



Micromobility Equity

*Prepared for the Los Angeles Department of Transportation
(LADOT)*

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Disclaimer

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Glossary of Terms

Glossary of Terms

2035 Mobility Plan	A plan by the City of Los Angeles outlines the policy foundations for achieving a balanced transportation system.
Access	Riders are within a quarter-mile proximity to an e-scooter.
City	The City of Los Angeles.
Deployment	The average number of scooters available per day by month for each Neighborhood Council.
Dockless e-scooter	E-scooters available for rent do not require to be parked in a rack or designated location unless specified by the scooter company or city officials.
Elasticity	The percent change in quantity demanded of a good or service in relation to the percent change in price.
First and last mile	Connections are needed to complete trips via other transit modes like walking, ride-hail, or bus.
Micromobility	A form of transportation that comprises small, low-speed, human- or electric-powered wheeled mobility devices.
MyLA311 Requests	A City of Los Angeles call center that provides various options to connect to a variety of non-emergency services and general information.
Neighborhood Councils	The City of Los Angeles is divided into smaller units of geography to be more responsive to community needs. There are 99 Neighborhood Councils with about 40,000 people in each one. ¹ In this report, Neighborhood Councils are the smallest unit of analysis.
Non-SFV	Trips occur in other areas of the City of Los Angeles besides the San Fernando Valley.
On-Demand Mobility Rules and Guidelines	Requirements that govern the permitting and operations of the micromobility program in the City of Los Angeles. LA City Council approved these guidelines in April 2021.
Operators	E-scooter companies.
Penalties	MyLA311 requests that operators did not address within 2 hours.
Per-trip fee	The monetary amount LADOT collects for every trip beginning or ending in a specific zone.

¹Department of Neighborhood Empowerment. "Councils." *EmpowerLA*. Accessed April 11, 2023. <https://empowerla.org/councils/>.

Pilot Program	A one-year pilot program administered by LADOT from April 2019 to March 2020 to govern the permitting and operations of the micromobility program in the City of Los Angeles.
Program Geographies	The boundaries instilled by LADOT determine the number of scooters available and their associated per-trip fees.
Ridership	The number of trips within a system.
SFV	The San Fernando Valley is a region in the City of Los Angeles that is north of the Santa Monica Mountains.
Trips	A ride on an e-scooter that begins in a particular location.



Executive Summary

Executive Summary

In 2019, the Los Angeles Department of Transportation's (LADOT) micromobility program brought together the agency, scooter operators, and other stakeholders to create a holistic regulatory framework that established operational requirements and expectations to promote the safe and effective use of micromobility scooters, primarily dockless e-scooters, and e-bikes. While the program has effectively expanded the usage of micromobility and mitigated externalities associated with dockless vehicle programs, it has been less effective at ensuring access, particularly in underserved neighborhoods such as the Equity-Focused Mobility Development Districts. Without public intervention, operators deploy where existing demand is highest: the Special Operations Zones, including Venice, Downtown, and Hollywood. Without the ability to subsidize deployment in equity zones, LADOT must use market-driven incentives and leverage from its ownership over the City's right-of-ways to promote equitable deployment. Our analysis suggests reforming the micromobility program via three key policy levers: a reduction in the number of operators allowed within the program, strengthened outreach requirements with enforcement from LADOT, and a modification to the penalty schedule that does not deter deployment in the San Fernando Valley. These policies would create more favorable market conditions for increasing operator deployment in the equity zones while advancing LADOT's goal of improving access to shared mobility.



Introduction

Introduction

Micromobility as a transportation mode emerged in the late 2010s, relying mainly on venture capital to fund e-scooter production, deployment, and marketing. Scooter companies eagerly claimed that micromobility would reduce car reliance and greenhouse gas emissions by replacing short car trips.² Bird, an early mover, began deploying scooters in Santa Monica (2017),³ Los Angeles (2017),⁴ and San Francisco (2018)⁵ without formal agreements with those cities. The sudden deployment created friction between operators and cities. And residents complained about scooter oversaturation, right-of-way obstruction, and unsafe riding practices.⁶ Some cities responded with total bans. Other cities, including Santa Monica, Los Angeles, and San Francisco, responded with initial bans and later instituted a permitting process that imposed regulations in exchange for operation in public rights-of-way.

Micromobility services can exist in three forms:

1. A fully private operator manufactures, distributes, and maintains the vehicles and interacts with governmental agencies only to use rights-of-way and abate nuisances caused by the devices. Examples of this are companies like Bird, Lime, and Spin.
2. A private contractor builds and maintains the system with subsidies from the city to aid in the construction of docks. Examples of this are systems like CitiBike.
3. A fully publicly built and maintained system of vehicles. Examples of this are systems like LA Metro's Bike Share.

In this report, "micromobility" refers to the first type, which is the type covered by LADOT's micromobility program. Bike Share, a Metro program, is not governed by this program.

The economics of the micromobility segment is still developing, with no companies yet establishing themselves as sustainably profitable. A McKinsey & Company report suggests

² On the website of multiple scooter companies, companies claim that their e-scooters reduce car reliance and emissions. Bird's homepage says, "Cleaner air. Less traffic. More joy." (<https://www.bird.co/#ride-on>) Lime says, "Ride Green." (<https://www.li.me/>) Superpedestrian has a vision of "a world in which all cities have safe, green, free-flowing streets, and all city residents have easy access to reliable transportation." (<https://superpedestrian.com/about>)

³ Linton, Joe. "Santa Monica Extends Pioneering E-Scooter Pilot Program." Streetsblog Los Angeles. November 15, 2019. <https://la.streetsblog.org/2019/11/15/santa-monica-extends-pioneering-e-scooter-pilot-program/>.

⁴ LADOT, "Year One Snapshot. A Review of the 2019-2020 Dockless Vehicle Pilot Program" July 2020. 3. [ladot-dockless-year-one-report.pdf](#) (lacity.org)

⁵ Dickey, Megan R. "Lime, Bird and Spin have to temporarily remove scooters from SF." *TechCrunch*. May 24, <https://techcrunch.com/2018/05/24/bird-lime-spin-electric-scooters-san-francisco/>

⁶ Smith, Noah. "Sudden appearance of electric scooters irks Santa Monica officials." *Washington Post*. Feb 10, 2018.

https://www.washingtonpost.com/national/sudden-appearance-of-electric-scooters-irks-santa-monica-officials/2018/02/10/205f6950-0b4f-11e8-95a5-c396801049ef_story.html

that the typical e-scooter costs \$400 to produce,⁷ roughly \$2.95 per ride for fees, insurance, customer support, repairs, and charging. On average, a unique scooter requires five daily rides over four months to make the unit profitable, assuming a margin of \$.50-\$1 on each ride. With more durable vehicles, consistent ridership, and more efficient charging, profitability is possible, but most e-scooter operators currently claim that the COVID-19 pandemic is the main cause of significant ridership and revenue losses.⁸ After five years of operations, the industry's future is uncertain: Bird, an early mover, is on the verge of bankruptcy⁹, while Lime claimed its first profit in 2022.¹⁰

Cities have varied in their response to micromobility's disruptive approach. Some cities have embraced micromobility as an alternative form of transit that could replace short car trips or connect people between public transit and their initial or final destination.¹¹ Pittsburgh, San Diego, and Denver created long-term partnerships with operators that lay out distribution minima, equity requirements, penalty adjudications, and fee schedules. Others, like New York City, have permitted limited fleets and are monitoring activity before expanding.¹²

The City of Los Angeles has a micromobility program instituted in 2019 to govern the use of all for-hire non-automobile vehicles. In this report, we evaluate the effectiveness of the City's policy in achieving an equitable distribution of scooters. By analyzing scooter deployment data and conducting stakeholder interviews with LADOT, operators, and community-based organizations (CBOs), we determine that these policies have not achieved the stated equity goals of the city's micromobility program. This leads us to our policy question: **What actions can LADOT take within its micromobility program to improve the equitable deployment of scooters?** In this report, we identify six potential policy options and then narrow them down to the three most actionable, which are:

- Limiting the number of contracted operators
- Strengthening operator outreach requirements

⁷ Heineke, Kersten, Benedikt Kloss, Darius Scurtu, and Florian Weig. "Sizing the Micro Mobility Market | McKinsey," McKinsey. January 29, 2019. <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/micromobilitys-15000-mile-check-up>.

⁸ Heineke, Kersten., Benedikt Kloss, and Darius Scrutu. "The future of micromobility: Ridership and revenue after a crisis." McKinsey. July 16, 2020.

<https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-future-of-micromobility-ridership-and-revenue-after-a-crisis>

⁹ Varanasi, Lakshmi. "Scooter Company Bird Is Emailing Customers to Tell Them They Still Owe 62 Cents, 93 Cents, or 78 Cents from Rides Taken Years Ago." Business Insider. Accessed April 6, 2023. <https://www.businessinsider.com/bird-requesting-lost-funds-from-customers-worth-just-cents-2022-12>.

¹⁰ Bellan, Rebecca. "Lime Reports First Profitable Year, Tests the Waters for IPO." *TechCrunch* (blog), February 21, 2023. <https://techcrunch.com/2023/02/21/lime-reports-first-profitable-year-tests-the-waters-for-ipo/>.

¹¹ Cities Today. "New Roadmap Reveals How Cities Can Better Integrate Scooters with Public Transit." Accessed March 24, 2023. <https://cities-today.com/industry/new-roadmap-reveals-how-cities-can-better-integrate-scooters-with-public-transit/>.

¹² Bird Cities Blog. "Scooters in NYC: Bird Fleet Size to Double as Service Area Increases." March 24, 2022. <https://www.bird.co/blog/scooters-nyc-bird-fleet-size-double-service-area-increases/>

- Softening the penalties for scooter violations in the San Fernando Valley

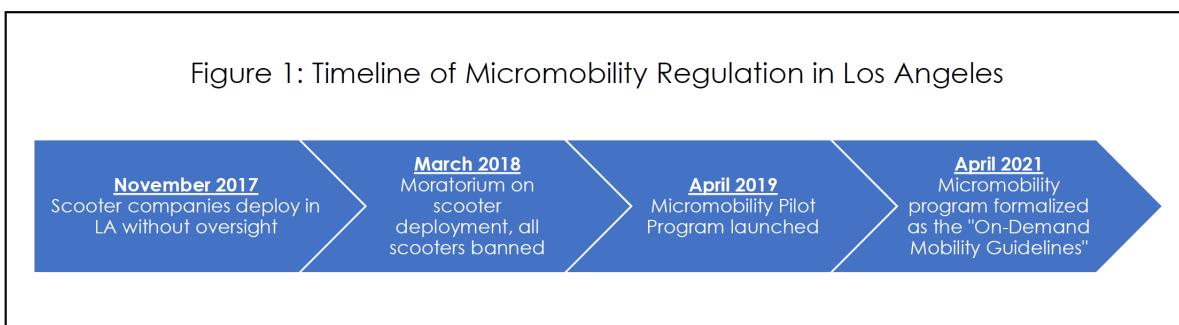
We begin with a review of micromobility deployment and ridership trends over time. We then identify the problems in the City's micromobility program. Subsequently, we discuss our research methods, policy options, and evaluation of policy options and conclude our report with the three final recommendations to LADOT.



