of simple recording tools such as Google forms and allowed us to hire neutral, third-party auditors. The auditors visited different sections of the city unannounced to evaluate whether devices were parked correctly, available for rental, and in good working order.

Reporting

To help the public understand how well the bike share program was meeting its goals, we issued both monthly and quarterly summary reports. The monthly reports focused on vendor performance and data, including total rides, users, and deployed bikes per month. The quarterly reports took a more holistic approach and included the results of our third-party audits, enforcement actions, and bike parking construction.

Reduced fares and low-barrier programming

The bike share pilot evaluation identified barriers for some communities to access the city's bike share system. These barriers include affordability, lack of data or a smartphone, not having a bank account, and a lack of general knowledge about what bike share is and how to access it. As required by the 2019 permit, both operators offered a reduced pricing option for low-income individuals. Jump offered a "Boost Plan," which is $5 per month for 60 minutes of included riding time per day and then $4 per hour ($0.07 per minute) after 60 minutes, for individuals that meet the income requirements. Lime provided Lime Access, charging $0.50 to unlock an e-bike and $0.07 per minute to ride (a 50% discount). Both vendors also provided "text-to-unlock" features where low-income plan members could access the rental without a smartphone or data. To allow access to bike share without a bank account, Lime partnered with PayNearMe, enabling users to add cash to their Lime account at certain convenience stores. Jump allowed users to add cash to their account by purchasing Uber gift cards at stores across the city.

Partnerships with disability rights advocates

We developed unique partnerships to provide more cycling options and to improve rider education. Our partnership with Outdoors for All allowed us to offer recreational adaptive cycling options through the summer, and our partnership with Rooted in Rights provided education about proper parking and use of the bike share system. Our partnership leveraged the organization's expertise and existing adaptive cycling program to dramatically increase adaptive cycle access in Seattle. This partnership model is one-of-a-kind and makes Seattle a leader in finding innovative ways to provide adaptive cycles and educate people about bike share.

Figure 4: Adaptive Cycle

Our partnership with Outdoors For All expanded recreational cycling opportunities to people with disabilities

2. HOW WELL DID WE ADVANCE OUR GOALS AND HOW CAN WE IMPROVE IN 2020?

When working with new technologies in untested environments, it is critical to establish a strong foundation of goals against which to measure success. The bike share pilot was about learning a new technology and figuring out if it could integrate into our transportation system. Using lessons from the pilot, in 2019 we turned our focus toward eight specific goals, as documented in the permit requirements. These eight goals reflect our values and help us hold bike share vendors to City standards.

Using data from a mix of sources including vendor data reported according to the Mobility Data Specification (MDS), vendor report logs, on-the-ground audits, and surveys of customers and the general public, this evaluation report carries through on the promise to measure ourselves against these goals. Each goal-oriented section below includes a summary of how we succeeded, where challenges remain, and how we might address those challenges in 2020.

KEY QUESTIONS

For the 2019 evaluation, we identified 27 key questions to inform an assessment of our successes and shortcomings in meeting the eight program goals. By goal, the key questions are:

GOAL 1: Support an active, healthy, people-first use of Seattle's streets

- Who is using bike share and why?
- How much bike share use did we see?
- Where did people use bike share?
- Did people park bikes responsibly?

GOAL 2: Ensure affordable and equitable service – particularly for cost-burdened communities of color – while expanding access to opportunities

- Did people use permit-required reduced-fare plans?
- What portion of bike share users were people of color?
- How much did a typical bike share trip cost, and how do people prefer to pay?
- Was bike share available in neighborhoods where bike share access is most critical?
- How much usage did we see in access focus neighborhoods?
- Where was bike share available citywide?

GOAL 3: Be safe and advance our Vision Zero objectives

- How many total reported injuries were associated with bike share?
- How many bike share riders died or suffered a serious injury?
- Did people feel safe using bike share?
- How many bike parking spaces were installed at corners or intersections to improve visibility?
- Did people park bikes responsibly?

GOAL 4: Fill mobility gaps and improve connections to transit

- Why did people choose bike share and what did they use it for?
- How many bike share trips started or ended near transit hubs?
- How many bike parking spaces were installed near transit hubs?

GOAL 5: Provide a low-carbon mobility option as part of Seattle's efforts to reduce carbon emissions

- How many total miles of electric-powered travel did the bike share program achieve?
- What portion of trips would have otherwise been driving trips?
- Did the bike share program reduce, increase, or have little impact on carbon emissions?

GOAL 6: Manage public space to ensure sidewalks are organized and free from obstructions

- Did people park bikes responsibly?
- Did vendors respond to reports of improperly parked bikes in a timely manner? Did they provide accurate parking reports to SDOT?

GOAL 7: Derive insights into how people use the system, compliance issues, and targeted bike infrastructure investments with robust data partnerships

- How well did we derive new insights from program data?
- How did we ensure we were making decisions based on reliable data?
- How did we protect user privacy?

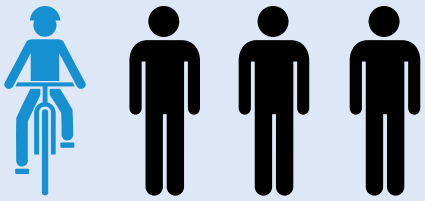
GOAL 8: Make Seattle a world leader in diverse cycling by increasing access to adaptive cycles as a recreation and mobility option

- How much were Outdoor for All's adaptive cycles used?

GOAL 1: SUPPORT AN ACTIVE, HEALTHY, PEOPLE-FIRST USE OF SEATTLE'S STREETS

To understand how well the bike share program supported an active, healthy, people-first use of Seattle's streets, we asked vendors to provide information on bike share trips and numbers of unique customers. Separately, through our 2019 new mobility survey of people who use Seattle's transportation systems (see Appendix B), we learned more about who was using bike share, the purposes of their trips, and their typical destinations. We also conducted audits, counted available bikes in each area and assessed whether they were correctly parked.

1 in 4 Seattle residents used bike share in 2019



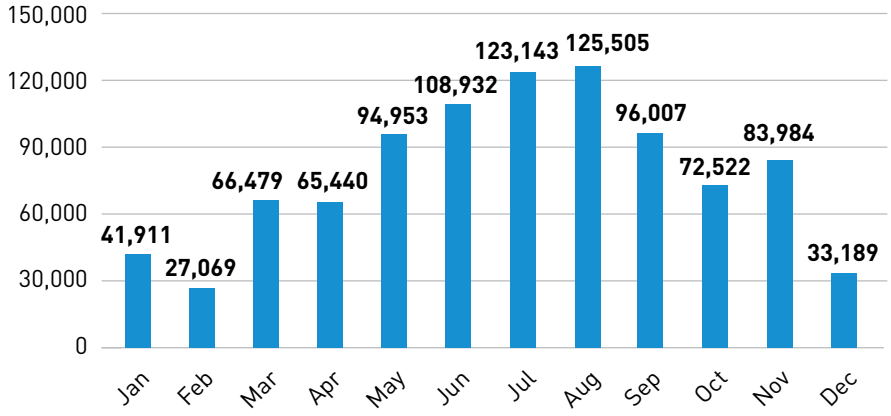
These metrics help us understand bike share use, adoption, trip purposes, rider behavior, and general public sentiment about the program.

Who is using bike share and why?

According to our new mobility survey results, a quarter of Seattle residents ages 13 and above reported using Seattle's bike share system in 2019.

Those users were more likely to be male than female and more likely to be white than people of color. Riders between the ages of 25 and 44 accounted for 66% of users, and 3% of users reported having a physical disability. Compared to 2018, bike share users were more likely to be women and from a broader age range, and about as likely to be people of color. These shifts may be at least partially attributable to the switch from regular bikes to e-bikes, which made bike share more physically accessible to a broader range of people, though e-bikes are also more expensive.

Figure 5. Total Unique Riders by Month (2019)[3]



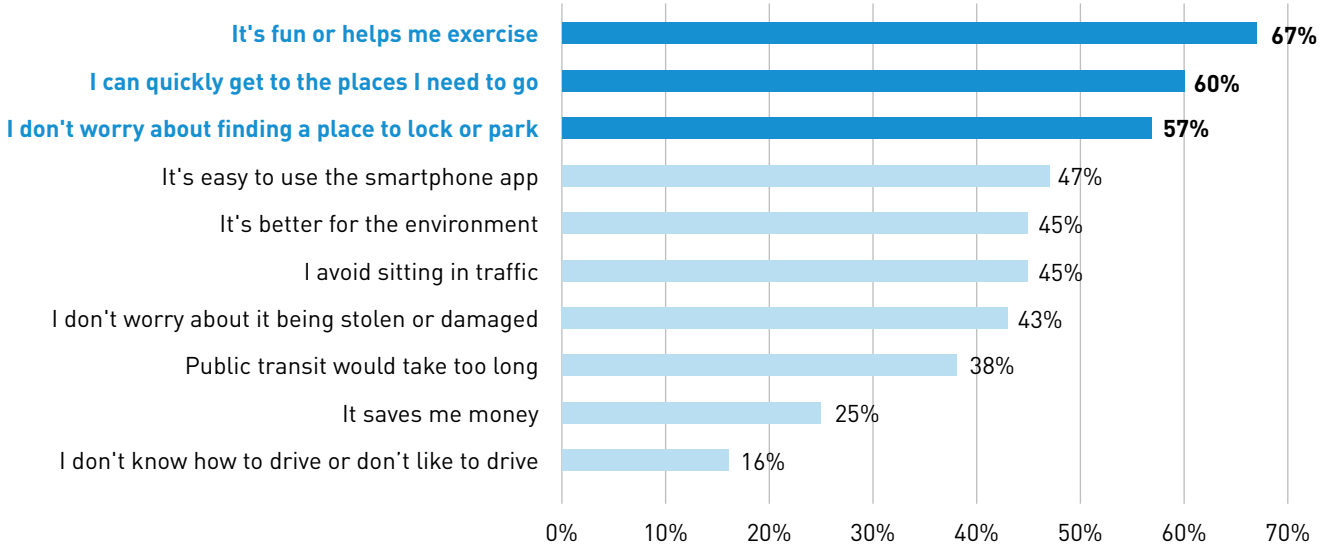
Source: Vendor unique user counts, 2019 new mobility survey

[3]Unique riders refers to the sum of each vendor's unique rider totals and does not account for riders that are registered with both companies.

About one in three tourists who responded to our new mobility survey reported using bike share in Seattle in the last year. And in general, tourists used new mobility options like bike share, car share, and ride hail more frequently than locals. Still, many city residents who used bike share did so with some regularity—32% of Seattle-based bike share users rode at least a couple times per month.

As for why people choose bike share over other modes, fun, exercise, and convenience rise to the top, with 67% of bike share users saying they choose bike share because it's fun or helps them exercise, 60% saying bike share helps them quickly get to the places they need to go, and 57% saying they don't worry about finding a place to lock or park their bike when they use bike share (see Figure 6).

Figure 6. Reasons people use bike share instead of other modes

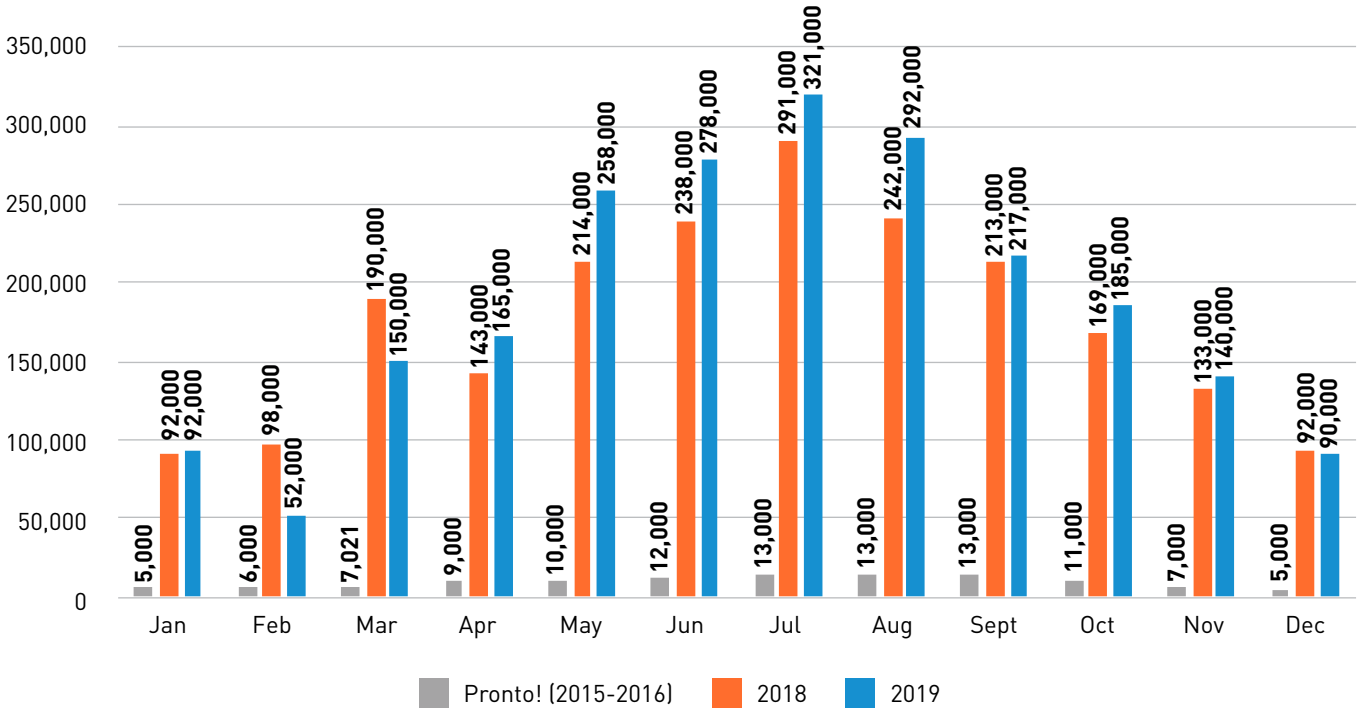


Source: 2019 new mobility survey

How much bike share use did we see?