Background

Background

The policy framework governing micromobility vehicles' operation emerged when several companies deployed scooter vehicles without the City's permission in November 2017. Residents complained about clogged rights-of-way, over-deployment in certain areas, and blocked crosswalks.¹³ In response, Los Angeles City Council unanimously approved a moratorium in March 2018 to ban dockless vehicles until LADOT formed governing rules. In 2019, LADOT introduced the Dockless Vehicle Pilot Program to comprehensively manage all shared micromobility options between April 2019 and March 2020. In April 2021, the City Council approved LADOT's updated program version, renamed the On-Demand Shared Mobility Permit Program. This background section summarizes the program requirements and trends in deployment, trips, and MyLA311 requests during the two programs. The reported information below comes from LADOT's "Year One Snapshot" of the pilot program and LADOT data requested through the California Public Records Act (CPRA).



To briefly summarize the outcomes from both programs, the Pilot Program sought to address equity issues by designating some areas as disadvantaged communities where operators could deploy more scooters beyond the maximum in other high-density areas. They also required operators to have low-income discount programs. However, the Pilot failed to increase deployment in these equity zones. LADOT changed its equity framework in the current version of the program by modifying the equity zone definitions, fee pricing, and distribution requirements. However, scooter deployment remained low in the equity zones. In the following sections, we describe the trends in deployment, trips, and 311 requests to highlight the disparities of these metrics between equity zones and non-equity zones.

¹³ Nelson, Laura. "In Response to Complaints, Bird Creates 'No-Go Zones' Where Its Scooters Aren't Welcome." Los Angeles Times, September 14, 2018.

<https://www.latimes.com/local/lanow/la-me-ln-bird-red-zones-20180914-story.html>.

Overview of the One-Year Dockless Vehicle Pilot Program

Eleven operators expressed interest in the pilot, eight of which were granted permits (Bird, Bolt, Jump, Lime, Lyft, Sherpa, Spin, and Wheels). LADOT's intent of the program was to "understand dockless on-demand technology and the implications on mobility, city streets, and the people that use them."¹⁴ They also sought to rectify earlier concerns about safety and equal access to scooters in all communities.

Program Description

During the pilot program, LADOT intended to promote inter-operator price competition by allowing eight operators to enter the micromobility market, which they shared during our interviews with LADOT staff. The strong competition would result in lower scooter prices for consumers. Instead of setting up individual negotiations and partnerships with LADOT, all operators had to follow the same guidelines. Operators were required to:

- Pay an annual permit administration fee of \$20,000
- Pay a \$130 per vehicle fee to operate within the City.
- Deploy up to 10,500 dockless vehicles city-wide.
- Deploy up to 2,500 vehicles in Disadvantaged Communities (DACs) and 5,000 in SFV DACs. DACs derive from the California Office of Environmental Health Hazard Assessment's screening tool called CalEnviroScreen to help identify California census tracts heavily burdened by pollution.¹⁵ DACs do not neatly align with LA Neighborhood Council geographies.
- Respond to MyLA311 requests within two hours or face penalties for unaddressed requests.
- Provide low-income discounts, non-smartphone, and unbanked payment options.
- Lead community outreach events with stakeholders in underserved communities.
- Promote safe parking and riding practices.

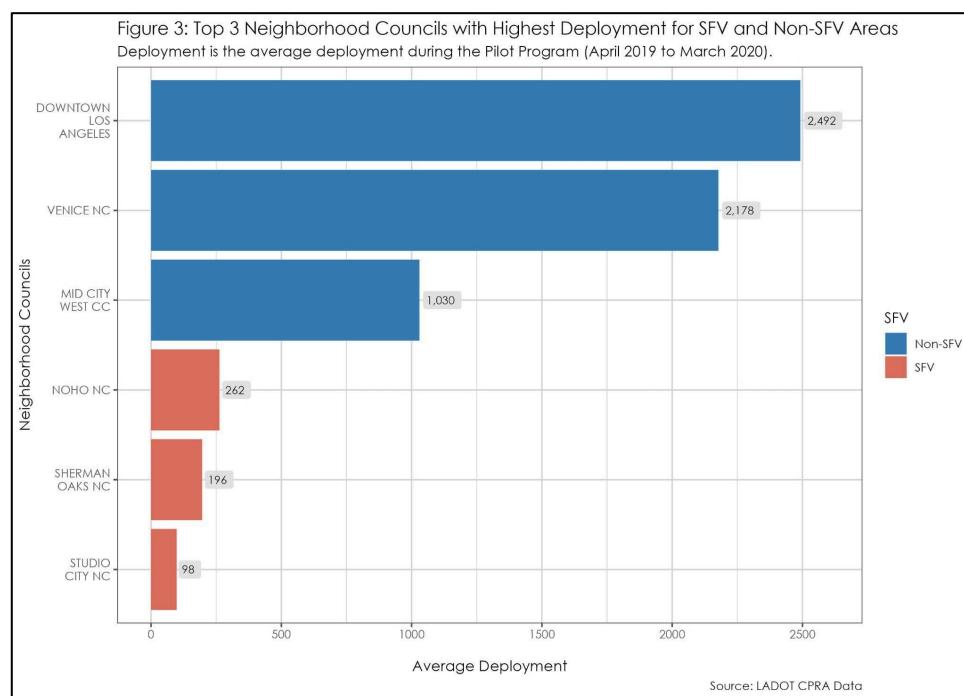
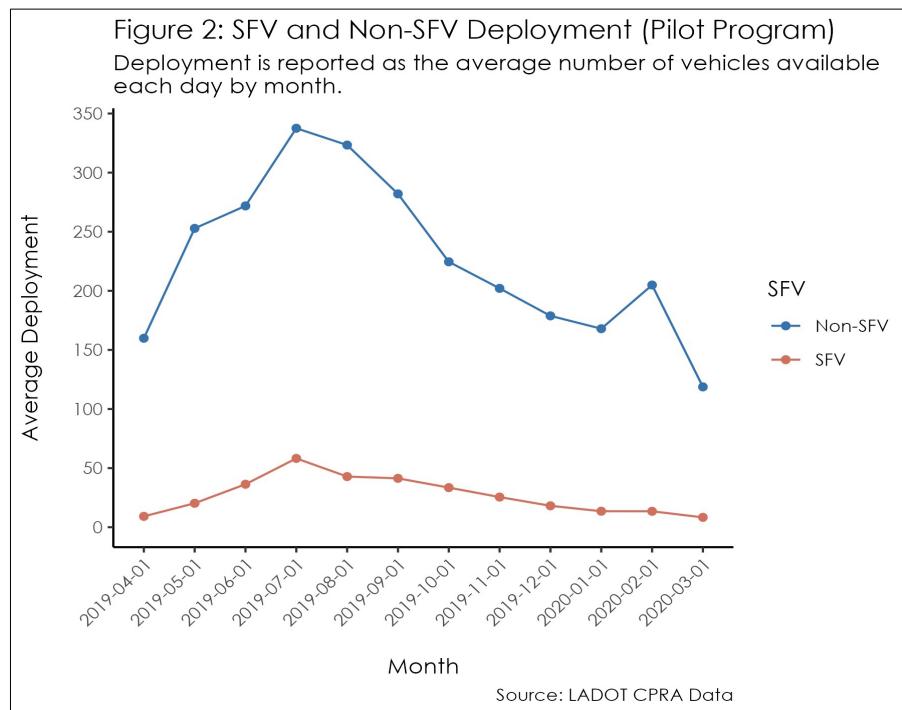
¹⁴ LADOT. Year One Snapshot, 6.

¹⁵ OEHHA. "CalEnviroScreen 4.0." Text, September 20, 2021.

<https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40>.

Deployment Trends

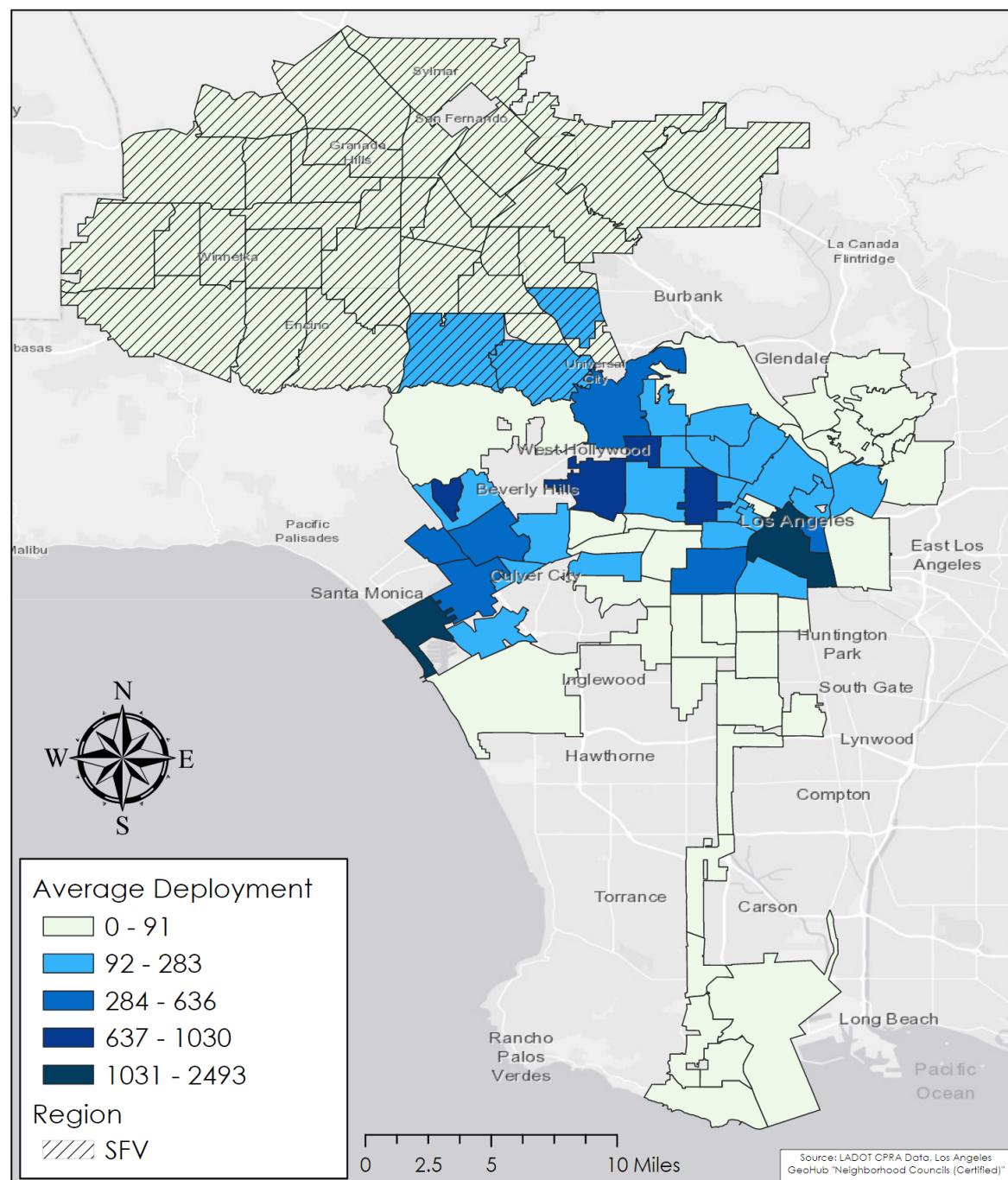
Based on deployment data from LADOT, operators deployed far fewer vehicles in the SFV compared to non-SFV areas. Operators deployed 26.8 vehicles per month in the SFV and 227.1 vehicles per month outside of the SFV. Figure 2 shows that the average monthly deployment in the SFV remained much lower than in non-SFV areas.¹⁶ Deployment in the San Fernando Valley peaked in the summer of 2019, with total deployment throughout the City dwindling by the end of the pilot program.