Total Trips and Miles Ridden: In 2019, bike share riders took about 2.2 million trips and pedaled over 2.5 million miles, despite low ridership in February due to a record-breaking snowstorm. This level of trip activity is on par with what we saw in 2018, despite a significant decrease in the number of devices in 2019, showing that we can reduce sidewalk clutter without reducing use. Ridership remains **10 to 20 times higher than Pronto!**, Seattle's previous station-based bike share system, demonstrating continued strong demand for free-floating electric-assist bike share.

Figure 7. Total Trips Taken by Month



Source: MDS data, Trips; Pronto! data

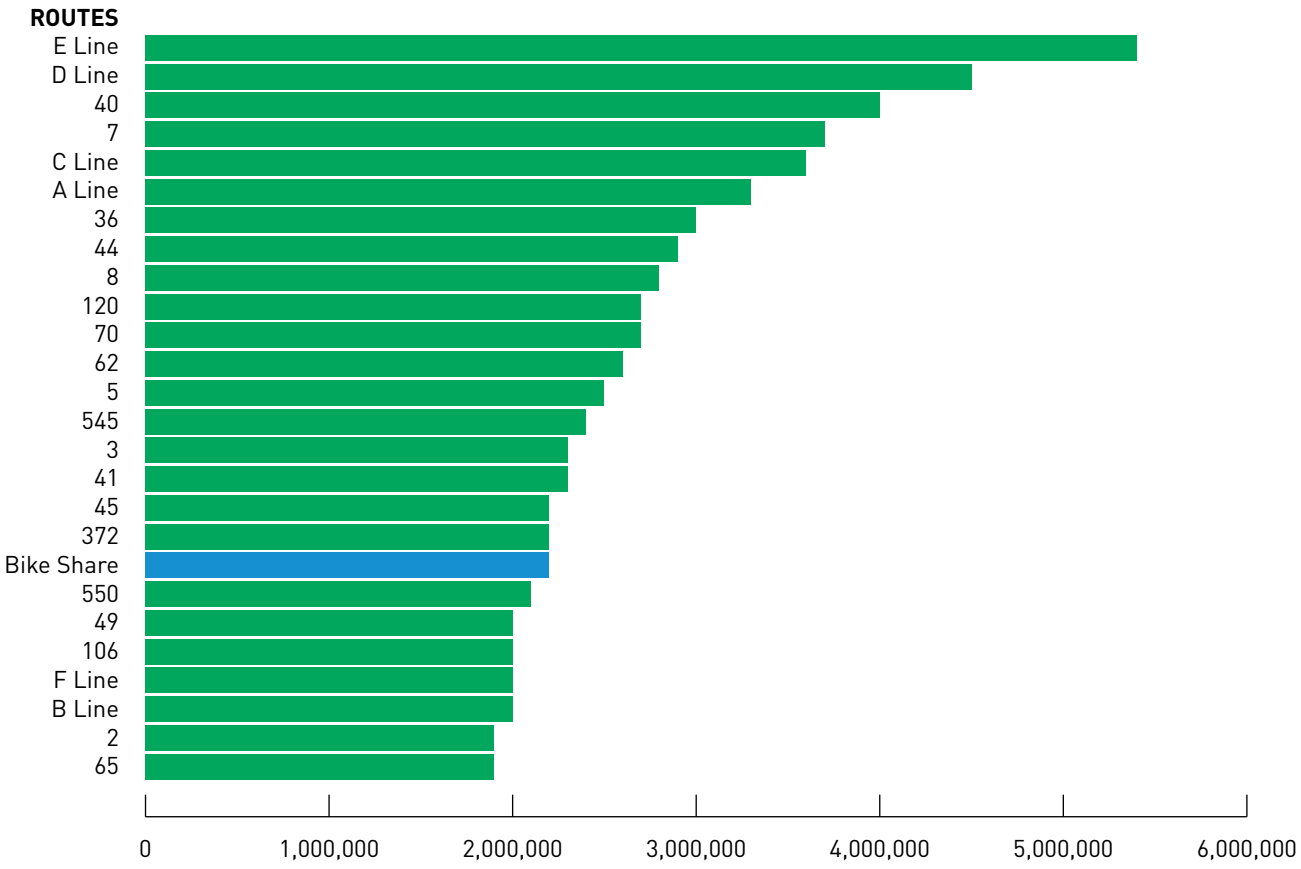
TYPICAL TRIP DURATION

- The average trip duration is 14 minutes
- The median duration is 9 minutes
- 92% of trips are under 30 minutes

TYPICAL TRIP DISTANCE

- The average trip distance is 1.2 miles
- The median distance is 0.8 miles
- 90% are under 2.5 miles

IF BIKE SHARE WERE A BUS ROUTE



Ridership for King County Metro's top 25 routes in 2019 compared to Bike Share trips in 2019

Fleet Size: Although the bike share system had similar ridership in 2018 and 2019, the number of shared bikes available for use on any given day decreased by almost 30% in 2019. There were 3,000 to 7,000 bikes available at any given time in 2019 as compared to 9,000-11,000 bikes available at any given time in 2018.

Rides Per Day Per 1,000 Residents: For every 1,000 Seattle residents, 8 bike share trips were taken per day in 2019 as compared to 7.9 in 2018—a comparable amount. For comparison, New York City's highly regarded dock-based bike share system, Citi Bike, sees around 6.7 rides per 1,000 residents per day, suggesting that Seattle's free-floating system has higher per-capita usage than Citi Bike.

HOW MANY BIKES? 2018 VS 2019

2018: 9,000 - 11,000

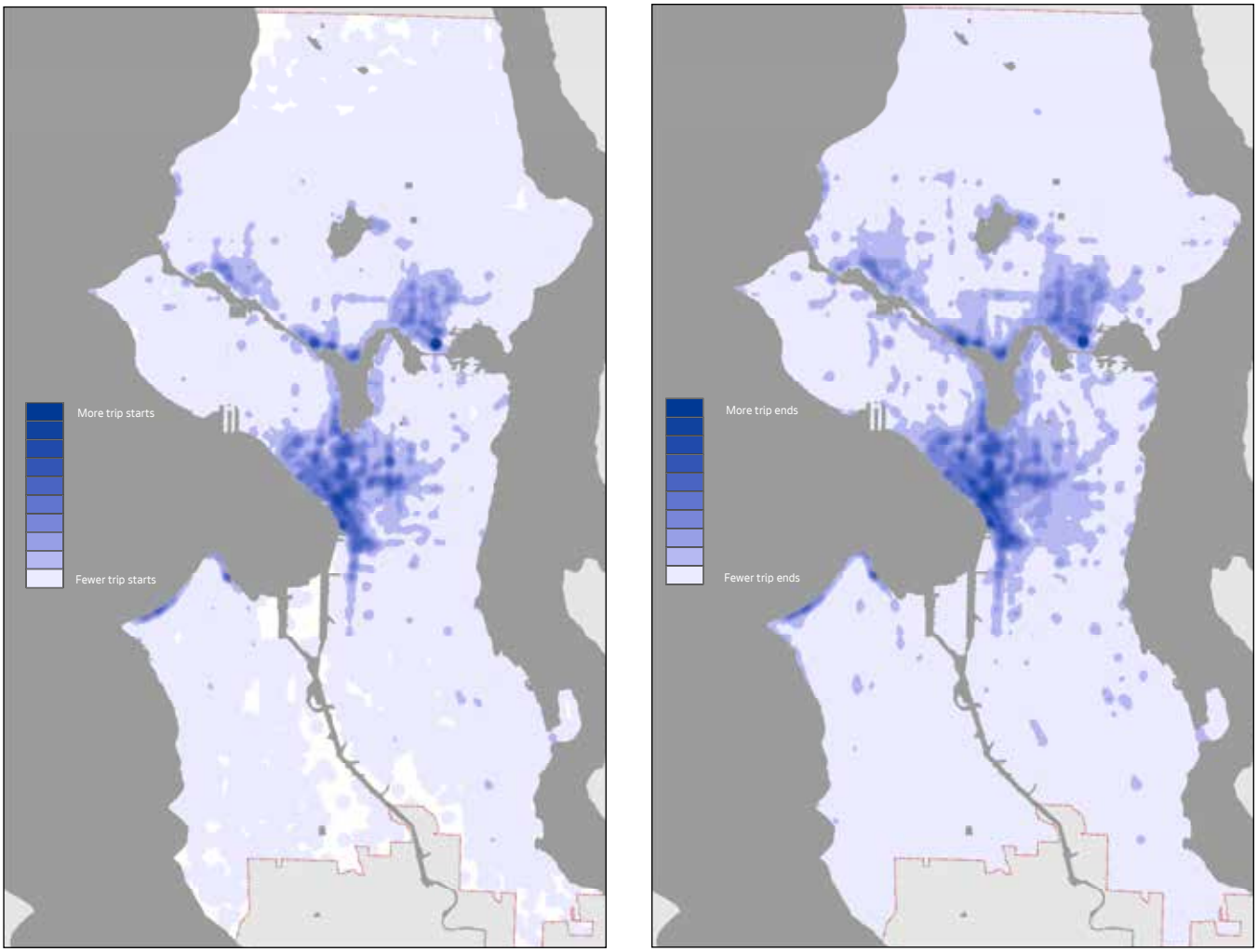
2019: 3,000 - 7,000

8 rides per day per **1,000** residents

Where did people use bike share?

Seattle's bike share permit requires that vendors allow rentals to begin and end across the city. In 2019, bike share riders continued 2018 trends and used bike share citywide. Trip ends were more spread out than trip starts, indicating that people generally began their trips in more centralized locations but ended their trips in more dispersed areas. Like last year, bike share trip starts and ends were focused in north and central neighborhoods, including Downtown, Belltown, Capitol Hill, South Lake Union, the University District, Fremont, and Ballard. In the southern portion of the city, there were limited hot spots near Alki Beach, in the Industrial District, in neighborhood business districts, and near Sound Transit stations.

Figure 8. Trip starts and ends



Did people park bikes responsibly?

When surveyed, Seattleites were polarized on whether we should require companies and customers to lock bikes at dedicated spots. This might reflect the finding that, while we saw improvement over the program year, the bike share program did not meet our ambitious bike parking standards for customer behavior. These data are presented in more detail in the Manage Public Space to Ensure Sidewalks are Organized and Free from Obstructions section.

Summary of Successes and Lessons Learned

Where We Succeeded	Where We Fell Short
• 2019 ridership was comparable to 2018 and significantly higher than ridership on Seattle's previous dock-based system (Pronto!). • Bike share continued to serve the entire city, with trips taken in every part of Seattle. • About 25% of Seattleites used bike share at least once in the last year. • 47% of users identified as female, a significantly higher percentage than in 2018 and in nationwide bike ridership in general. • 67% of bike share users reported using bike share for fun or exercise, suggesting that bike share is offering an active, healthy use of Seattle's streets. • Tourists used bike share frequently.	• While we saw improvement, we did not meet our ambitious parking performance targets.

Next steps for bike share in 2020

- Develop a more prescriptive approach to ensure better parking behavior through education and vendor- and customer-oriented accountability mechanisms (e.g., trip-end photographs, customer-targeted fines).
- Continue to deliver high-quality bike infrastructure investments.
- Actively manage the bike share system to ensure a minimum overall fleet size that meets mobility objectives.
- Be more proactive in ensuring bike share is meeting the needs of people of color, including more extensive outreach and engagement work.

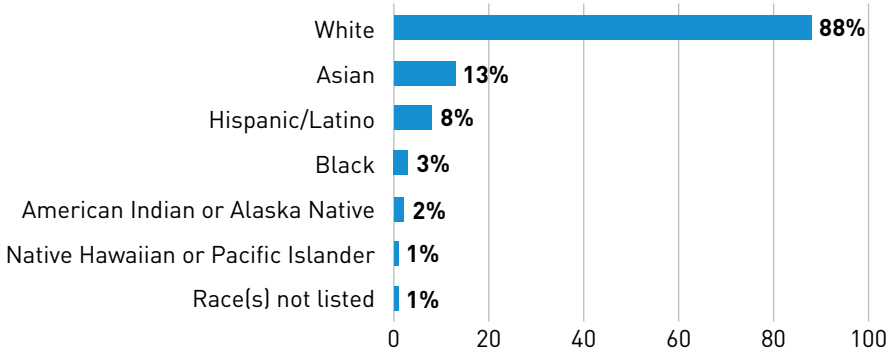
GOAL 2: ENSURE AFFORDABLE AND EQUITABLE SERVICE—PARTICULARLY FOR COST-BURDENED COMMUNITIES OF COLOR—WHILE EXPANDING ACCESS TO OPPORTUNITIES

To understand how well the bike share program has provided affordable and equitable service—particularly for cost-burdened communities of color—while expanding access to opportunities, we asked (but did not require) vendors to provide us with the number of participants in their low-income membership plans, we considered the racial diversity of bike share users, we compared trip costs of a bike share ride with other modes of transportation available in Seattle, and we analyzed bike share availability and usage in neighborhoods with limited access to opportunity and low bike share usage during the pilot year (see Figure 8).[4] Taken together, these metrics tell us how effective we have been at expanding access to and ensuring affordability of bike share in Seattle.

Did people use permit-required reduced-fare plans?

We required vendors to offer a reduced-fare program of no more than $1.50 per hour with eligibility criteria to match the cost of the ORCA Lift and Regional Reduced Fare Permit (RRFP) programs. Although 2019 permit requirements did not require bike share vendors to submit usage data for these programs, SDOT was able to obtain high-level data on low-income plan usage. In 2019, around 2% of total trips were taken using a vendor's low-income plan. Regionally, around 25% of the population qualifies for these reduced fares, indicating that the low-income plans were not highly used.

Figure 9. Racial and ethnic composition of bike share users (respondents could choose multiple options)



Source: 2019 new mobility survey

[4]These are referred to as "equity focus areas" in the permit application and include the following neighborhoods: Bitter Lake, Cedar Park, Haller Lake, North College Park, Olympic Hills, Pinehurst, Atlantic, First Hill, Minor, Brighton, Dunlap, Georgetown, High Point, Highland Park, Holly Park, Mid-Beacon Hill, Rainier Beach, Rainier View, Roxhill, Seward Park, South Beacon Hill, South Delridge, and South Park.

What portion of bike share users were people of color?

According to the new mobility survey results, somewhere between 12% and 28% of bike share users identified as people of color (see Figure 9). Slightly different data collection and reporting methods between our 2018 and 2019 surveys make direct comparisons difficult, but this portion of bike share users who are people of color appears roughly consistent with 2018 data.

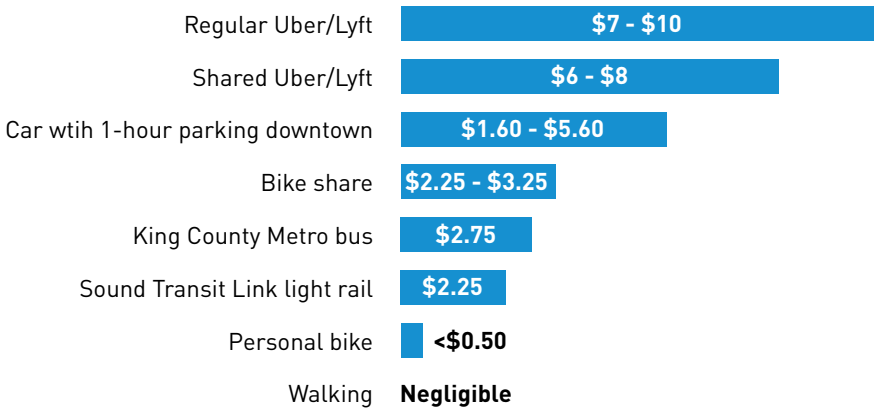
How much did a typical bike share trip cost, and how do people prefer to pay?

A typical bike share trip of about 0.8 miles or about 9 minutes costs $2.25 to $3.25. King County Metro bus adult fare is $2.75, Sound Transit Link light rail fare is $2.25 for short trips, and a 0.8-mile ride hail trip in downtown Seattle could cost $6 to $10, or more in peak periods.While the per-mile cost of driving a personal car is typically estimated at under $1.00, on-street parking prices in downtown Seattle range from $1 to $5 per hour depending on location and time of day.

Credit cards are a preferred method of payment, yet many survey respondents would prefer to pay with an ORCA card (especially for Seattle and regional residents).

People with disabilities were more likely than other respondents to prefer paying with cash, check, debit cards, gift cards or pre-paid cards, and PayPal. People who speak a language other than English at home were more likely than other respondents to prefer paying with cash.

Figure 10: Comparative costs of a short trip



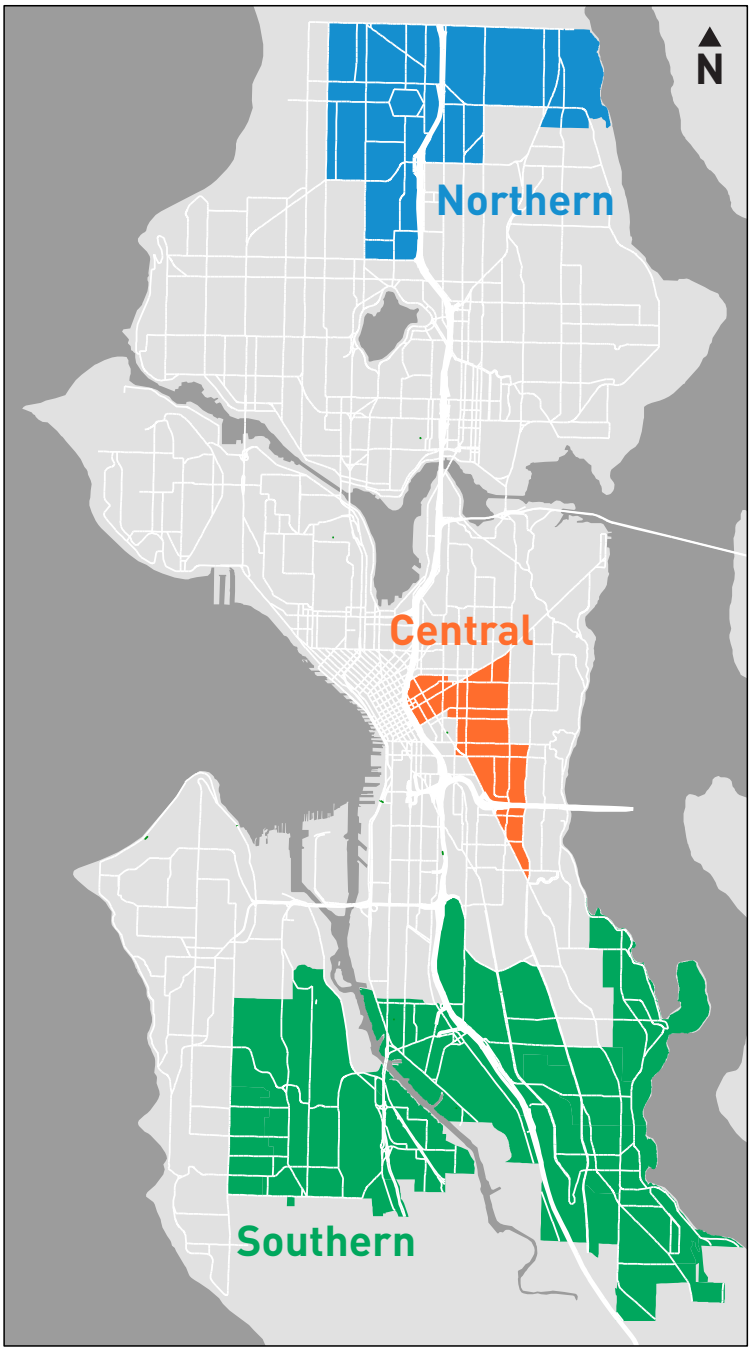
Sources:
www.uber.com/us/en/price-estimate/
www.lyft.com/rider/fare-estimate
https://newsroom.aaa.com/tag/driving-cost-per-mile/
www.seattle.gov/transportation/projects-and-programs/programs/parking-program/paid-parking-information/street-parking-rates
https://kingcounty.gov/depts/transportation/metro/fares-orca/what-to-pay.aspx
www.soundtransit.org/ride-with-us/how-to-pay/fares/link-light-rail-fares

Was bike share available in neighborhoods where bike share access is most critical?

To meet our goal of expanding access to opportunities, we required each vendor to distribute at least 10% of its deployed fleet in designated neighborhoods (Figure 11). These focus neighborhoods were determined by identifying places where:

- Displacement risk is highest
- Access to opportunity is lowest
- Usage of bike share in the pilot year was lowest

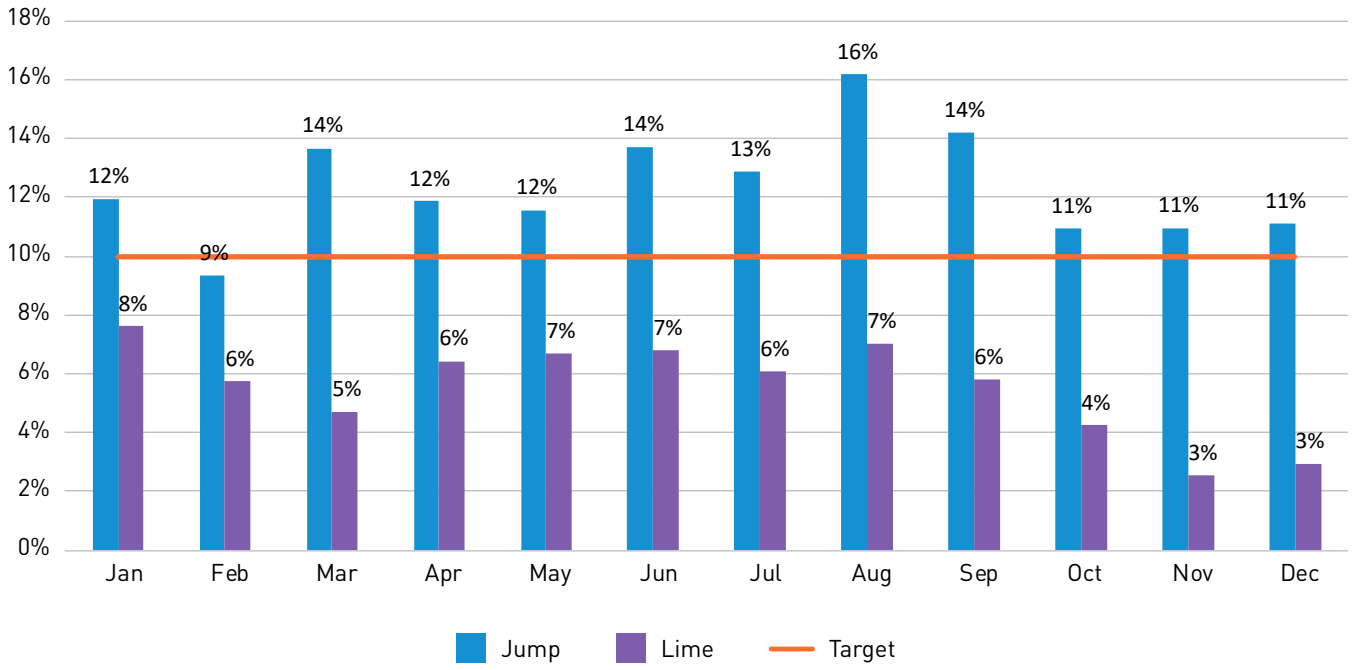
Figure 11. Bike Share Access Focus Neighborhoods



Source: SDOT

According to our year-end data analysis, after February 2019 more than 10% of Jump's bikes were deployed to these neighborhoods throughout the year. Lime's average monthly deployment (5% to 7%), however, never met the 10% deployment target in 2019. In the future we will be able to audit this on an ongoing basis and enforce permit requirements accordingly.

Figure 12. Share of Fleet Size in Bike Share Access Focus Neighborhoods by Month (Goal: 10%)



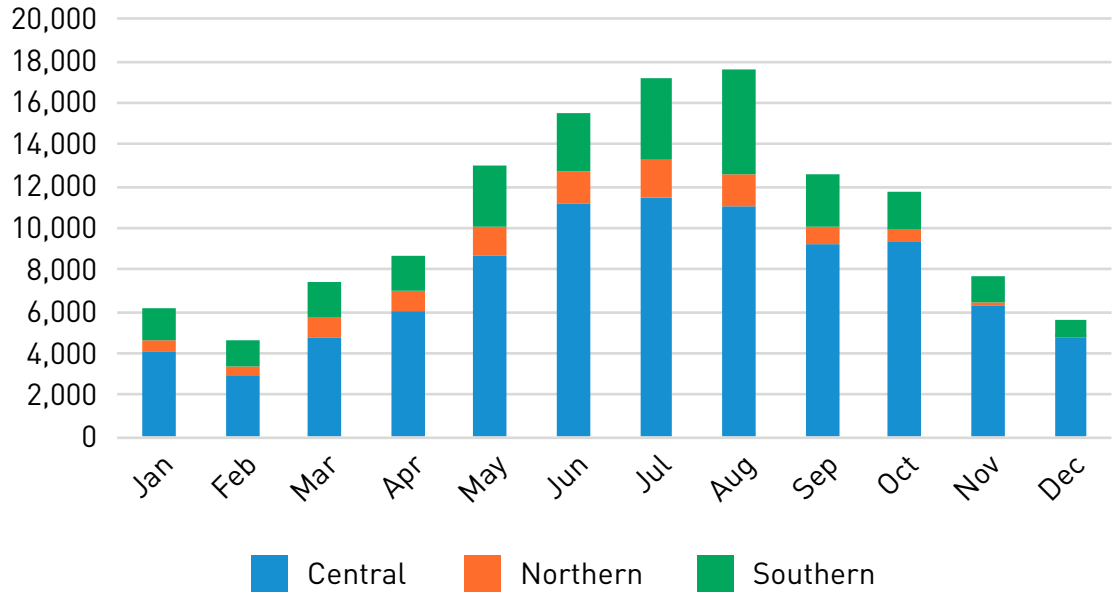
Source: MDS Data, Status Changes

How much usage did we see in access focus neighborhoods?

Bike availability, however, is not the only measure of success for improving access in these neighborhoods. We also looked at the number of trips made to or from these areas. Approximately 115,000-118,000 trips were made to or from focus neighborhoods in 2019 (or 5% of total trips). Given the Central neighborhoods' overall higher density and activity, it is not surprising to see that these areas generate a much higher number of monthly trips than Northern or Southern neighborhoods, even though the total number of bikes deployed in each area is similar throughout the year (see Figure 13). Similarly, the Central Area has more dedicated and separated bike infrastructure, which provides a comfortable riding environment for riders of all ages and abilities.

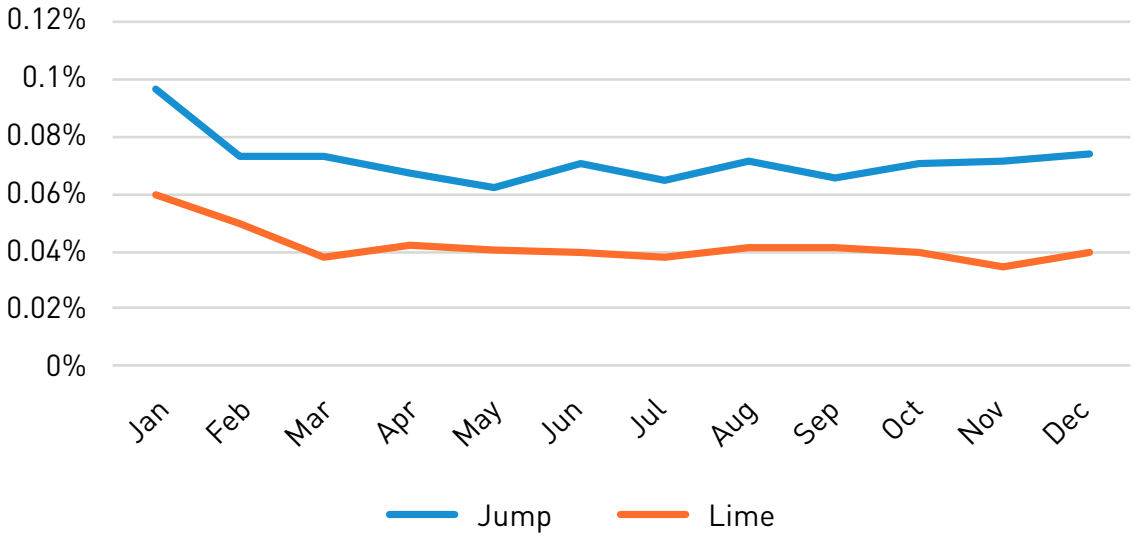
As expected given the deployment patterns of each vendor, a higher percentage of Jump trips served focus neighborhoods throughout the year (between 6% and 10%) as compared with Lime (between 4% and 6%) (see Figure 14).