¹⁶ See Appendix C for deployment by SFV areas for the whole time series. Since each NC contains ~40,000 people, we did not measure deployment, trips, and 311 requests per capita.

In non-SFV neighborhoods, the top 3 areas with the highest average deployment during the pilot were Venice, Downtown LA, and Mid City West CC. In the Valley, NoHo (North Hollywood), Sherman Oaks, and Studio City had the highest deployment, but their levels were far lower than the non-SFV areas. Map 1 likewise shows the disparity in deployment.¹⁷

Map 1: Average Deployment Per Neighborhood Council During Pilot Program



¹⁷ See Appendix Maps 1 in Appendix B for specific deployment trends per Neighborhood Council throughout the pilot program.

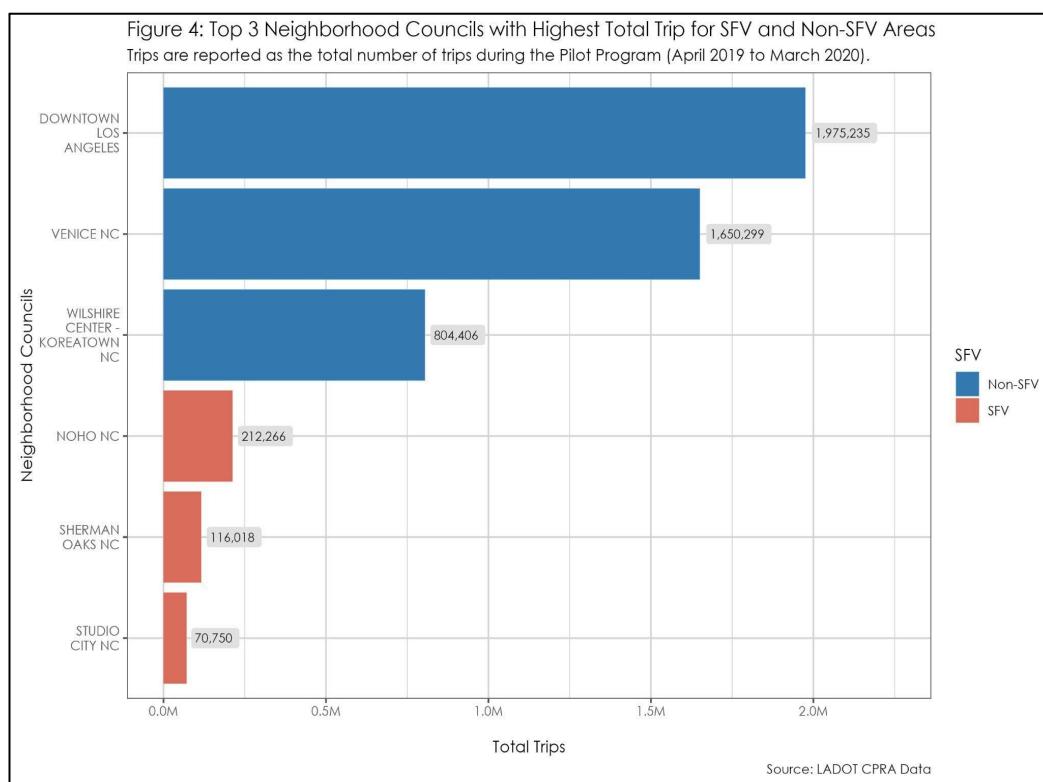
Trip Trends

While the pilot program boasted more than 10 million electric scooters and bike trips, most trips occurred outside DACs because operators did not deploy as many vehicles in those communities as in non-DACs.¹⁸ In LADOT's one-year report, over 50% of trips originated or ended in non-DACs, 44% originated or ended in non-SFV DACs, and less than 2% of all trips began or ended in SFV DACs.¹⁹

The LADOT CPRA data likewise reflects this pattern of low trip count in the SFV. During the pilot, about 10.6 million total trips began outside of the SFV, while there were about 589,000 total trips in the SFV.²⁰ Figure 4 shows the top three SFV and non-SFV neighborhoods with the highest trip counts. NoHo (North Hollywood) had the highest among all areas in the SFV but was well below the non-SFV communities.

Table 1: Pilot Program Trip Summary

Program Geography	12-Month Average	12-Month Total
San Fernando Valley (SFV)	1,445	588,561
Outside of SFV	13,660	10,647,797

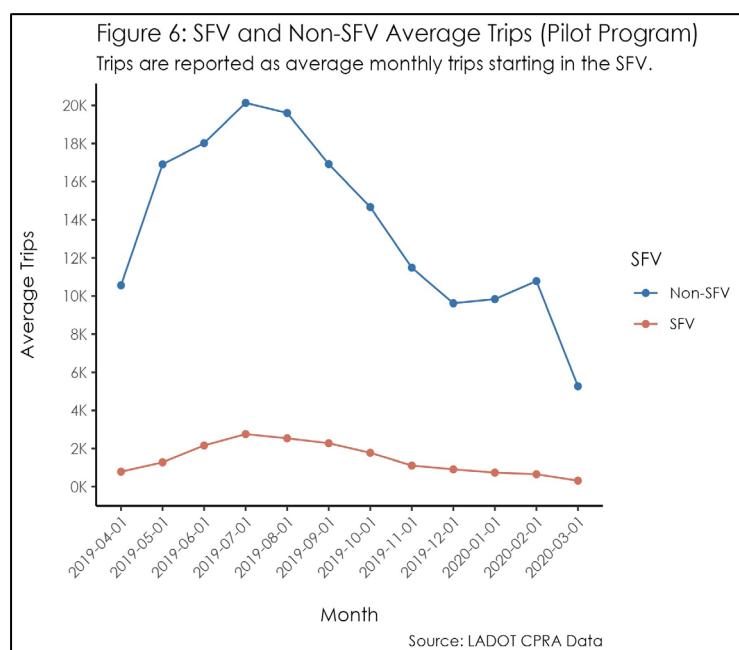
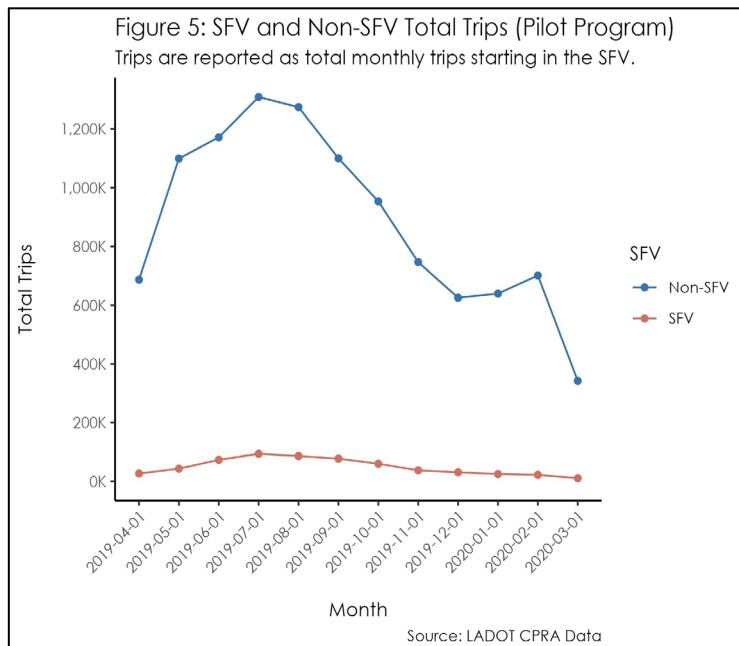


¹⁸ LADOT. Year One Snapshot, 6-7.

¹⁹ LADOT. Year One Snapshot, 6-7.

²⁰ We counted trips by trip origin even though we also have trip destination counts. Counting trips by destination yielded similar results. See Appendix Tables 1 and 2 for the strong correlation between trip origin and trip destination. For the remainder of the report, trips will refer to trip origin.