Figure 13. Monthly Trips to and from Bike Share Access Focus Neighborhoods



Source: MDS data, Trips
Source: MDS data, Status Changes

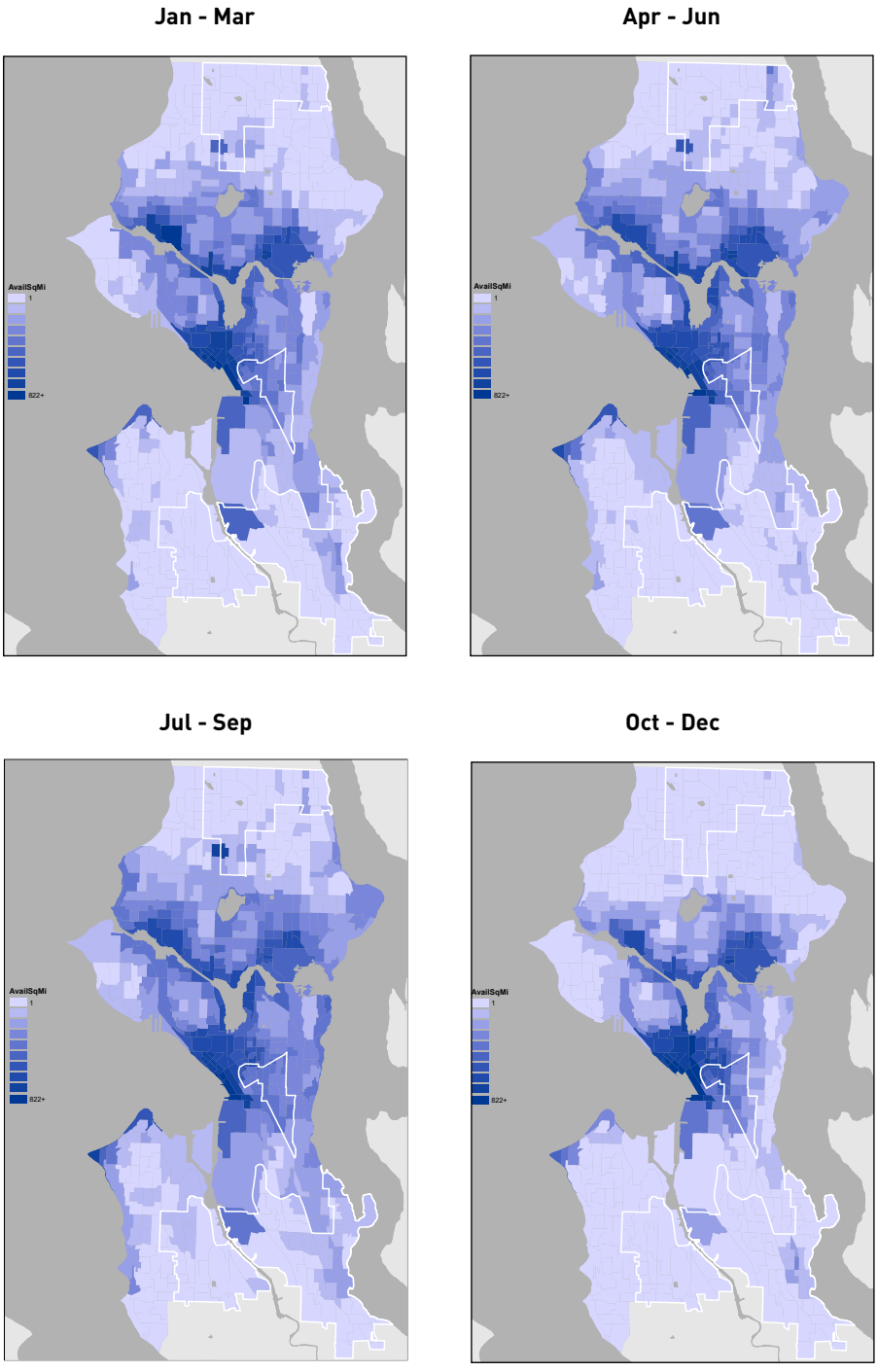
Figure 14. Percentage of Trips Taken to or from Access Focus Neighborhoods, by Vendor



Where was bike share available citywide?

Though available citywide, bike share was concentrated in the center of the city for much of 2019. In the summer months, the fleet coverage appeared to expand outward toward large city parks like Discovery Park and Seward Park, as well as further north and south. By late fall and early winter, the bike share fleet became more centrally concentrated than at any other point in the year.

Figure 15. Bike share availability citywide, by census tract and quarter



Source: MDS data, Status Changes

Summary of Successes and Lessons Learned

Where We Succeeded	Where We Fell Short
• For most of the year, Jump ensured at least 10% of their in-service fleet was deployed in neighborhoods where we would like to see expanded bike share access. • Both vendors introduced a reduced-fare plan to increase bike share access for cost-burdened communities. • Jump's Boost plan offered 60 minutes of daily ride time for only $5 per month. Lime Access offered a 50% discount on unlocking and per-minute ride rates.	• Lime missed our target for device availability in focus neighborhoods (10% on any given day). • The percent of all trips starting or ending in neighborhoods where we're focused on bike share access tended to be less than the percentage of all bike share bikes deployed to those neighborhoods, suggesting proximity to available bikes is not the only barrier to use. • We required vendors to collaborate with us on community engagement activities, to make certain information available in multiple languages, to create a marketing document, and to establish an equity programming plan. However, these requirements did not lead to quantifiable improvements in making bike share both available and accessible to cost-burdened communities and communities of color. • We do not have a full picture of the success of the reduced-fare program because the 2019 permit did not require vendors to share detailed program membership and adoption rates. • The limited low-income plan usage data we do have indicates that these programs were not well-used.

Next steps for bike share in 2020

- Require vendors to report reduced-fare program participation and use of different payment options.
- Establish a new performance indicator beyond bike availability/deployment to measure progress on equitable access (e.g., percent of trips that start and end in access focus areas).
- In future surveys, ask about race and ethnicity of bike share users in a way that better lends itself to year-over-year comparisons.
- Develop a better understanding of barriers to bike share usage and limits of bike share's role in expanding mobility for cost-burdened communities of color through new data audits and community engagement methods.
- Partner with non-profit and community-based organizations to expand familiarity with bike share and reduced-fare program options.
- Continue requiring vendors to provide a broad set of payment options, with a focus on making preferred payment options available within access focus neighborhoods.

GOAL 3: BE SAFE AND ADVANCE OUR VISION ZERO OBJECTIVES

Our Vision Zero objective is to reduce traffic related fatalities on city streets to zero by 2030. To understand how the bike share program helps advance our safety and Vision Zero objectives, we required bike share vendors to report injuries, serious injuries, and fatalities associated with bike share rides. Due to potential differences in reporting methodology between the vendors, we also reviewed Seattle Police Department (SPD) incident reports. When it comes to why people do or don't use a certain mode, perceived safety is more indicative than injury statistics, so we also asked in our new mobility survey whether people feel safe using bike share. Finally, we installed new bike share parking infrastructure near crosswalks and intersections, which can increase pedestrian visibility to motorists and contribute to improved safety.

How many total reported injuries were associated with bike share?

We collected injury-related data by reading each Seattle Police Department (SPD) bike-related incident report and counting injuries from all that mentioned bike share or that we knew to involve bike share through news media. Using this method, we found 13 SPD-reported incidents, with 7 reported injuries, one of which was a serious injury.

We also required vendors to report all injuries to SDOT in a monthly log. Though we specified a common reporting format, we did not specify how the data was collected and counted, so we lack insight into the severity of the injuries reported and the accuracy of the logs. Accordingly, we decided to keep our data consistent with other SDOT safety studies and only include data from the SPD crash reports.

A 2017 study of 2008-2009 U.S. pedestrian and bicyclist injury rates found an average of 72.9 pedestrian injuries per 100 million kilometers walked (or 1.2 per 1 million miles) and 207.1 bicyclist injuries per 100 million kilometers biked (or 3.3 per 1 million miles).[5] Using our Seattle Police reported data, the bike share injury rate in 2019 was 2.4 injuries per 1 million miles ridden, which is 20% less than the national bicycle injury rate cited above.

It is likely that there were additional injuries that went unreported. The San Francisco Vision Zero Prevention Research Collaborative found that "29% of patients who were injured in transportation-related crashes (all crashes), transported by ambulance, and required hospitalization at ZSFG (SF's only trauma center) were not reported in police records. Among cyclists, this proportion is even greater at 39%."[6]

How many bike share riders died or suffered a serious injury?

There were no deaths and one serious injury related to bike share use in 2019.

Did people feel safe using bike share?

The new mobility survey didn't ask bike share users if they felt safe, but it did ask non-users whether safety was a barrier for them. About one in three Seattle and regional residents who don't use bike share said they wouldn't feel safe using it, and one in five specified that they feel unsafe going up or down hills on bike share (see Figure 16).

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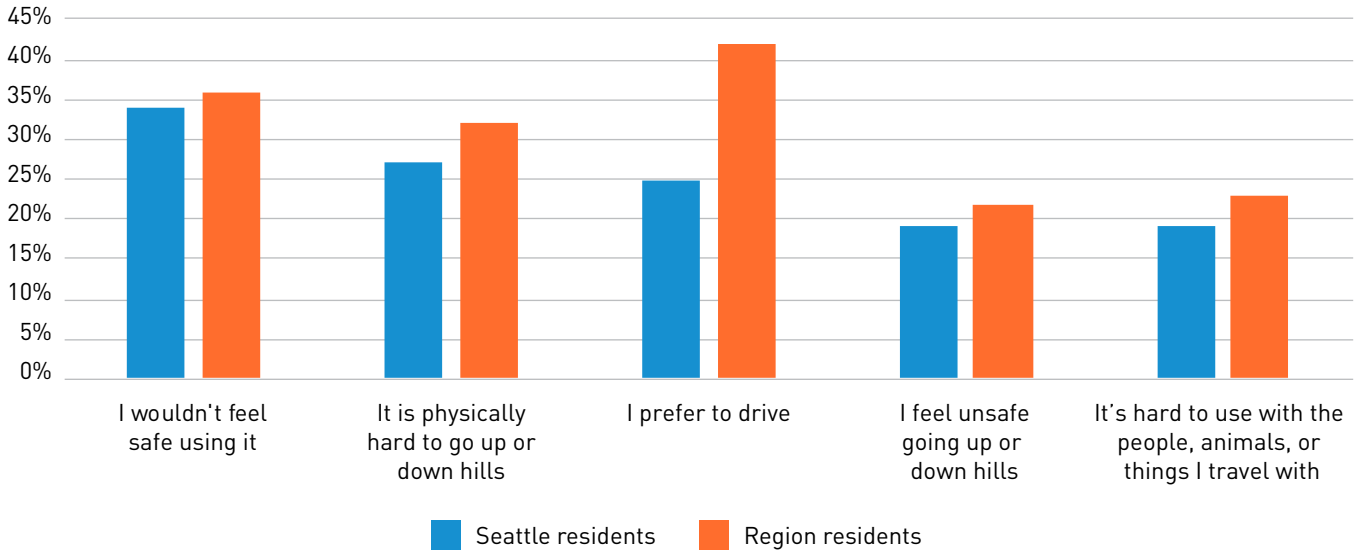
[5]Buehler, Ralph and John Pucher. Trends in Walking and Cycling Safety: Recent Evidence from High-Income Countries, With a Focus on the United States and Germany. American Journal of Public Health. February 2017. www.ncbi.nlm.nih.gov/pmc/articles/PMC5227927/

[6]2019, June. Emerging Mobility Inujury Monitoring in San Francisco, California Utilizing Hospital Trauma Records: a Methodology. www.sfdph.org/dph/files/EHSdocs/PHES/VisionZero/Emerging_Mobility_Injury_Monitoring_Methodology.pdf

Compared with white respondents, people of color were more likely to say they don't use bike share because they wouldn't feel safe using it, they don't know how to use it, it's too expensive, they don't have a helmet, the hills are physically challenging or make them feel unsafe, and the bikes aren't well-maintained. Compared to respondents without disabilities, respondents with disabilities were more likely to say they don't use bike share because the bikes don't fit their physical needs and because the hills are physically challenging or make them feel unsafe.

Figure 16. Top reasons people don't use bike share



Source: 2019 new mobility survey

How many bike parking spaces were installed at corners or intersections to improve visibility?

To advance our Vision Zero objectives, we installed new bike parking spaces at intersections to improve visibility for people walking, biking, and driving. We placed on-street corrals in the 20- or 30-foot restricted parking area at the approach to a crosswalk to reinforce the parking restriction and ensure that pedestrians crossing at the corner are more visible to approaching drivers. Of the more than 1,500 bike share parking spaces we installed this year, 881 spaces (58%) were in a location that improved visibility or shortened crossing distances for pedestrians. We installed 576 lock-to spaces and 305 wheel-lock spaces in 92 on-street corrals at locations meeting this definition.

Figure 17. On-street bike share parking corrals installed near intersections

Did people park bikes responsibly?

Proper bike parking is necessary to ensure the comfort and safety of all people using the streets. We set ambitious targets for proper bike parking behavior, and although most people park correctly, we have more work to do to continue to shift culture and behavior. A full performance evaluation is in the *Manage Public Space to Ensure Sidewalks are Organized and Free from Obstructions goal section* (see pg. 41).

Summary of Successes and Lessons Learned

Where We Succeeded	Where We Fell Short
• Bike share injuries remained rare in 2019, with only 2.4 injuries reported per 1 million miles ridden. • 58% of new bike parking spaces installed in 2019 were in locations that enhance pedestrian safety. • There were no bike share fatalities in 2019.	• One serious bike share-related injury was reported in 2019. • A lack of standard reporting definitions for information provided by vendors meant that we could not appropriately evaluate vendor-provided injury statistics. • We failed to ask bike share users if they felt safe using bike share in the new mobility survey, so we only had information about perceived safety from non-users.
Next steps for bike share in 2020 • Shift from requiring vendors to submit injury data to performing a more holistic public health study about the impacts of bike and scooter share. • Continue requiring vendors to include safety messaging in the app as well as on bike share devices.	

GOAL 4: FILL MOBILITY GAPS AND IMPROVE CONNECTIONS TO TRANSIT

Mobility gaps occur when people cannot get to where they want to go when they need to with available options. In Seattle, we strive to provide a variety of sustainable transportation options to all communities to reduce reliance on single-occupancy car trips.

To understand how well the bike share program has filled mobility gaps and improved connections to public transportation, we asked for what purposes people use bike share, used information provided by bike share vendors to calculate the number of trips that began and ended near transit stations, and we prioritized proximity to transit in siting new bike parking spaces to encourage a seamless transition between bike share and transit. These metrics help us evaluate whether the bike share program was able to fill mobility gaps and improve connections to transit.

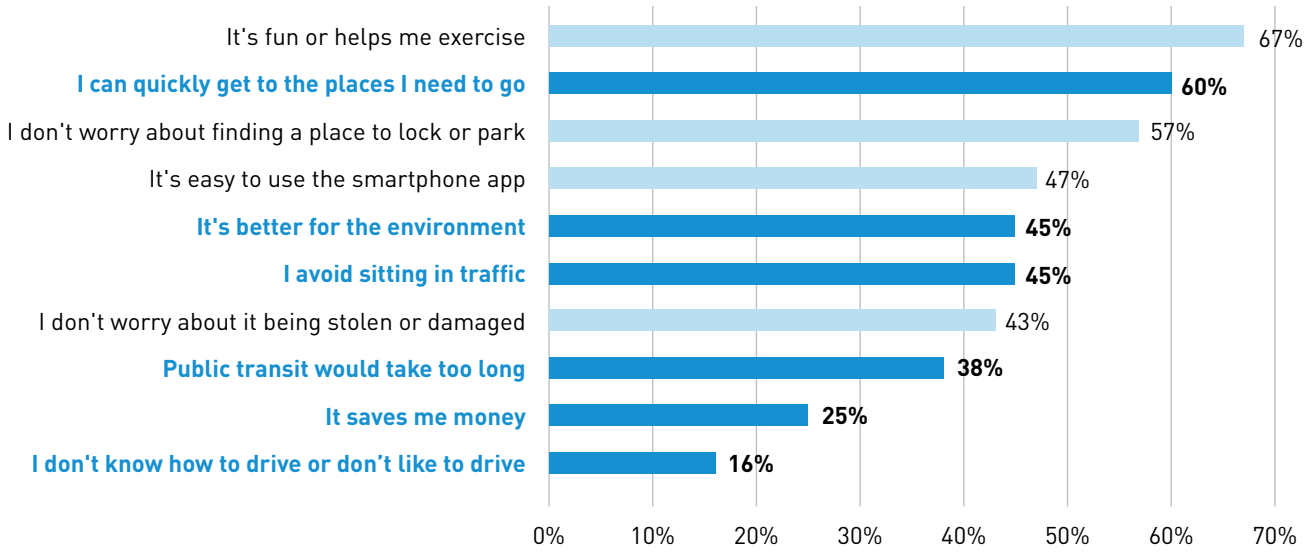
Why did people choose bike share and what did they use it for?

In addition to being a fun and active option (see Figure 18), bike share also saves people time and money. 60% of bike share users said it helps them quickly get where they need to go, and 38% said they use it because public transit can take too long (see Figure 18). 25% of bike share users said they use bike share because it saves them money.

Further, bike share offers people an alternative to driving, with 45% of bike share users saying they choose bike share because it's better for the environment and allows them to avoid sitting in traffic and 16% of bike share users saying they don't like driving or know how to drive.

Compared against respondents without disabilities, respondents with disabilities were even more likely to choose bike share as an alternative to driving, because they don't have to worry about finding a place to lock or park their bike, and because public transit would take too long.

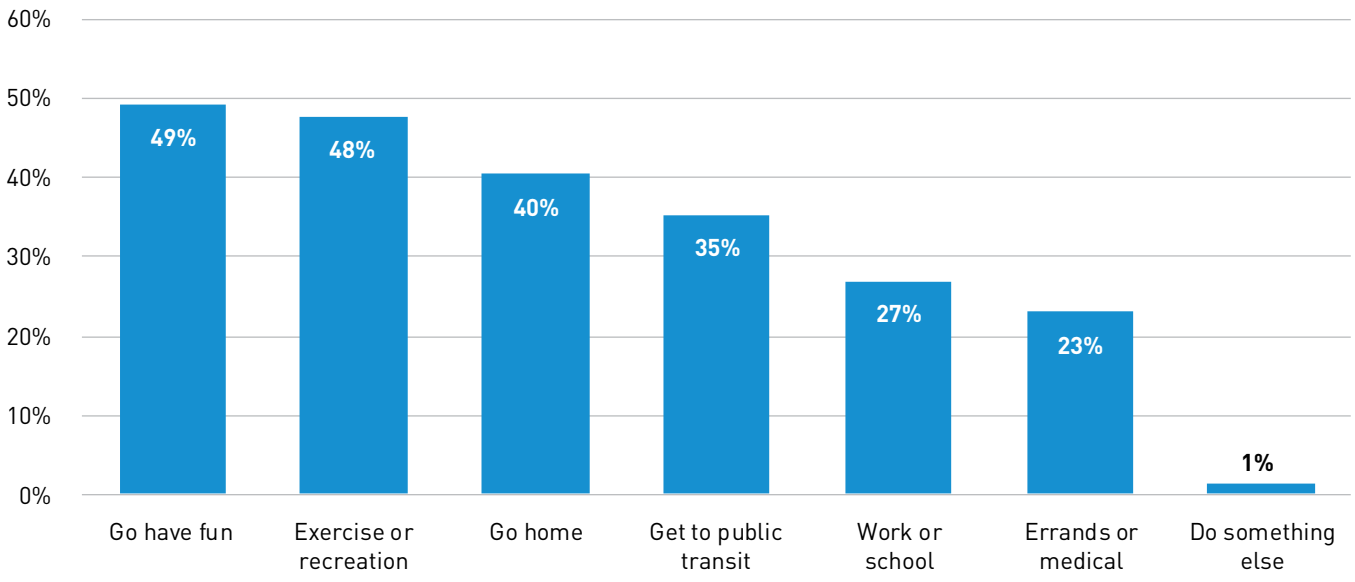
Figure 18. Reason for Choosing Bike Share Over Other Modes



Source: 2019 new mobility survey

People use bike share for a variety of trip purposes, including connecting to transit. Nearly half of bike share users are getting exercise and recreation (48%) and using it to access something fun (49%). A substantial portion of bike share users also use it to get home (40%) and get to work or school (27%), and 35% of bike share users take bike share to connect to public transit, which makes bike share the most used new mobility mode for connecting to transit.

Figure 19. Bike Share Trip Purpose



Source: 2019 new mobility survey

Bike share supports short-distance, daytime travel needs. Half of all bike share trips lasted nine minutes or less and covered less than one mile. Over 90% of bike share trips taken in 2019 were under 30 minutes in duration and under 3 miles in length. In general, most bike share rides happen during the afternoon and early evening.

How many bike share trips started or ended near transit hubs?

Though bike share seems to replace some transit trips (38% of bike share users reported choosing bike share because public transit would take too long), it also appears to help people connect to transit (35% of bike share users reported using bike share to get to transit). These survey results align with our trip data, which suggest that about **75% of trips started or ended within a very short walk to a transit stop with two or more frequent transit options.**[7]

How many bike parking spaces were installed near transit hubs?

To facilitate connections from bike share to transit, we installed 469 new bike share parking spaces near 54 transit hubs. These 469 spaces represent nearly a third (31%) of the 1,515 bike share spaces we installed in 2019.

[7]Transit Hub in this context is defined as an area (520'x520' grid) within an approximate one-minute walk to transit stops/stations with frequent transit service (e.g., 2 or more frequent bus routes, RapidRide, or Link light rail).

Figure 20. Trip starts and ends overlaid with high-frequency transit hubs

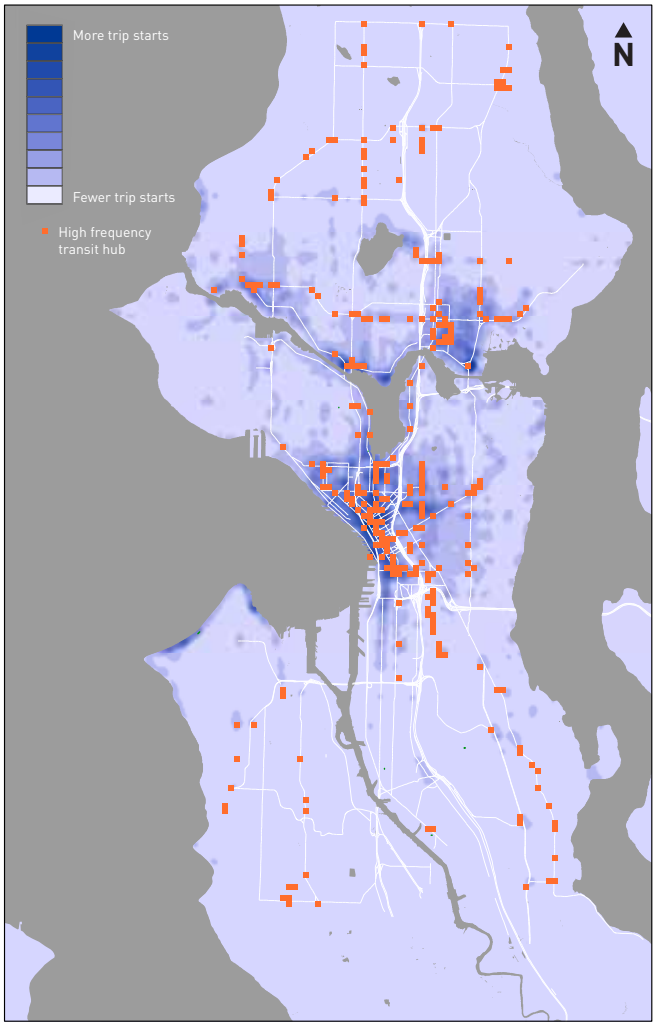


Figure 21. New bike share parking installations near high-frequency transit hubs

Figure 22. Bike share parking near transit hubs

Summary of Successes and Lessons Learned

Where We Succeeded	Where We Fell Short
• Results from our new mobility survey suggest that bike share fulfills a variety of needs for users and that people are more likely to use bike share to connect to transit than other new mobility modes (e.g., ride hail or car share). • About 75% of bike share trips started or ended near a high-frequency transit hub. • We installed 31% of our new bike share parking spaces—469 in total—near a high-frequency transit hub, facilitating connections from bike share to transit.	• We intended to install a larger portion of our bike share parking near high-frequency transit hubs, particularly near Sound Transit Link light rail stations.
Next steps for bike share in 2020 • Identify opportunities to partner directly with Sound Transit to install bike share parking spaces near Link light rail stations. • Continue to target bike parking installation near bus and rail hubs.	

GOAL 5: PROVIDE A LOW-CARBON MOBILITY OPTION AS PART OF SEATTLE'S EFFORTS TO REDUCE CARBON EMISSIONS

We hypothesized that bike share could be part of Seattle's efforts to reduce carbon emissions, and we tested that hypothesis using a range of metrics available through the permit program and our new mobility survey. We calculated how many miles of electric-powered travel the bike share program achieved and estimated the amount of carbon emissions the program diverted in 2019. We were unable to obtain meaningful data on emissions associated with device lifecycle and vendor operations, but we learned what information we want to require vendors to provide in the next iteration of the permit to help us develop a more complete assessment of whether the bike share program contributes to an overall reduction of carbon emissions for Seattle.

How many total miles of electric-powered travel did the bike share program achieve?

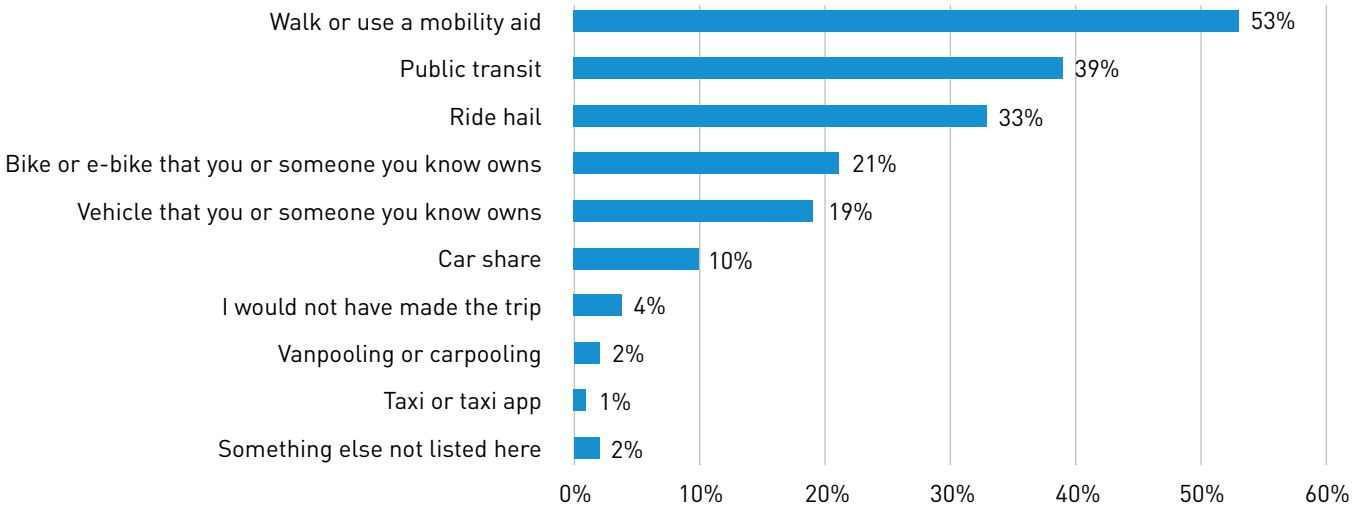
In 2011, the Mayor and City Council adopted a bold climate protection goal for Seattle to become carbon neutral by 2050.[8] The strategy specifically looks to the transportation system to increase electric mobility options and move single occupancy trips to shared transportation. Providing electric transportation choices and expanding bicycling infrastructure and services is one of the strategies for meeting our ambitious goal of carbon neutrality. The bike share program has provided a low-carbon mobility option for the people of Seattle, and in 2019 bike share users rode over 2.5 million miles. That is equivalent to 100 trips around the planet.