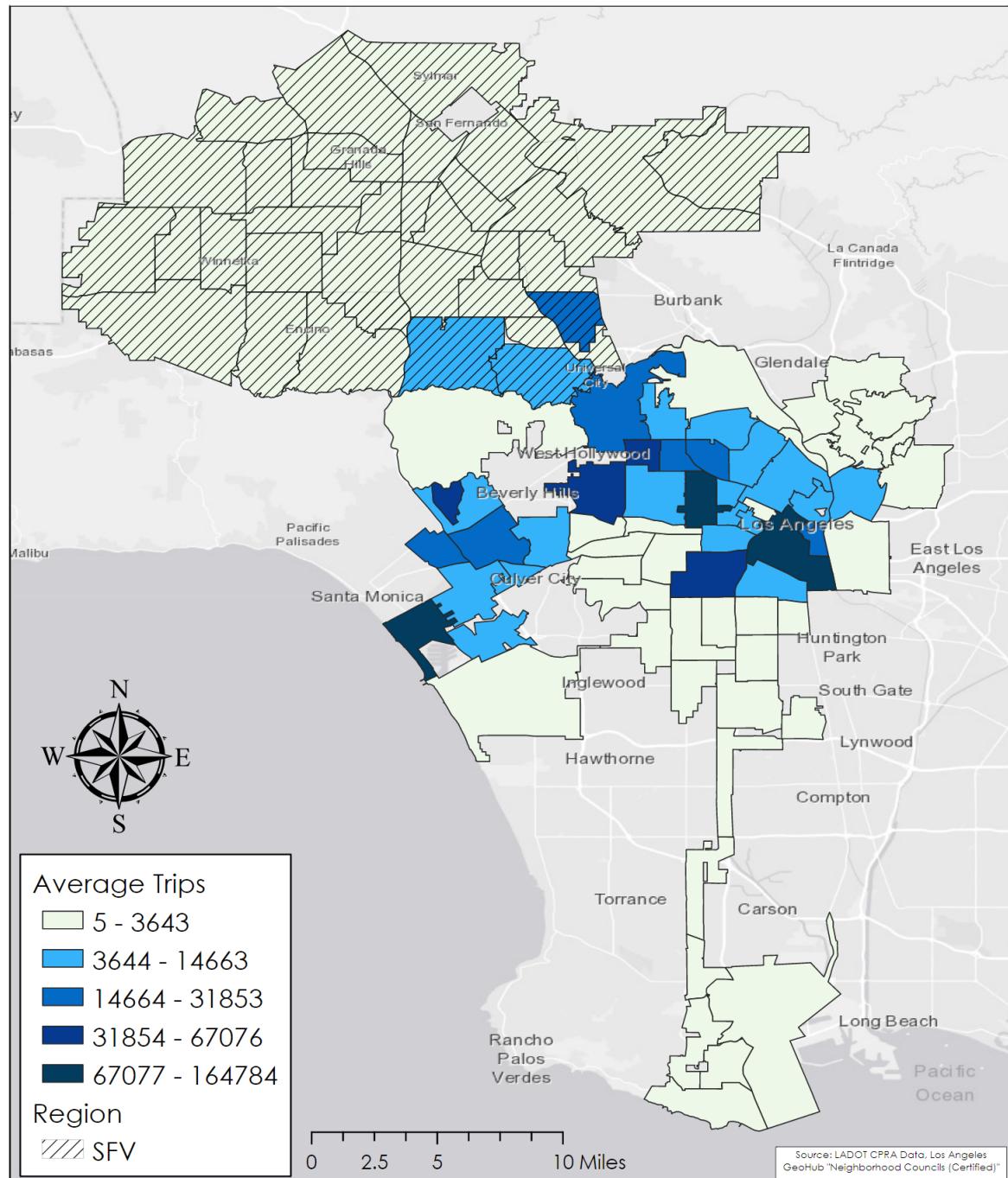
Figures 5 and 6 show the total and average monthly trips for the SFV and non-SFV areas in the City.²¹ They follow a similar trend, but the average monthly trip highlights the variability in SFV trips. Total and average monthly trips peaked in July 2019 and then declined afterward. The sharp drop in March 2020 is likely due to the beginning of the COVID-19 pandemic. Map 2 shows the average number of trips per month for each Neighborhood Council. The trip trends mirror the deployment patterns whereby the more e-scooters deployed, the more people use them. Conversely, if deployment decreases, so do trips.²²



²¹ See Appendix Figures 5 and 7 for total and average trips by SFV and non-SFV during the entire period of available data (January 2019 to September 2022).

²² See the Correlation Analysis in Appendix Tables 1 and 2 where we discuss the strong relationship between deployment and trips.

Map 2: Average Trip Counts Per Neighborhood Council During Pilot Program

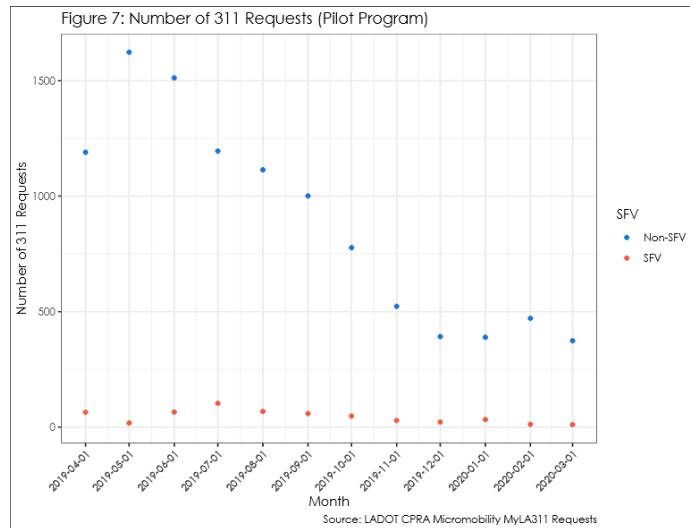


MyLA311 Trends

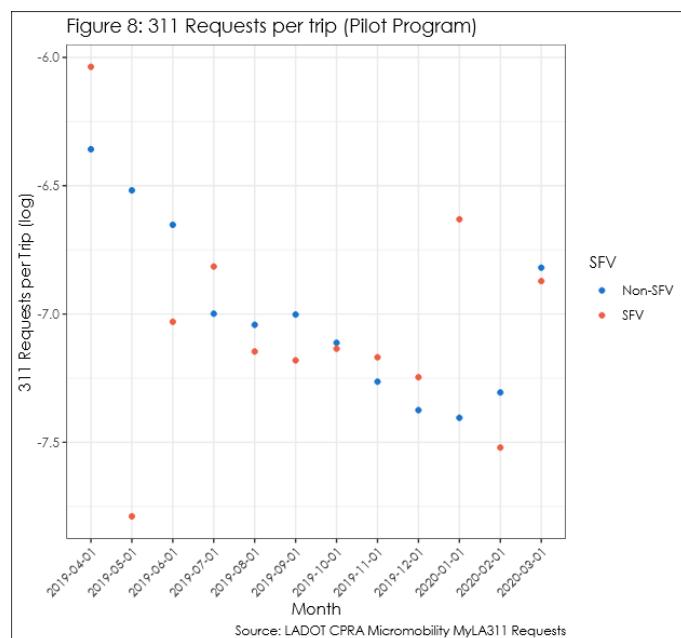
As for operator responsiveness to MyLA311 requests, LADOT received 12,653 requests between March 1, 2019, and March 22, 2020. According to the Pilot Program report:²³

- 68% of service requests were resolved within two hours.
- Nearly 90% of all service requests involved improperly parked vehicles.
- Most service requests were reported from non-DACs (84%) and non-SFV DACs (14%).

The CPRA Data also confirms the report's trends. Figure 7 shows that most requests came from non-SFV neighborhoods.



Additionally, Figure 8 shows that, on average, there was an equal proportion of 311 requests for trips. 311 requests are also strongly correlated with trip counts and deployment.²⁴ In other words, the San Fernando Valley nearly saw no service requests since there were few trips and deployed vehicles in the first place.



²³ LADOT. Year One Snapshot, 73.

²⁴ See Correlational Analysis in Appendix Tables 1 and 2.

Overview of the Current On-Demand Shared Mobility Permit Program

After the one-year Pilot Program, LADOT modified some of its program rules to promote more significant deployment in communities left out of the pilot program.

Program Description

First, LADOT transitioned from DACs to more nuanced equity zones to accurately reflect mobility needs, infrastructure, and socioeconomic indicators. LADOT acknowledged that “requiring a percentage of the total fleet in large geographies [such as the SFV] does not guarantee access, nor does it address the unique mobility needs of the people that live there.”²⁵ See Table 2 and Map 3 for the new zones.

Table 2: On-Demand Mobility Geographies ²⁶	
Mobility Development Districts (MDD)	Neighborhoods where people, on average, travel for short periods, have access to comfortable bicycle infrastructure and high-frequency transit, and have a lower rate of crashes.
Equity-Focus Mobility Development Districts (EFMDD)	Neighborhoods that meet the same criteria as Mobility Development Districts but where many households also experience economic hardship based on a high concentration of households living in poverty, overcrowded housing, high rates of unemployment, and low educational attainment.
Standard Permitted Zones (SPZ)	Neighborhoods where people take longer trips on average, have less access to physically-separated bicycle infrastructure, are not served by high-frequency transit, and where more crashes occur.
Special Operation Zones (SOZ)²⁷	Neighborhoods where specific rules are necessary due to high on-demand mobility demands within finite boundaries, an oversaturation of deployed devices, or specific geographic characteristics that prohibit dockless devices.

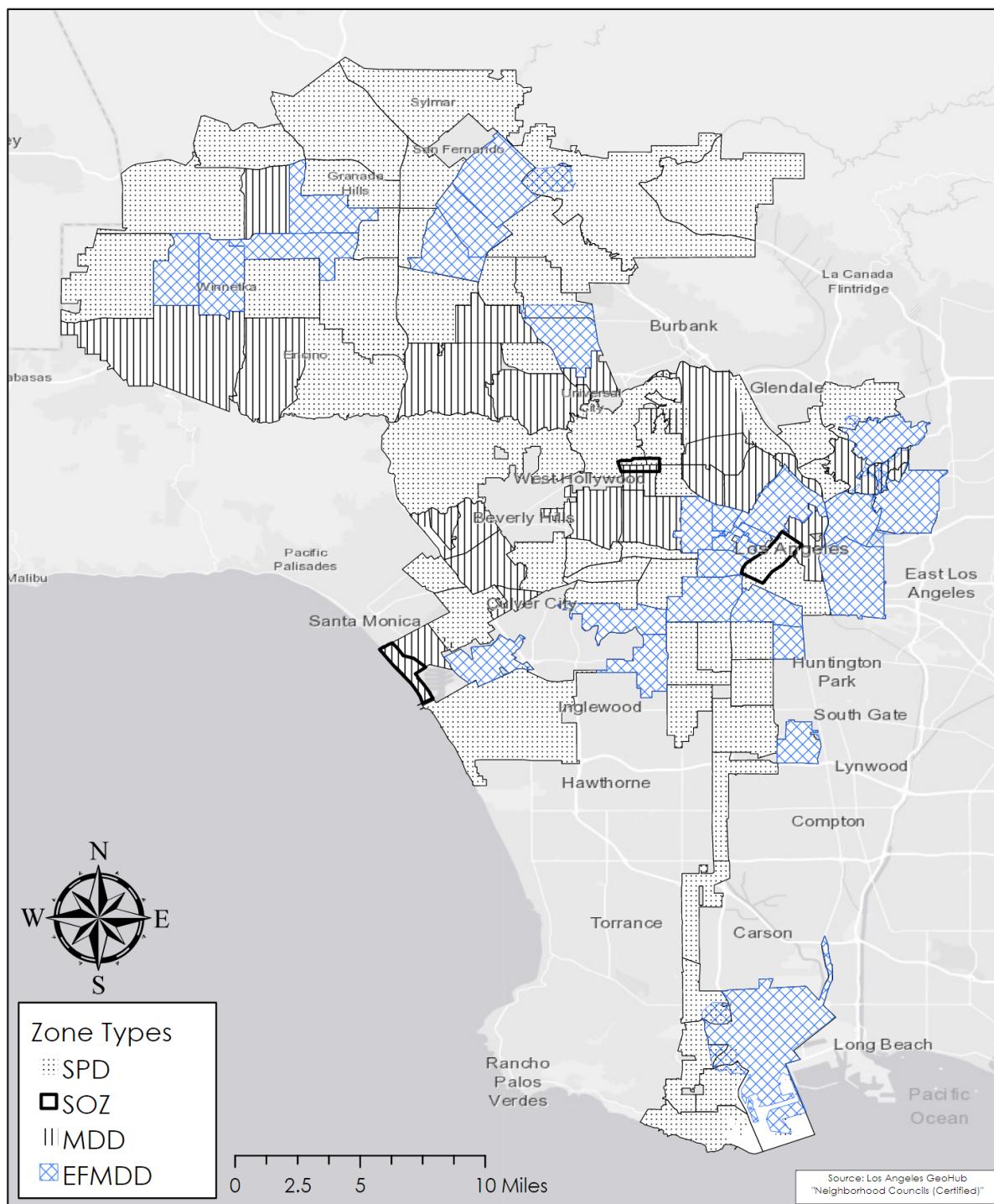
²⁵LADOT. Year One Snapshot, 58.

²⁶ City of Los Angeles, “On-Demand Mobility Rules and Guidelines.” 2021. 1-2.

<https://ladot.lacity.org/sites/default/files/documents/on-demand-mobility-rules-and-guidelines-2021.pdf>

²⁷SOZs are a smaller unit of geography than Neighborhood Councils. The Venice Ocean Front Walk SOZ and Downtown LA SOZ are bounded within their respective Neighborhood Councils. The Hollywood Walk of Fame SOZ intersects 3 neighborhoods (Hollywood Hills West NC, Hollywood United NC, and Central Hollywood NC). In the LADOT CPRA Data, average deployment, trip counts, and penalty counts are only given at the Neighborhood Council level. To include SOZs in our analysis, we labeled neighborhoods as SOZs if the SOZ intersects or is inside the neighborhood. One limitation of this method is that SOZ metrics are inflated. We cannot subdivide the counts since we do not know the spatial distribution of the metrics within those neighborhoods. Thus, we thus assumed that all metrics in the respective neighborhood belong to the SOZ.

Map 3: On-Demand Mobility Geographies



Second, LADOT changed its fee structure from a per-vehicle fee to a zonal trip fee which took effect in April 2021. LADOT intended to promote greater ridership and deployment in EFMDDs and MDDs through this new fee structure. High-demand zones such as SOZs have higher fees, while other zones have lower fees or none.

Table 3: Trip Fees by Zones (April 2021 to Current)

Geography	Applicability	Per Trip Fee*
Equity-Focus Mobility Development District	Trips that begin or end in the Equity Focus Mobility Development District	\$0.00 / No Cost
Mobility Development District	Trips that begin or end in a Mobility Development District	\$0.06
Standard Permitted Zone	Trips that begin and end in a Standard Permitted District	\$0.20
Special Operation Zone	Trips that begin or end in Special Operations Zone	\$0.40

*The lower per-trip fee will apply for trips that begin in one geography and end in another.

Third, LADOT altered the distribution requirement from a maximum of 10,500 vehicles per operator²⁸ to a minimum deployment of 500 vehicles per operator.²⁹ Also, operators that deployed in the Venice SOZ needed 20% of their total fleet in EFMDDs. Operators that deployed in the Hollywood SOZ (but not Venice) needed to deploy at least 20% of its total fleet deployed either in EFMDDs or MDDs.³⁰

Fourth, LADOT created a fine and penalty point structure to enforce operator compliance with the policies.³¹ Operators incurred a penalty point when their vehicle technology or safety did not comply with LADOT's standards, failed to provide accurate vehicle data to LADOT, or did not respond to a 311 request within two hours. After reaching certain point thresholds, operators would need to pay a fine. For 100 penalty points, operators needed to pay \$50,000. For 200 points, operators needed to pay \$100,000.

Beyond the measures above, several policies remained intact, including the open entry system for operators and the mandate for operators to create "outreach and equity plans" with CBOs. While all of these measures could improve equitable distribution, operators did not meet the distribution requirements for EFMDDs, and ridership in those zones continued to lag.

²⁸ LADOT. Year One Snapshot, 8.

²⁹ City of Los Angeles, 13.

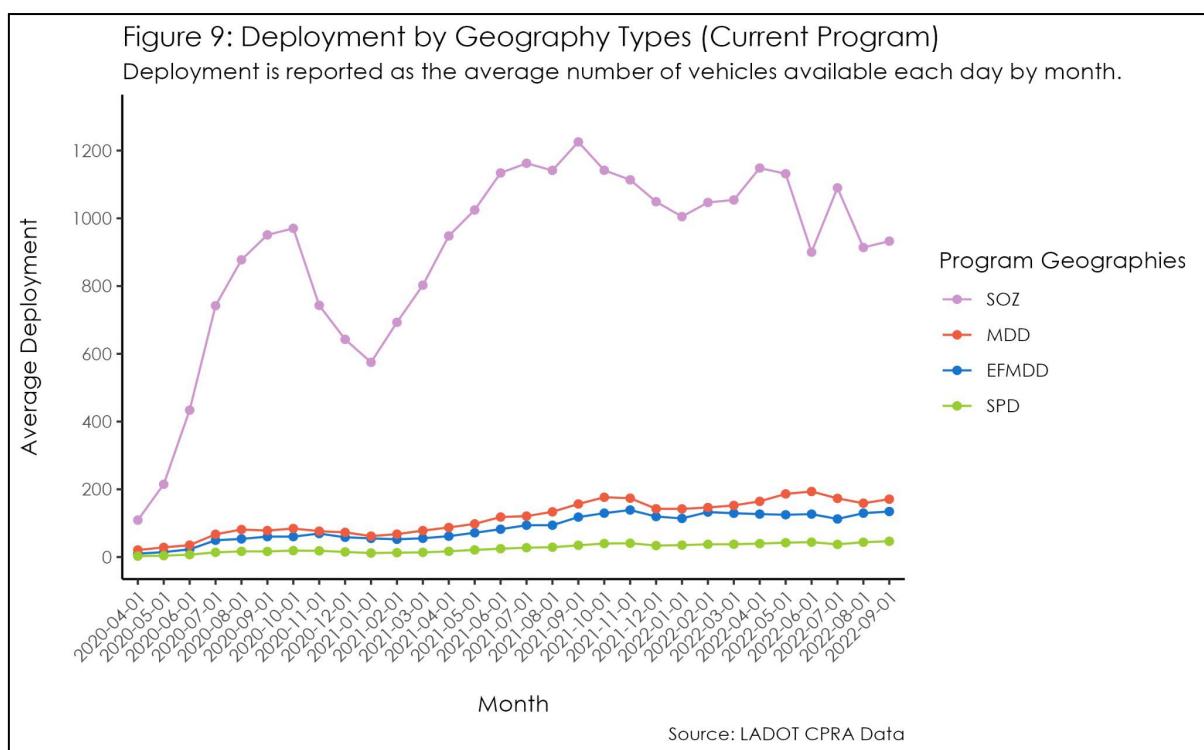
³⁰ City of Los Angeles, 13.

³¹ LADOT. Year One Snapshot, 97.

Deployment Trends

Based on deployment data from April 2020 to September 2022, operators, on average, deployed 87 vehicles per month in EFMDDs, 115 vehicles in MDDs, 898 vehicles in SOZs, and 26 vehicles in SPDs. In Figure 9 and Map 4, most of the vehicles deployed were concentrated in the SOZs.³²

After recording its lowest level of deployment in March 2020, deployment rebounded from April 2020 to January 2021. The exact driver of this rebound is unclear. As the pandemic progressed, operators could have deployed more because consumers preferred to avoid modes with higher disease risk, like public transit.³³ Consumers could have also had a net increase in demand for micromobility technology as outdoor, pedestrian-friendly neighborhoods became more popular during the pandemic. Regardless, Figure 9 shows a persistent disparity in deployment by zone types, where SOZ deployment exceeds deployment in all other zones.

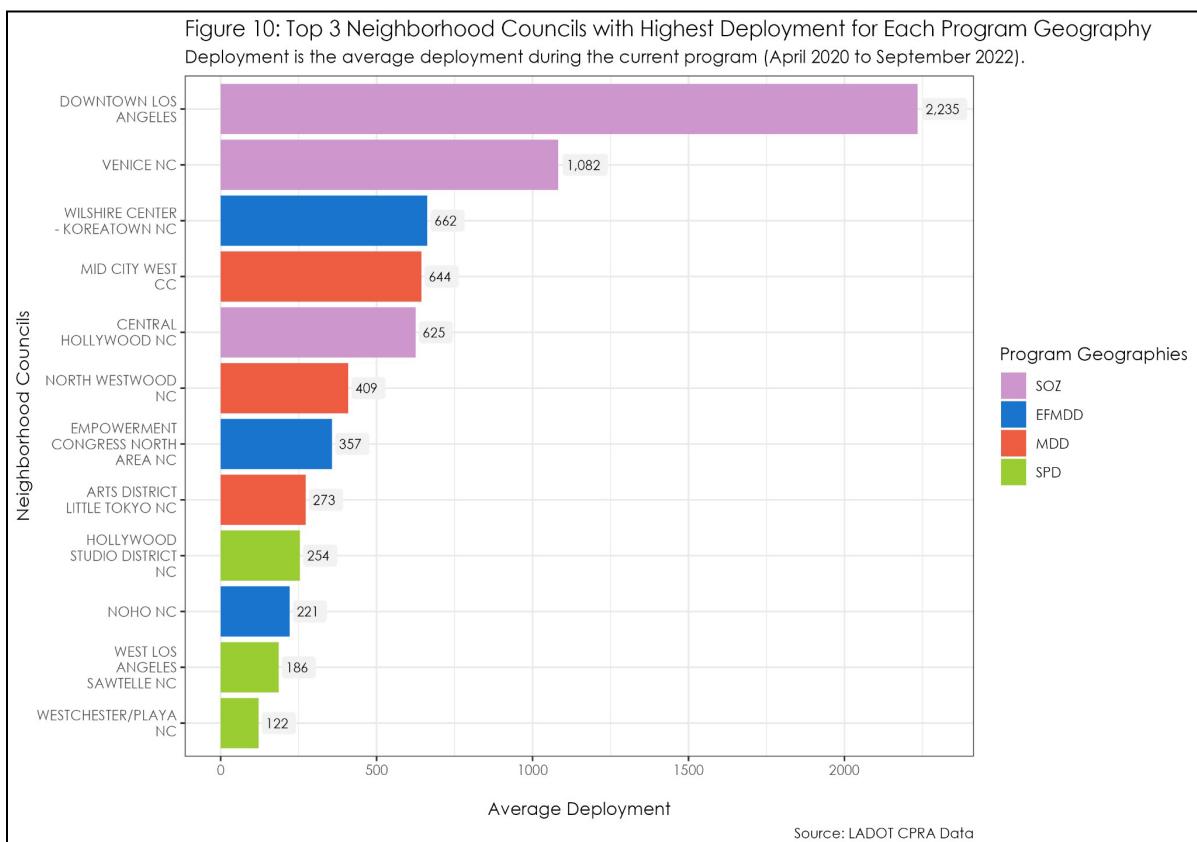


³² See Appendix Figure 4 for average deployment by the 4 zones during the entire period of available data (January 2019 to September 2022).