What portion of trips would have otherwise been driving trips?

If the bike share program did not exist this year, some of the 2.5 million miles of trips would have been travelled by other modes of transportation such as walking, public transit, ride hailing, or driving a personal vehicle. The new mobility survey results indicate that 33% of respondents would have used ride hail (Uber or Lyft), 19% would have used a personal vehicle, and 10% would have used car share if bike share hadn't been available for their last trip. As the survey allowed respondents to choose more than one option, we cannot add these percentages to determine a total car-trip replacement number. However, even if we just focus on ride hail, 33% of 2.2 million bike share trips represents a major potential reduction in driving trips. This implies that bike share supports a significant shift away from driving modes and towards a low-carbon mobility option.

[8]2018. Seattle Climate Action Strategy. Available online at www.seattle.gov/environment/climate-change/climate-planning/climate-action-plan

Figure 23. Bike share trip replacement



Did the bike share program reduce, increase, or have little impact on carbon emissions?

We did not require vendors to share operations and device lifecycle data in the 2019 permit, so we can't say for sure whether the bike share program's emissions savings outweighed the program's emissions production. To develop a more complete assessment of the bike share program's emission impacts, we need to consider vendor operations (e.g., emissions associated with storage warehouses, device maintenance, and vendors' daily rebalancing operations) and the lifecycle of a bike share device, including manufacturing and decommission. Future bike share permits will require vendors to submit this data.

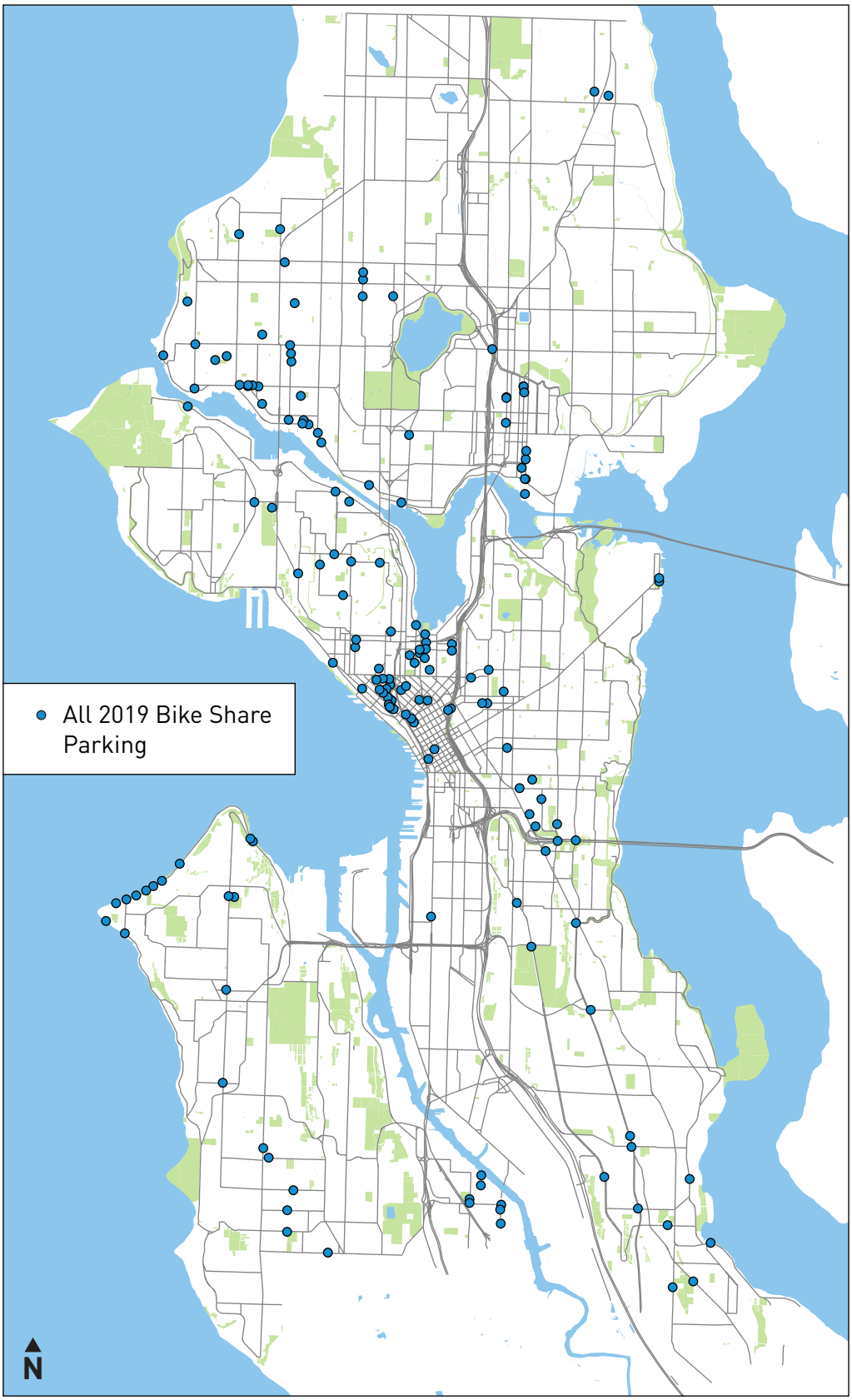
Summary of Successes and Lessons Learned

Where We Succeeded	Where We Fell Short
• Seattle residents and visitors traveled 2.5 million miles using an active, electric mode in 2019. • Our data suggests that about 33% of the 2.2 million bike share trips taken in 2019 might have otherwise been taken in a motor vehicle.	• We did not request a lifecycle emissions analysis from vendors, inclusive of operations and device lifecycle, so we can't measure the net emissions reduction benefit of the bike share program.

Next steps for bike share in 2020

- Require sufficient data from vendors to conduct a bike share lifecycle emissions analysis, inclusive of operations, to measure the net emissions reduction benefit of the bike share program.
- Continue to evaluate bike share use and mode replacement patterns to understand the environmental sustainability impacts of the program.
- Consider incentivizing vendors to use electric vehicles and/or electric bicycles to rebalance bike share devices and support program operations.

Figure 24. Locations of the 1,515 new bike share parking spaces SDOT installed in 2019



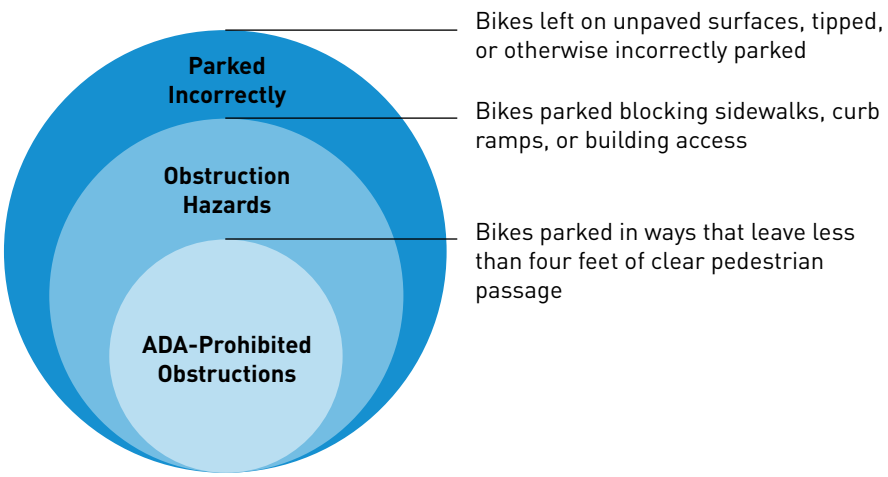
Source: SDOT

GOAL 6: MANAGE PUBLIC SPACE TO ENSURE SIDEWALKS ARE ORGANIZED AND FREE FROM OBSTRUCTIONS

In 2019, we built out more bike parking infrastructure than ever before to help keep bike share from interfering with sidewalk access and other public space. **We installed 1,515 new bike share parking spaces this year (see Figure 24)**. And to understand how well the program is doing in protecting pedestrian right-of-way, we used a combination of on-the-ground audits of how bikes are parked on a day-to-day basis, data on how quickly vendors respond to reports of incorrectly parked bikes, and audits of how accurately vendors report parking data. Taken together, these metrics help us to understand how well our program is doing in actively managing public space and incentivizing vendors to ensure their devices are not obstructing sidewalks.

Figure 25. On-Street Corrals on Alki Ave SW and 59th Ave SW

Figure 26. Level of Parking Obstructions



Did people park bikes responsibly?

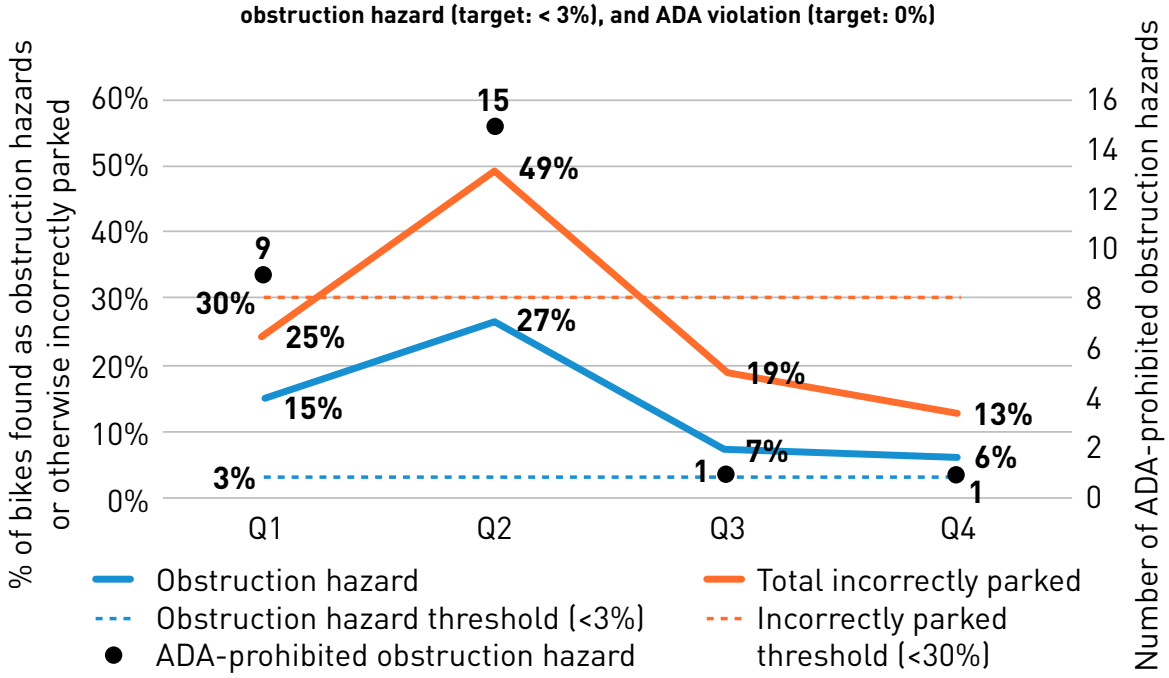
To support our people-first goal and to strive for obstruction-free sidewalks, we collected data on whether bikes were blocking sidewalks and curb ramps through our quarterly on-the-ground audits (see Appendix D for our audit methodology). Through our audits, we set ambitious targets for bike share parking performance:

- At least 70% of bikes should be parked correctly
- At least 97% of bikes should not be creating an obstruction hazard
- No bikes should be creating an ADA violation

SDOT hired a third-party auditor to ensure an objective review of parking compliance. The audits were conducted in randomly sampled areas of the city (see Figure 27) and in different sets of audit areas for each quarter.

In 2019, bike share vendors never met our target of at least 97% of bikes not creating an obstruction hazard. As a result, we issued fleet reductions of 2,100-2,680 bikes to each vendor, but we did observe a significant improvement in Q3 and Q4 2019 compared to the beginning of the year (see Figure 27). This unsatisfactory performance indicates an additional need for educating and incentivizing correct parking behavior among riders and new vendor enforcement mechanisms.

Figure 27. Percentage of bikes found to be incorrectly parked (target: < 30%), obstruction hazard (target: < 3%), and ADA violation (target: 0%)



Source: SDOT Audits and Quarterly Reports

ROOTED IN RIGHTS

To encourage correct parking behavior, we worked with Rooted in Rights to develop a user education video.[9] Rooted in Rights is a storytelling advocacy group within Disability Rights Washington. We intended for our ambitious parking targets to motivate the vendors to invest in creative user education campaigns, but when we did not see that investment from vendors, we hired Rooted in Rights to produce a video about how and why to park bike share bikes correctly. https://youtu.be/ZHXozrBZFOM

[9] https://rootedinrights.org/video/bike-share-parking-do-the-right-thing/

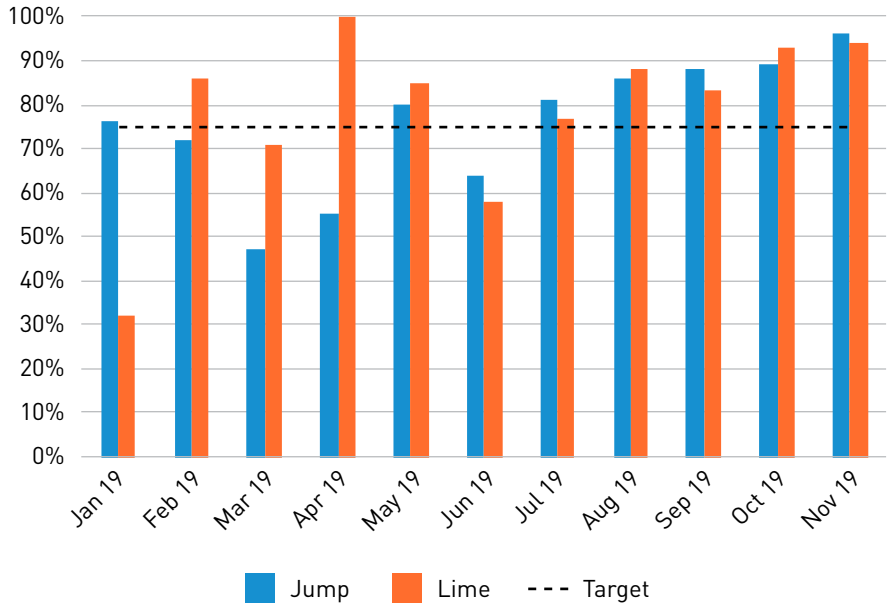
Did vendors respond to reports of improperly parked bikes in a timely manner? Did they provide accurate parking reports to SDOT?