³³ Heineke, Kersten., Benedikt Kloss, and Darius Scrutu. "The future of micromobility: Ridership and revenue after a crisis." McKinsey. July 16, 2020.

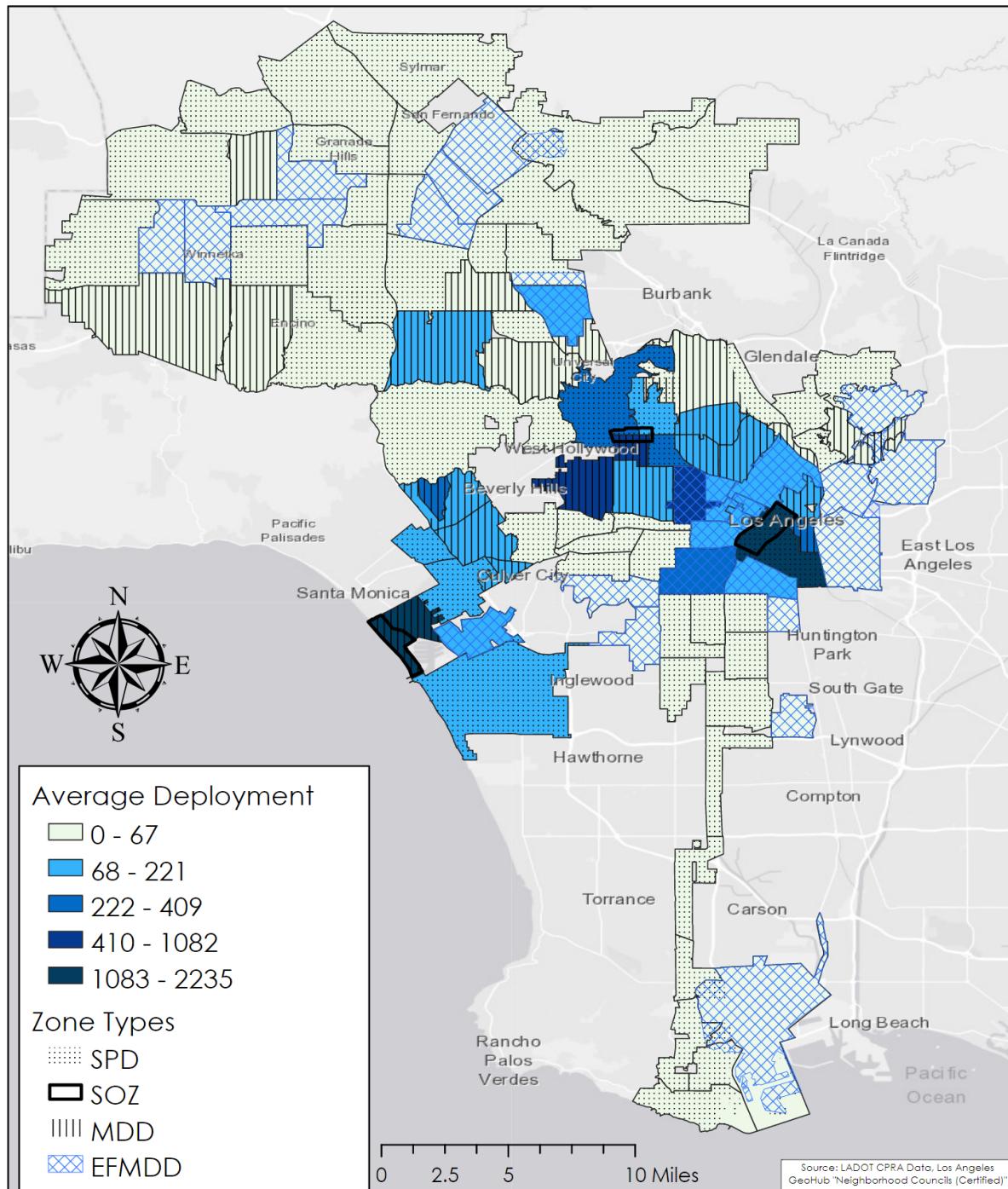
<https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-future-of-micromobility-ridership-and-revenue-after-a-crisis>

Looking at the highest deployment in each program geography in Figure 10, all other neighborhoods do not come close to Downtown LA and Venice's deployment. Map 4 likewise confirms that deployment lagged in non-SOZs.³⁴



³⁴ See Appendix Maps 2 in Appendix B for specific deployment trends per Neighborhood Council throughout the current program.

Map 4: Average Deployment Per Neighborhood Council After Pilot Program



Trip Trends

Though the new program geographies were not implemented until April 2021, we included the months starting from April 2020. The increase in trips beginning in April 2020 and January 2021 is likely due to a resurgence in ridership as COVID-19 stay-at-home orders eased. The nadir in December 2021, all trip figures do not indicate ridership trends. Instead, it is a data reporting error from LADOT. For any averages across months that include December 2021, we excluded that observation from the analysis. Across the entire time since the end of the pilot program (April 2020 to September 2022),

SOZs had the highest total and average trip counts, followed by MDDs, EFMDDs, then SPDs. SPDs remained the lowest of all zones since these neighborhoods lack proper road infrastructure to support micromobility. On the other hand, MDDs and EFMDDs have better infrastructure to support more trips.

Table 4: Current Program Trip Summary

Program Geography	Average	Total
SOZ	43,069	6,235,918
MDD	5,224	3,179,840
EFMDD	3,737	2,926,033
SPD	937	1,248,880

Total and average trips in Figure 11 and 12 followed similar trends for each of the four zones.³⁵ Regarding trip volumes, the gap between SOZ, MDD, and EFMDD trips decreased. However, in terms of averages, the gap remained wide. This is likely due to MDDs and EFMDDs having many neighborhoods with little to no trips, which pulls down their average.

³⁵ See Appendix Figure 6 and 8 for total and average trips by the 4 zone types during the entire period of available data (January 2019 to September 2022).

Figure 11: Total Trips by Geography Types (Current Program)
Trips are reported as total monthly trips starting in a Program Geography.

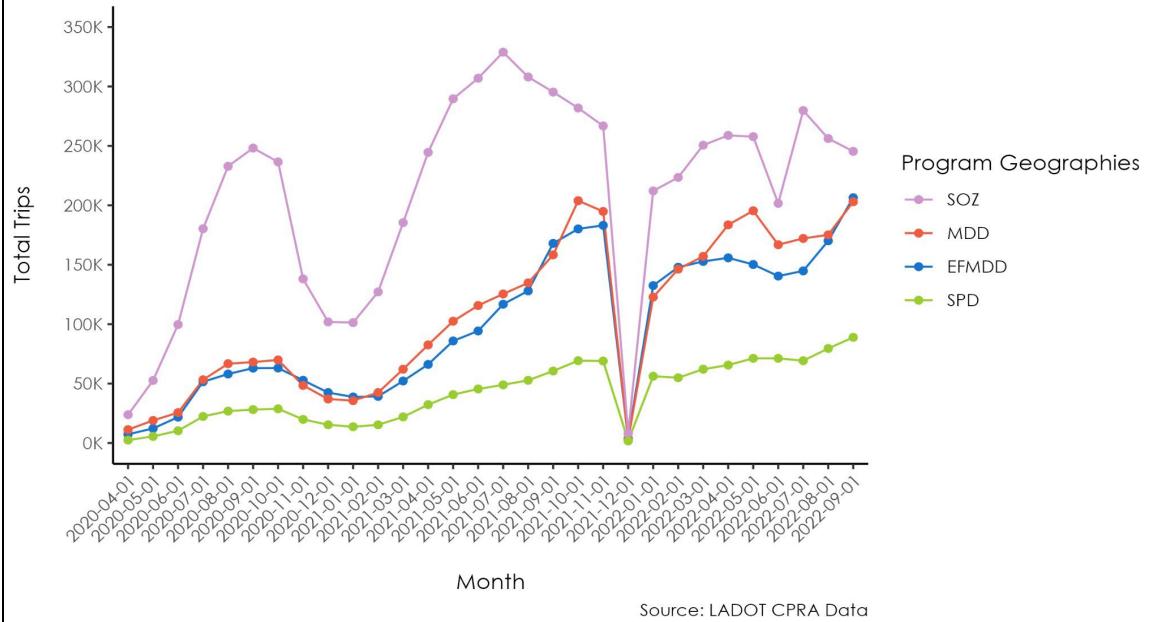


Figure 12: Average Trips by Geography Types (Current Program)
Trips are reported as average monthly trips starting in a Program Geography.