We designed the permit to be goal-based, expecting vendors to respond to reports from the public about improperly parked bikes, especially obstruction hazards. The permit requires vendors to respond to and resolve reports of obstruction hazards within two hours if the reports are made during the day (6am to midnight) and within four hours if the reports are made at night (midnight to 6 am). For other reports of improperly parked bikes that aren't obstruction hazards, vendors must respond within 24 hours. The permit requires vendors to meet these targets at least 75% of the time and to respond within 48 hours at least 99% of the time.

We had concerns about the quality and reliability of the data we were receiving from the vendors, so in April we started checking the vendor logs for reports we submitted during our audits and for reports we were copied on. We found the vendor logs to regularly be missing reports we expected to be there, suggesting that we need to consider new ways to collect and validate this data in 2020.

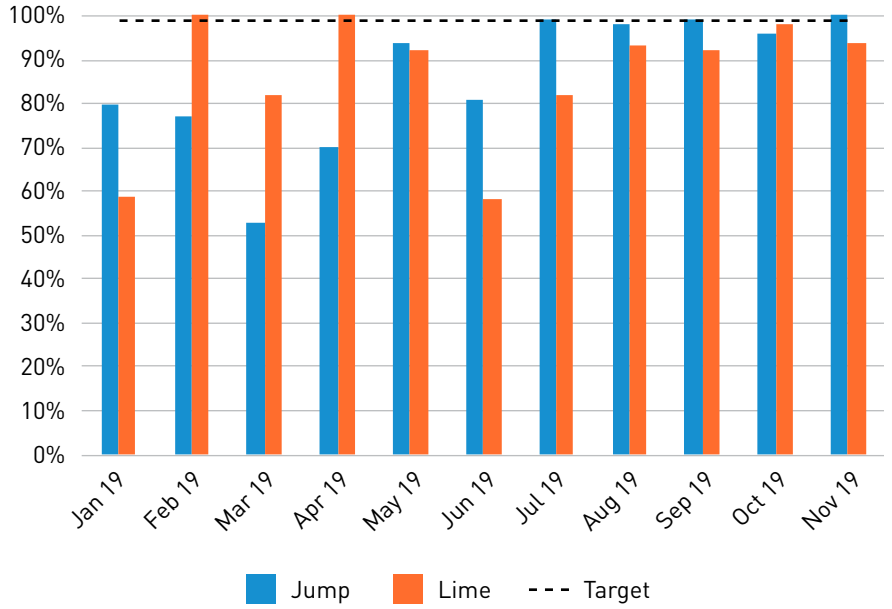
Figure 28 shows the percentage of parking report responses made "in time" by the two operators. Both operators appeared to consistently meet the 75% target between July and November 2019, though we have concerns about the accuracy of their logs.

Figure 28. Percentage of reports of improper parking that vendors responded to "in time" (target: > 75%)



Source: Vendor Report Response Logs

Figure 29. Percentage of reports of improper parking that vendors responded to within 48 hours (target: > 99%)



Source: Vendor Report Response Logs

Figure 29 shows the percentage of parking report responses by operators within 48 hours. Jump met this target only three times, in July, September, and November 2019. Both companies fell short of the 99% response target, although between July and November the vendors were consistently above 80%.

Summary of Successes and Lessons Learned

Where We Succeeded	Where We Fell Short
• The percentage of parking report responses made "in time" by the two vendors appeared to consistently meet the 75% target beginning in July 2019. • Parking behavior improved at the same time new bike parking spaces were being installed. • Our education and enforcement actions appear to have helped reduce the percentage of improperly parked bikes that we found in our audits from as much as 49% to only 13%.	• Though we saw significant improvement over the course of the year, vendors did not meet our audit goal of less than 3% of devices found to be parked as obstruction hazards. • Vendor data did not consistently include SDOT-submitted parking complaints in their logs, indicating data accuracy and completeness issues with the data received from vendors.
Next steps for bike share in 2020 • Develop a more prescriptive approach to ensure better parking behavior through education, as well as vendor and customer-oriented accountability mechanisms (e.g., trip-end photographs, customer-targeted fines). • Integrate bike share parking complaints into the citywide complaint mechanisms, including the Find-It-Fix-It smartphone application and 684-ROAD hotline. This will not only better serve Seattle residents, but allow SDOT to better track complaints and resolution times. • Require vendors to show bike parking infrastructure locations in their apps. • Continue to audit parking performance.	

GOAL 7: DERIVE INSIGHTS INTO HOW PEOPLE USE THE SYSTEM, COMPLIANCE ISSUES, AND TARGETED BIKE INFRASTRUCTURE INVESTMENTS WITH ROBUST DATA PARTNERSHIPS

During the pilot bike share program (2017-2018), SDOT was in a third-party data partnership with the University of Washington called the Transportation Data Collaborative (TDC). As the third party between the private operators and SDOT during the pilot phase, the TDC received, processed, and cleaned raw data from vendors for later evaluation by SDOT.

We learned from the pilot program's data partnership that we needed greater transparency into data cleaning and processing decisions to interpret the findings correctly and make sound decisions. During the pilot, we found that the TDC made decisions about what data counted as a trip and what data counted toward a vendor's total fleet size that we did not always fully understand. Therefore, in the 2019 permit year we required the vendors to provide all required data directly to SDOT. This necessitated that SDOT build a new, robust system for taking in, storing, and analyzing data, and it required us to update our understanding of how to protect user privacy when handling mobility data. We had to work closely with our IT Department to make this happen, but our new capacity for in-house data management will have far-reaching benefits for other City programs and departments.

How well did we derive new insights from program data?

In 2019, we successfully used the bike share program data to derive insights in three main areas:

- **Compliance issues** – With access to more granular data, we were able to determine if the vendors complied with certain permit requirements.
- **How people use the system** – Direct access to the raw data also empowered us to thoroughly evaluate the 2019 permit year against our eight goals and to make changes to the program to better align with those goals.
- **Targeted bike infrastructure investments** – Data we collect also provides insights for broader transportation planning purposes, like where to invest in active transportation infrastructure like bike parking and bike lanes and how to approach other mobility programs in the future.

Accurate data is essential to support these three purposes. Therefore, in 2019, we also performed audits of the vendor data. This exercise promoted improvements in data accuracy over time, but more importantly, it lent confidence to our recommended program changes (see Conclusion and Next Steps).

Targeted Bike Infrastructure Investments

Using trip data provided through the Mobility Data Specification (MDS) in the latter half of the year, we identified and confirmed hotspot locations for bike corrals and bike racks. These data supported the addition of 1,515 spaces (a 14.6% increase across the city).

How did we ensure we were making decisions based on reliable data?

To improve the reliability of the data we receive from vendors, we required vendors to submit trip data and bike data according to the Mobility Data Specification (MDS), an open-source city-designed data standard that we adopted in the 2019 permit. MDS is designed to require vendors to share more granular data than they were required to in the past. MDS allows cities to decide what counts as a trip and what counts as a bike in service rather than ceding that decision to the vendors. For example, instead of receiving daily or weekly trip totals, with MDS we receive records of every trip, including when and where they started and ended, what bike was used, how long the trip lasted, and how far it went. MDS also requires vendors to transmit their data via an application program interface (API), which means in a machine-readable or computer-to-computer format. This reduces opportunities for error and makes it easier to validate the data for completeness, accuracy, and timely submission.

Originally created by the Los Angeles Department of Transportation in 2018, MDS is now used in municipalities around the world. As one of the earliest adopters, Seattle also helped transition governance of the specification to the Open Mobility Foundation, a new city government-led open-source foundation. Adopting MDS and setting up an internal data system architecture to support its use was an exercise in innovation, experimentation, and capacity-building for both SDOT and the Seattle IT Department. The result of this effort is a secure, in-house data system that we can trust and that serves as a model for future mobility programs in Seattle and beyond.

With both MDS data and other permit-required data, we also conducted regular checks and audits for completeness and accuracy. While we are reasonably confident about the relative quality of various data streams, we still have room to grow in formalizing and automating these checks and in improving the quality of the data we receive.

How did we protect user privacy?

SDOT and the City of Seattle are known across the country for having some of the most robust IT infrastructure and privacy competency. When we brought program data analysis in-house, we established our own data handling principles and protocols to improve the security of the mobility data associated with the bike share program (and others). While SDOT does not require vendors to share any user data, we recognized that trip data can be vulnerable to attempts to connect it back to individuals' travel. State of Washington privacy laws do not yet account for the emerging concerns of mobility data, so we researched international best practices and proactively wrote our own data handling and privacy guidelines. Our guidelines dictate what data we store, how we secure it, who has access to it, and what we use it for. We were successful in taking the data in-house because of these guidelines, and we are proud to have produced new institutional practices that will benefit not just SDOT but all City departments.

Summary of Successes and Lessons Learned

Where We Succeeded	Where We Fell Short
• We succeeded in bringing data collection and processing in-house, and through this effort developed citywide institutional capacity, increased our trust in the program data, and developed robust data privacy and security standards. • Once we transitioned to MDS and brought our data analysis in-house, we had granular and extensive enough data to ensure permit compliance, inform overall program evaluation, and inform broader transportation planning decisions like where to prioritize new bike parking infrastructure.	• Moving data management in-house required a great deal of staff capacity and limited our ability to manage the program effectively (e.g., it took 6 months to develop a trustworthy fleet count methodology). • The data infrastructure we created was experimental, and some changes are still needed before we make it a permanent part of our process. • Much of the data we receive from vendors would still benefit from quality improvements.
Next steps for bike share in 2020 • Invest time and resources to create more scalable and sustainable in-house data infrastructure that can support the bike share program, scooter share pilot, car share program, and others in 2020 and beyond. • Hire additional staff to increase capacity for data analysis and visualization. • Continue participating in development of MDS to ensure it meets our data needs. • Recognize where we are requiring more data than we need and where we are lacking critical insights; adjust data sharing requirements accordingly.	

GOAL 8: MAKE SEATTLE A WORLD LEADER IN DIVERSE CYCLING BY INCREASING ACCESS TO ADAPTIVE CYCLES AS A RECREATION AND MOBILITY OPTION

The 2017-2018 pilot showed us that we need to offer accessible options for people with disabilities for our bike share system to serve all potential bike share riders in Seattle. We explored two approaches to increasing access to adaptive cycles: permit incentives and third-party partnerships. While the shift from traditional bicycles to e-bikes has increased accessibility for those who might have difficulty riding bicycles without electric power assistance, we found that the vendors did not otherwise take advantage of permit incentives (application preference and a bonus of up to 1,000 extra devices allowed) for deploying adaptive bicycles.

Because vendors did not make adaptive cycles available directly, we worked with a local partner, Outdoors for All, to make them available as part of the bike share program. By partnering with Outdoors for All, we more than doubled the reach of one of the leading adaptive cycling programs in the country. Through a portion of the funds from the bike share permit, Outdoors for All was able to offer free rentals for their adaptive cycles, daily operations in the riding season, and extended service hours for rentals. We also brought adaptive cycles to multiple events in South Seattle, such as Seward Park Bicycle Sundays and the White Center Bicycle Demonstration from May to September 2019. This partnership enabled us to grow both the number of users and total number of rides of adaptive cycling by over 200% from 2018.

Outdoor for All offers:

- Hand cycles for individuals with no or limited leg movement
- Three- and four-wheel cycles for those who need more stability
- Children's hand- and foot-powered cycles
- Tandem cycles for individuals who want a guide while riding
- Hand- and foot-powered cycles for exercising your whole body
- Standard cycles

Expanding broader access to adaptive cycles—for trips beyond just recreational—proved challenging. The Outdoors for All partnership allowed people with disabilities to store their own mobility devices (e.g., wheelchairs, walkers) while using an adaptive cycle. In a free-floating bike share system, there is nowhere for people to store their personal devices, and all trips would have to return to the origin point to retrieve them. This challenge is not unique to Seattle, but we seek to be one of the first to address it.

How much were Outdoors for All adaptive cycles used?

In 2019, we set a goal of reaching 100 unique adaptive cycle riders and providing 400 total experiences. We achieved both goals, with a total of 281 unique riders and 755 total experiences. This is a huge increase in comparison to 64 unique riders and 224 total experiences in 2018. Additionally, Outdoors for All achieved an average customer satisfaction rating of 5 out of 5.

Looking to the future, there may be an opportunity for new, adaptive shared micromobility devices to take on the same mobility role as bike share does today with traditional bicycles and e-bikes. Scooters, seated-scooters, and other innovative micromobility devices could fill some remaining accessibility gaps. We will apply the lessons learned from the 2019 permit cycle to ensuring that people with disabilities can access more of the mobility benefits these devices provide.

OUTDOORS FOR ALL TESTIMONIALS

In 2019, Tyler, the program's 100th rider of the year, shared his experiences with us. Tyler is blind, which prevents him from safely biking alone, but with adaptive bikes, he can be as mobile as anyone and enjoy the outdoors.

Tyler: "I came for a bike ride with my Mom recently and found out that it was free! It was a nice surprise. Because of SDOT's sponsorship, I was able to ride with my Mom around Sand Point. It's great to be able to take a bike out for as long as you want without worrying about how much it would cost. When I got back to work, I told all my co-workers and friends about the program because they all have mobility issues."

Jan, Tyler's Mom: "Because of SDOT paying for something that was $25 per hour, per person, we were able to enjoy an activity that we had stopped doing because it was expensive. We didn't have to hurry; we could not only take our time to enjoy the ride, but we were able to stop for a picnic and enjoy the beauty around us. We will use this program for as long as it's running."