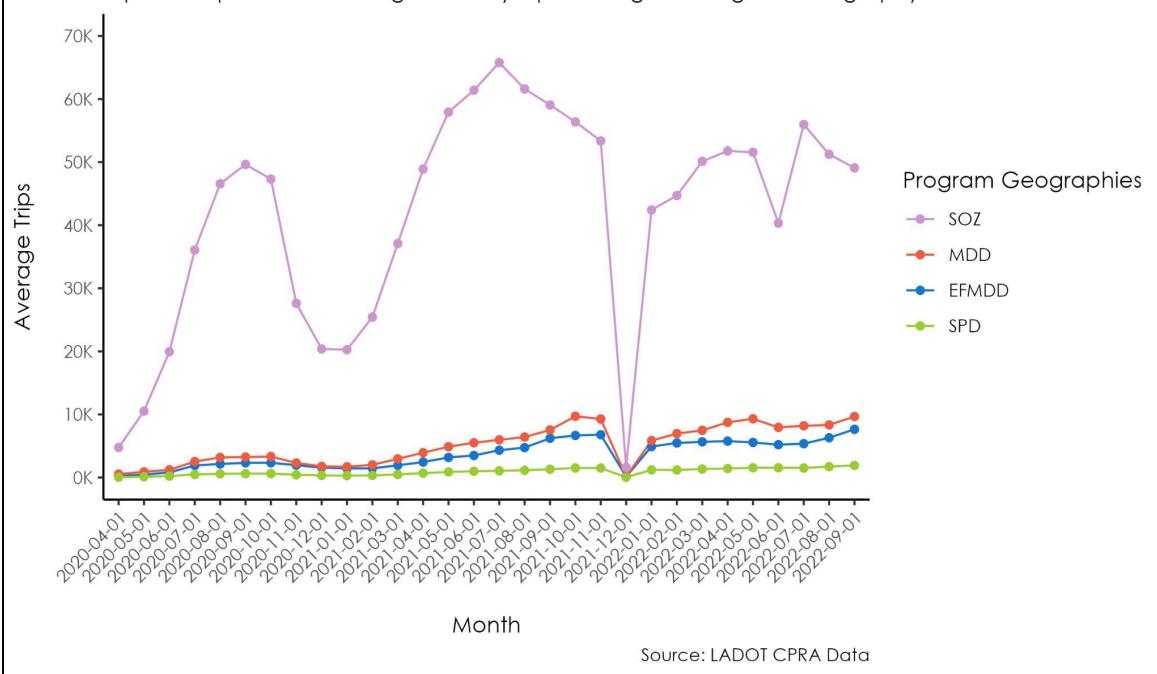
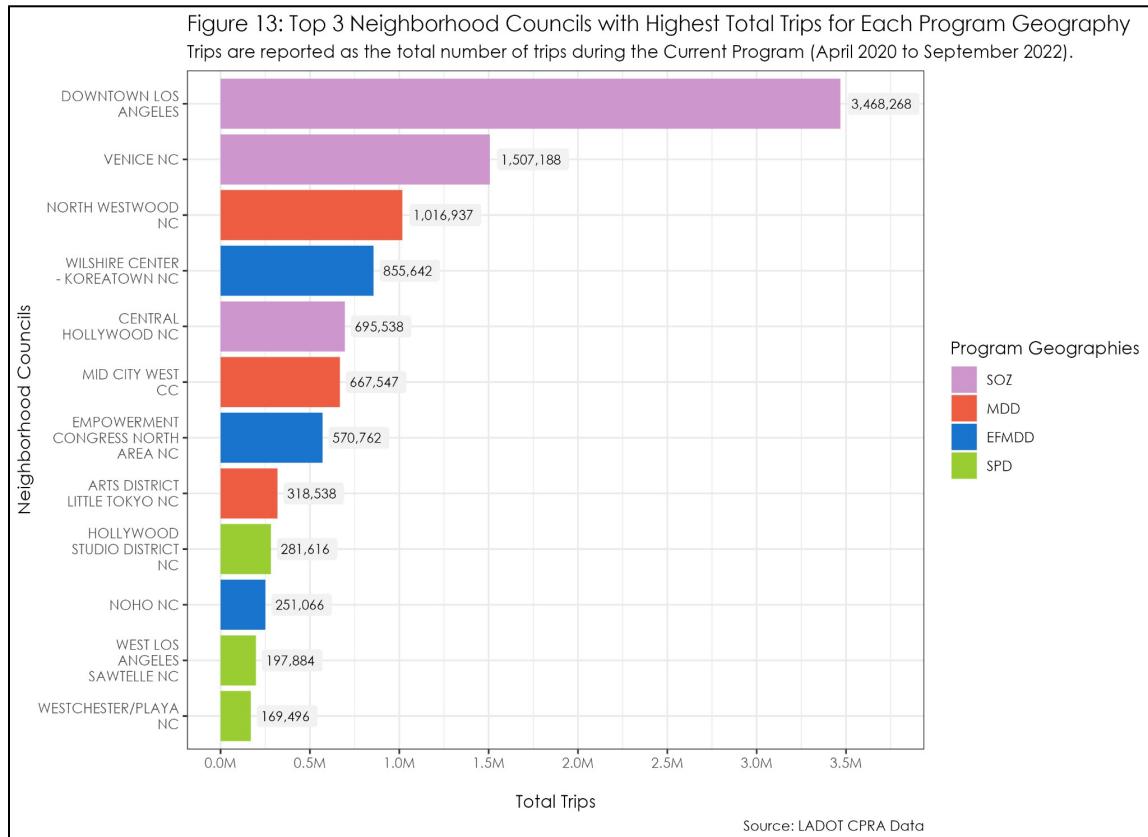
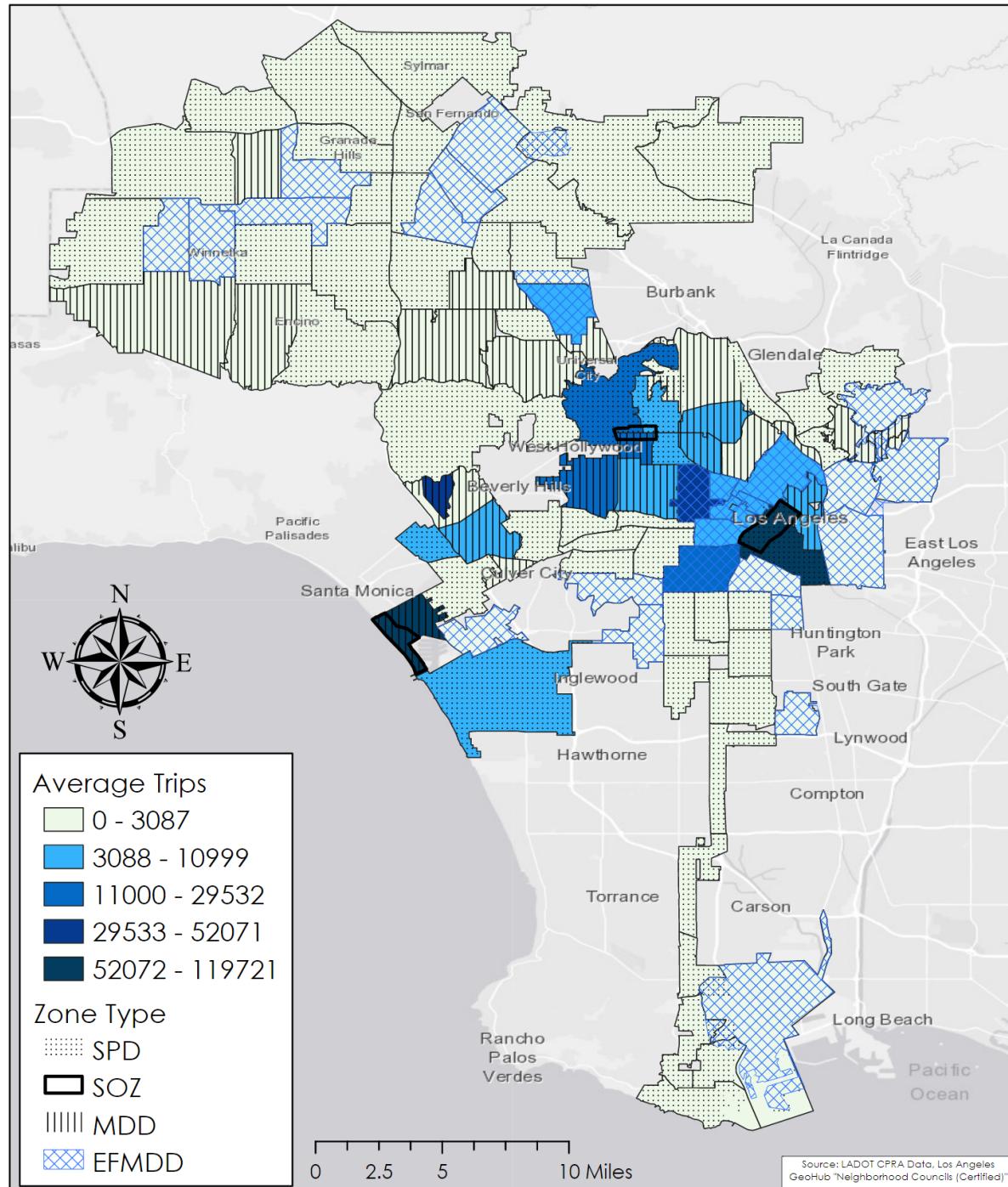


Figure 13 shows the top 3 highest total trip counts for each program geography. Trips in Downtown LA far surpassed all other neighborhoods. North Westwood, which contains UCLA and Koreatown, had a higher trip count than one SOZ neighborhood. Map 5 shows the average number of trips by the Neighborhood Council from April 2020 to September 2022.



Map 5: Average Trip Counts Per Neighborhood Council After Pilot Program



MyLA311 Trends

After the pilot program year, the patterns observed in the MyLA311 Requests reveal that the number of service requests, as depicted in Figure 14, directly correlates with the concentration of dockless vehicles. The San Fernando Valley experienced an almost negligible service request, primarily because of the few vehicles initially present.

- As illustrated in Figure 15, approximately 82% of the service requests were related to vehicles parked inappropriately.
- Most service requests originated from non-SFV areas (97.34%), while only a small portion came from SFV areas (2.66%).
- In Figure 16, penalties per trip are about equal between non-SFV and SFV areas.
- We maintain the unit of analysis for service requests as non-SFV versus SFV based on the feedback provided by the operators.