For more information, read the entire blog post about Tyler and Outdoors for All on the SDOT Blog: https://sdotblog.seattle.gov/2019/08/06/fearless-tyler-making-the-most-of-outdoors-for-alls-free-adaptive-cycles/

Tyler, Jan, and Outdoors for All Staff. Photo courtesy of Outdoors for All

Summary of Successes and Lessons Learned

Where We Succeeded	Where We Fell Short
• The introduction of e-bikes into Seattle's bike share system expanded service to those that might have difficulty using traditional bicycles without electric assistance. • SDOT's continued partnership with Outdoors for All expanded recreational access to bike share to people with disabilities, more than tripling the number of riders and total experiences of adaptive cycling over 2018.	• Expanding adaptive cycling beyond recreational uses has proven difficult. The current free-floating bike share system does not enable storage for personal mobility devices, forcing riders to return to their origin point. • The existing bike share market has consistently failed to provide adaptive cycles, suggesting limits to a market solution.

Next steps for bike share in 2020

- Work with vendors to explore opportunities for new, adaptive shared micromobility devices, and continue to incentivize accessible device design in future micromobility permit programs.
- Collaborate with Outdoors for All and community-based organizations to promote adaptive cycles and new mobility options like scooters to people with disabilities. Consider hosting promotional and demonstration events at schools and senior centers.

3. CONCLUSION

WHERE DID WE SUCCEED?

In 2019, we succeeded in several areas, including our ability to evaluate the program, generate ridership, rapidly install bike parking, take data processing and infrastructure in-house, provide an option to shift away from carbon-emitting trips, and offer recreational access to bikes for people with disabilities.

We used a goal-based permit approach to effectively monitor compliance and evaluate the program

Having a goal-based permit works well for us, particularly because it enables us to define and monitor compliance and to evaluate the program against key outcomes on a monthly, quarterly, and annual basis. The goals we defined align with Seattle's broader vision and values for transportation.

We could improve in the following areas:

- Articulating more specific and quantifiable goals, particularly to evaluate the ways in which the program improved mobility;
- Updating some of our targets to stretch beyond what has already been achieved (e.g., moving beyond data partnerships to building and maintaining a stable, scalable, sustainable mobility data system architecture); and
- Identifying key metrics (like those in this report) tied to each goal so that we're sure we're measuring the right things throughout the year. These key metrics would enable us to tie specific incentives (e.g., fleet bonuses) and penalties (e.g., fines) to specific areas of non-compliance and provide stronger incentives and penalties to higher priority outcomes.

We continued to generate high ridership despite a smaller fleet

Despite a significant reduction in the bike share fleet size between 2018 and 2019, the number of overall bike share trips remained consistent with 2018's highly successful pilot. This indicates that the bike share system, particularly using electric-assist devices, can do more with less—and at a certain point increased fleet size may not lead to a comparable increase in ridership. However, a larger fleet likely allows for improved coverage outside of the city center, and further data collection and analysis is needed before we know the optimal fleet size to meet our mobility, climate, and equity goals. As we face the possibility that we could have only one bike share vendor in 2020, we will continue to monitor ridership, safety, access, and other key metrics on a monthly basis.

We rapidly installed supportive bicycle infrastructure

In 2019, to support the growth of bike share use and preserve the public right-of-way, we installed as many bike parking spaces as we had in the previous three years (1,515 spaces). Additionally, in the latter half of 2019, we were able to use bike share trip data to identify hotspot locations to target bike parking installation. This rapid installation of bicycle parking was a major achievement for the 2019 bike share program.

We enhanced our data processing capabilities and infrastructure

In the pilot year, we relied on a partnership with the Transportation Data Collaborative to import and process our bike share data. In 2019, we brought the data system architecture in house, recognizing that with greater transparency into the data cleaning and processing decisions, we could more effectively interpret and act on the findings. We succeeded in creating a robust system for taking in, cleaning, storing, protecting, and analyzing data, and we've worked with the Seattle IT Department to develop a new capacity for data management that will have benefits for other City programs and departments.

We also required vendors to adhere to the Mobility Data Specification (MDS), which has enhanced our ability to ensure permit compliance, evaluate the program, and make transportation planning decisions. MDS data will continue to allow us to be more informed working with bike, scooter, and micromobility vendors in the future.

We supported a shift away from carbon-emitting trips

The Seattle Climate Action Strategy calls for an increase in electric mobility options and a movement from single occupancy trips to shared transportation as part of the bold climate protection goal to be carbon neutral by 2050.[10] The bike share program contributed to this climate strategy by providing a low-carbon mobility option for residents and visitors of Seattle. Bike share riders travelled over 2.5 million miles, and according to surveys, at least 33% of respondents would have used a motor vehicle (including Uber/Lyft, car share, and using a personal car) for their last trip if bike share hadn't been available. We need more information on the lifecycle carbon costs of e-bikes and bike share operations; however, we are confident that the bike share program offers a low-carbon alternative for residents and visitors.

[10]2018. Seattle Climate Action Strategy. Available online at www.seattle.gov/environment/climate-change/climate-planning/climate-action-plan

We provided access to adaptive cycles through a partnership with Outdoors for All

The 2017-2018 pilot demonstrated that we need to offer accessible options for people who cannot use traditional bicycles if we want our bike share system to serve everyone. We found our partnership with the non-profit organization Outdoors for All to be one of the biggest success stories of the 2019 bike share program.

Using funds from bike share permit fees, Outdoors for All offered free rentals for their adaptive cycles, managed daily operations in the riding season, extended service hours for rentals beyond their usual service offering, and ran multiple community events in South Seattle. This partnership enabled us to grow use of adaptive cycles by over 200% from 2018.

WHERE DID WE HAVE CHALLENGES?

Our ambitious bike share parking behavior targets were not met

While we did see significant improvement from both Lime and Jump concerning compliance with the City's bike share parking standards, the vendors did not meet our ambitious target of less than three percent of bike share vehicles obstructing the pedestrian right-of-way during any given audit. While we hope the robust increase in bicycle parking we've built in the city will assist in parking compliance, we will adjust our compliance and enforcement process to better meet the goal we initially set at the beginning of the 2019 permit cycle.

There's still opportunity to increase access to bike share among cost-burdened communities of color

While we had prescriptive vendor requirements for low-income plans, we didn't articulate clear reporting requirements about adoption and use of these low-barrier and affordable options. Further, only one vendor met our targets for deployment into neighborhoods where we would like to see increased bike share access. In 2019, were over-reliant on prescriptive requirements

and didn't take advantage of the opportunity to articulate meaningful performance metrics for prioritizing the needs and ideas of cost-burdened communities of color. We plan to spend more time developing reporting requirements and key performance indicators for the 2020 permit.

We could improve bike share integration with Seattle's transit system

While we did find that more people connected to public transit using bike share than with other new mobility options like ride hailing or car share, we believe we could have better integrated the bike share system with Seattle's public transit network. In 2019, we installed 1,515 total bike parking spaces across Seattle, and 469 spaces (31%) were installed near 54 transit hubs. From the bike share trip data, we know we could do more to support bike share integration with transit by continuing to increase bike parking at our 270 high-frequency transit hubs.

We maintained a good safety record, but one person was seriously injured using bike share

We have high standards for safety and a Vision Zero plan to end traffic deaths and serious injuries on city streets by 2030. No death or injury is acceptable. One person experienced a serious injury while using bike share in 2019, and we know of at least six more minor injuries that were captured in Seattle Police Department crash reports. Still, the safety record of our bike share system—with only one serious injury in 2.5 million miles ridden—suggests that bike share is about as safe as biking on a personal bike or walking.[11]

We don't know the net carbon effect of the bike share system

Through our 2019 new mobility survey, we were able to understand riders' potential shifts from carbon-emitting modes to bike share. However, we do not have sufficient information from vendors to assess the lifecycle emissions of the program, including those from the production of the devices as well as from bike share operational activities. Given Seattle's ambitious climate goals, we need to better understand the climate impact of the bike share program.

We offered adaptive cycles, but we see opportunity for increased access

Our partnership with Outdoors for All enhanced access to bikes for people with disabilities. In 2019, the partnership focused on providing access to adaptive cycles at specific locations and times, leading to primarily recreational uses. Recognizing the operational hurdles of including adaptive cycles in the general bike share fleet, we do have ambitions to increase transportation access to people with disabilities.

NEXT STEPS

In 2019, we learned vital lessons from both our achievements and the challenges we faced. We will be taking these lessons with us as we begin the next permitting cycle for bike share and the new scooter share pilot program.

In 2020, we want to maintain and build on the achievements of this year. Going forward, we will continue to expand SDOT's in-house data infrastructure and processing capacity to effectively regulate and foster free-floating bike share in Seattle. And we will continue our successful partnership with Outdoors for All to provide people with disabilities access to adaptive bicycles.

[11] Buehler, Ralph and John Pucher. Trends in Walking and Cycling Safety: Recent Evidence from High-Income Countries, With a Focus on the United States and Germany. American Journal of Public Health. February 2017. www.ncbi.nlm.nih.gov/pmc/articles/PMC5227927/

We learned that having a goal-based permit program for bike share has worked well for Seattle, but we have also learned that we may need to be more prescriptive in some areas to ensure we are meeting our goals. We also believe we may benefit from being more specific and quantifiable in our goals to measure our progress and ensure we achieve them. In 2020, we will clarify our goals and be more prescriptive with what bike share vendors must contribute. Our new approach will include a mix of education, performance metrics, and enforcement:

- **Education** – We will be more specific with the education requirements we expect from vendors about road safety and vehicle parking. Additionally, we will require an enumeration and summary of feedback from educational and engagement efforts.
- **Performance metrics** – We will continue to experiment with goal-based and prescriptive approaches, and we will articulate clear performance metrics and targets to ensure that vendors are complying with the permit and to strengthen the program's efficacy in advancing SDOT's goals.
- **Enforcement** – We are exploring partnerships with vendors to conduct user-targeted fines for improper parking behavior. Portland, Oregon, uses a similar approach, and we are learning from their experience.

Additionally, it is important that we understand our bike share program in the context of the state of micromobility more broadly, especially as we begin our pilot permit program for shared e-scooters in 2020. We are taking lessons learned this year on data management, goal-setting, compliance, and equity and using them to craft our scooter share pilot, while at the same time working to make sure bike share and scooter share are compliments to one another.

Bike share and shared mobility represent increasingly important and hopefully long-term parts of our transportation system. In order to support car-free and car-lite mobility, we plan to continue exploring how the bike share system functions as a form of public transportation, including how to ensure it is reliable, convenient, accessible, and affordable. As the industry matures and residents and visitors come to rely on bike share, SDOT will take a more active role in ensuring its continued and expanding presence as a transportation option in our dynamic city.

Summary of next steps for bike share in 2020

Goal	Next Steps for Bike Share in 2020
Support an active, healthy, people-first use of Seattle's streets	• Develop a more prescriptive approach to ensure better parking behavior through education and vendor- and customer-oriented accountability mechanisms (e.g., trip-end photographs, customer-targeted fines). • Continue to deliver high-quality bike infrastructure investments. • Actively manage the bike share system to ensure a minimum overall fleet size that meets mobility objectives. • Be more proactive in ensuring bike share is meeting the needs of people of color, including more extensive outreach and engagement work.
Ensure affordable and equitable service—particularly for cost-burdened communities of color—while expanding access to opportunities	• Require vendors to report reduced-fare program participation and use of different payment options. • Establish a new performance indicator beyond bike availability/deployment to measure progress on equitable access (e.g., percent of trips that start and end in access focus areas). • In future surveys, ask about race and ethnicity of bike share users in a way that better lends itself to year-over-year comparisons. • Develop a better understanding of barriers to bike share usage and limits of bike share's role in expanding mobility for cost-burdened communities of color through new data audits and community engagement methods. • Partner with non-profit and community-based organizations to expand familiarity with bike share and reduced-fare program options. • Continue requiring vendors to provide a broad set of payment options, with a focus on making preferred payment options available within access focus neighborhoods.
Be safe and advance our Vision Zero objectives	• Shift from requiring vendors to submit injury data to performing a more holistic public health study about the impacts of bike and scooter share. • Continue requiring vendors to include safety messaging in the app as well as on bike share devices.
Fill mobility gaps and improve connections to transit	• Identify opportunities to partner directly with Sound Transit to install bike share parking spaces near Link light rail stations. • Continue to target bike parking installation near bus and rail hubs.
Provide a low-carbon mobility option as part of Seattle's efforts to reduce carbon emissions	• Require sufficient data from vendors to conduct a bike share lifecycle emissions analysis, inclusive of operations, to measure the net emissions reduction benefit of the bike share program. • Continue to evaluate bike share use and mode replacement patterns to understand the environmental sustainability impacts of the program. • Consider incentivizing vendors to use electric vehicles and/or electric bicycles to rebalance bike share devices and support program operations.

Goal	Next Steps for Bike Share in 2020
Manage public space to ensure sidewalks are organized and free from obstructions	• Develop a more prescriptive approach to ensure better parking behavior through education, as well as vendor and customer-oriented accountability mechanisms (e.g., trip-end photographs, customer-targeted fines). • Integrate bike share parking complaints into the citywide complaint mechanisms, including the Find It Fix It smartphone application and 684-ROAD hotline. This will not only better serve Seattle residents, but allow SDOT to better track complaints and resolution times. • Require vendors to show bike parking infrastructure locations in their apps. • Continue to audit parking performance.
Derive insights into how people use the system, compliance issues, and targeted bike infrastructure investments with robust data partnerships	• Invest time and resources to create more scalable and sustainable in-house data infrastructure that can support the bike share program, scooter share pilot, car share program, and others in 2020 and beyond. • Hire additional staff to increase capacity for data analysis and visualization. • Continue participating in development of MDS to ensure it meets our data needs. • Recognize where we are requiring more data than we need and where we are lacking critical insights; adjust data sharing requirements accordingly.
Make Seattle a world leader in diverse cycling by increasing access to adaptive cycles as a recreation and mobility option	• Work with vendors to explore opportunities for new, adaptive shared micromobility devices, and continue to incentivize accessible device design in future micromobility permit programs. • Collaborate with Outdoors for All and community-based organizations to promote adaptive cycles and new mobility options like scooters to people with disabilities. Consider hosting promotional and demonstration events at schools and senior centers.

4. APPENDICES

APPENDIX A: PILOT EVALUATION SCORECARD

APPENDIX B: NEW MOBILITY SURVEY RESULTS

APPENDIX C: BIKE SHARE USER SURVEY RESULTS

APPENDIX D: AUDIT METHODOLOGY

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