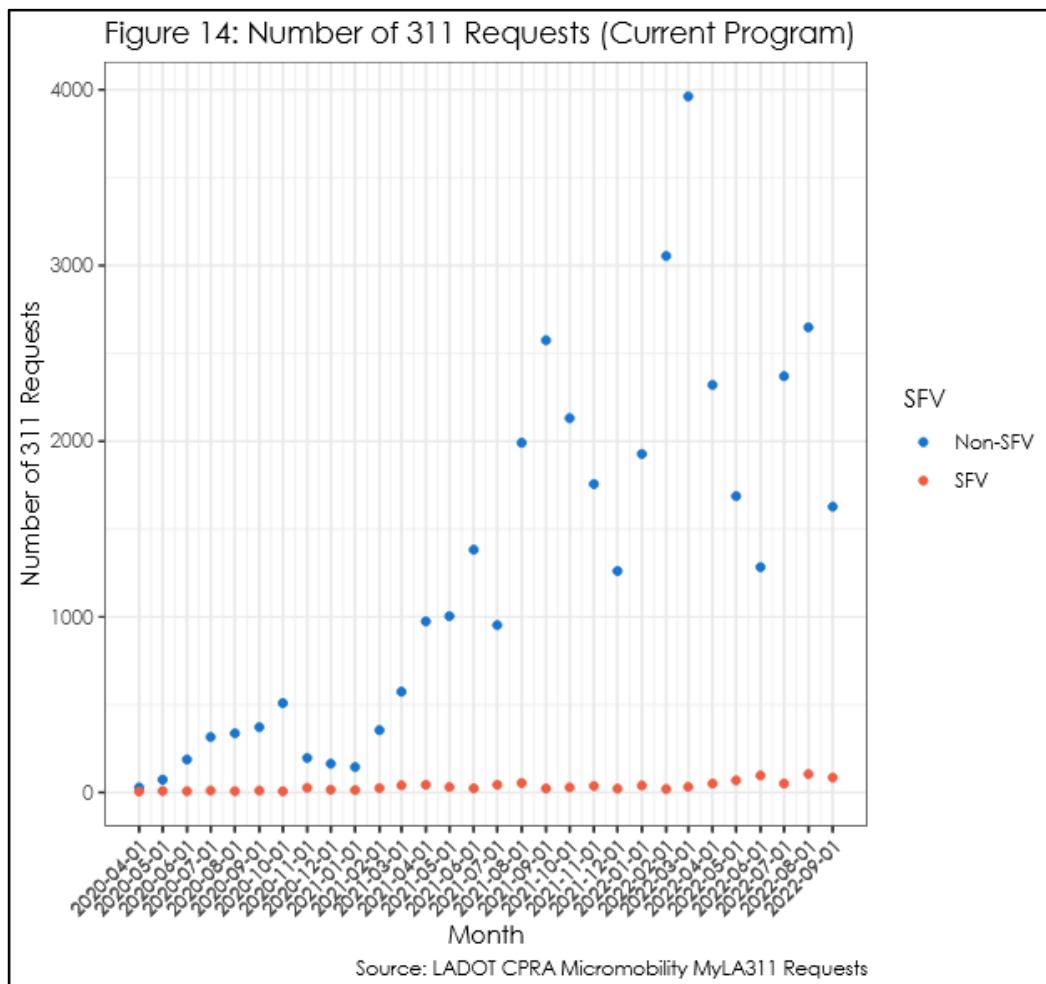


Figure 15: Number of each type of 311 Requests

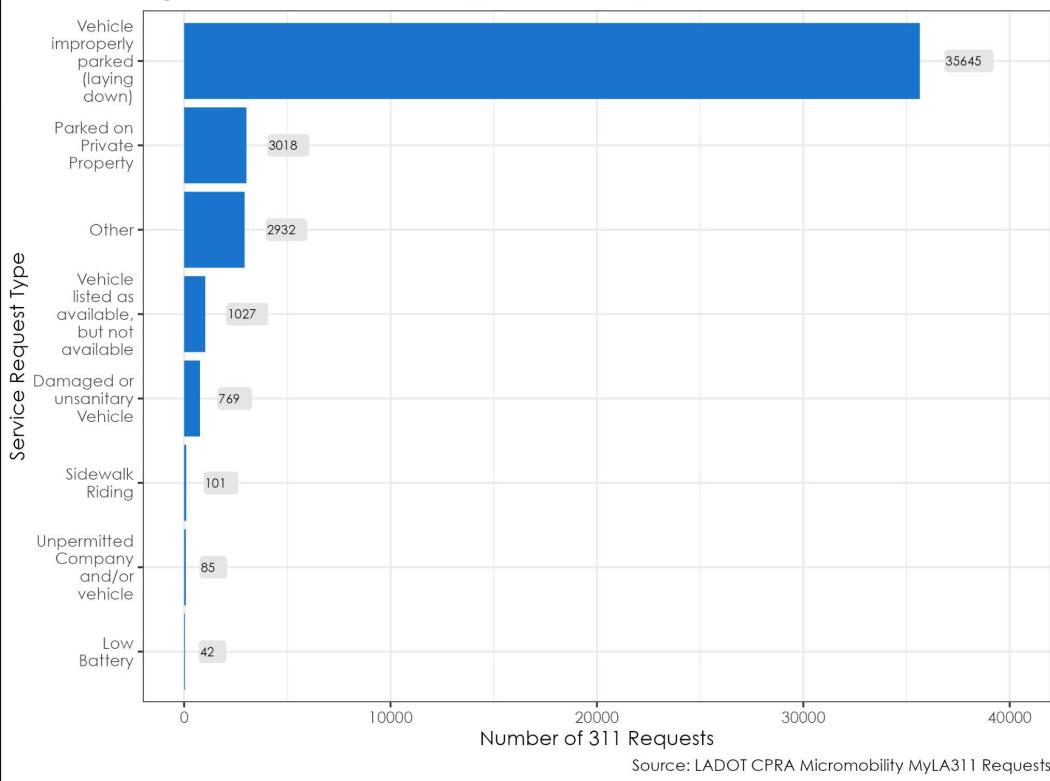
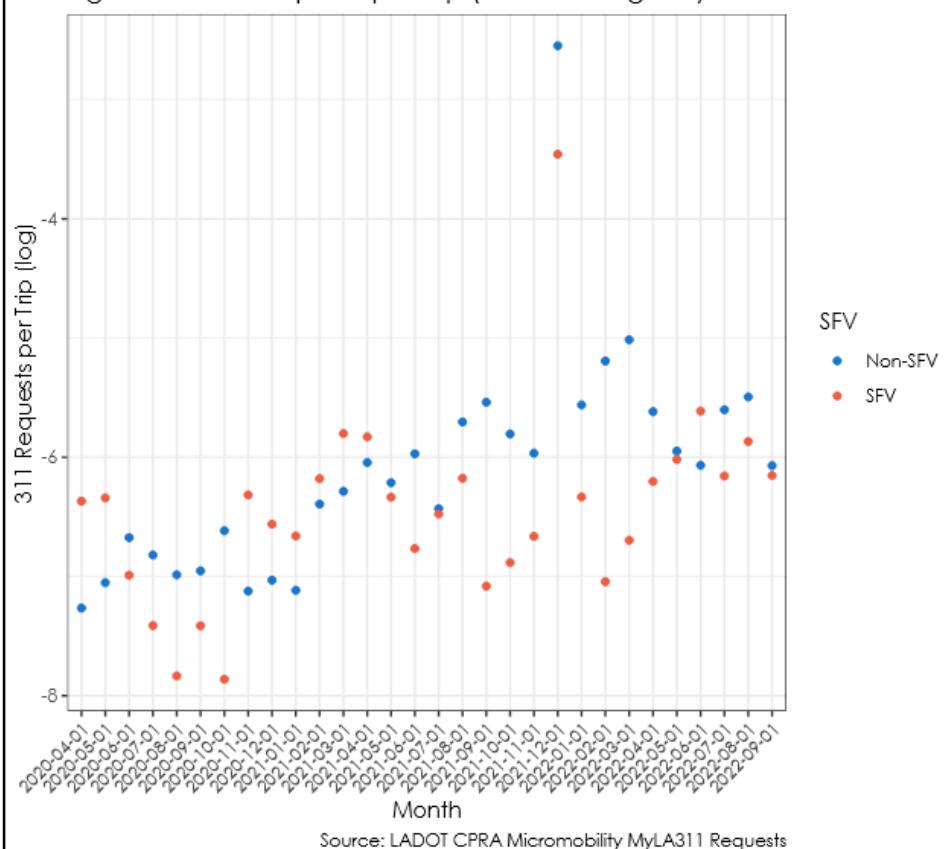


Figure 16: 311 Requests per trip (Current Program)



Summary of Pilot and Current Program

From the inception of the pilot program to the current day, several trends have emerged: after accounting for the impacts of the pandemic, deployment has risen back to near pre-pandemic levels, but deployment in equity zones has not recovered comparatively well. This implies that the policies instituted after the pilot program, including zonal percentage requirements, fee structures, and penalty schedules, have either been insufficient or counterproductive to achieving better equality in deployment across the City of Los Angeles. Many of the policies within LADOT's guidelines aim to improve equality. It is therefore concerning to see the consistent and rising discrepancy.

Solutions to this discrepancy could be measured in two ways: improvements in ridership, as measured by the number of rides within a zone, or improvements in deployment, as measured by the number of vehicles available within a zone. Both concepts are linked and influence one another. More visible vehicles may induce rides. More rides would signal operators to deploy more vehicles. However, a strategy focused on improving ridership in the equity zones may only increase the number of rides *per user and vehicle*. This strategy does not result in expanding the rider base or improving vehicle access. Given this, and LADOT's 2035 Mobility Plan goal to provide 75% of all households in Los Angeles with a shared vehicle within half a mile,³⁶ this report focuses on improving **deployment** in equity zones. Our report also includes a policy option to improve deployment in the San Fernando Valley since operators noted specific concerns about deploying there. To begin the analysis, we first identified the drivers of low deployment.

³⁶Los Angeles Department of City Planning, "Mobility Plan 2035: An Element of the General Plan." September 7, 2016. <https://planning.lacity.org/plans-policies/initiatives-policies/mobility>



Problem Identification

Problem Identification

In this section, we are interested in identifying the factors in the low deployment of micromobility vehicles in the San Fernando Valley equity zones. The issues described below come from interviews with micromobility operators (Bird, Lime, Lyft, and Superpedestrian) and the LADOT For-Hire Policy and Enforcement Division.

Stakeholder Perspectives on the Problem Identification

During interviews with operators, they noted several hesitations regarding deployment in the San Fernando Valley. First, they emphasized that responding to 311 complaints in the SFV was more burdensome given the region's size, sprawl, and distance from service warehouses in Downtown and West Los Angeles. Since 311 complaints and deployment are closely related, deploying in the Valley is more costly than deploying in the basin. It would cost more to collect scooters in the Valley to recharge. And it is more costly to address 311 requests from the Valley since the few scooters are more spread apart from others. These factors discourage operators from deploying in the Valley.

Multiple operators also noted the challenges of the open market system. When the pilot began, LADOT granted contracts to eight operators, though there is no limit on the number of operator permits. Under the current guidelines, LADOT does not limit the number of approved permits. The main requirements for permitting are compliance with technical guidelines, fee structures, and 311 request resolution. According to LADOT, the open market system should generate the fairest price for consumers via inter-operator competition on fares and deployment size. Operators, however, have noted that the open market model has stretched margins thin to the point where some, including Lyft and Spin, have exited the Los Angeles market entirely. Operators struggle to obtain profitability since they cannot motivate customer retention. The competition also increases the concentration of scooters in SOZs. They deploy more scooters in demand-rich SOZs instead of lower-demand zones, such as EFMDDs, MDDs, and the SFV, to maximize their chances at revenue.

Operators also noted an absence of information about the most optimal deployment locations in EFMDDs, MDDs, and the SFV. The program zones are relatively large since the zones are the same size as Neighborhood Councils. And the SFV itself is even larger. The scooter companies requested that LADOT provide recommended deployment areas within these zones to optimize ride generation. They recommended identifying community centers, commercial zones, and pedestrian corridors.

Both operators and CBOs suggested that the open market model also reduces the mandatory low-income programs' effectiveness. Each operator is responsible for administering their respective programs, meaning to benefit from the entirety of the program, low-income riders must apply for eight distinct discount programs in Table 5. To qualify for the programs, applicants must submit proof of enrollment in local, state, or federal assistance. Although these assistance programs are generous, it is cumbersome for riders to apply to eight programs. As of October 2021, only 2,915 riders made use of the **programs, which is an**

increase of only 17 riders since the end of the pilot.³⁷ According to an LADOT user survey, 85% of riders were unaware of the low-income programs. While operators are supposed to work with Council Offices and CBOs to promote enrollment in equity programs, operators typically have limited staff.³⁸ Additionally, the lack of oversight from LADOT to monitor eight discount programs means that the programs are often an afterthought. Furthermore, the limited availability of scooters in EFMDDs means those who could use the low-income programs cannot access scooters.

Table 5: Low-Income Programs by Operator

Bird	\$5/month for unlimited rides of 30 minutes or less.
Bolt	50% off all rides.
Jump	\$5/month for free rides of 60 minutes every day.
Lime	\$5/month for unlimited rides of 30 minutes or less.
Lyft	\$5/month for unlimited rides of 30 minutes or less.
Sherpa	Monthly subscription for unlimited rides of 30 minutes or less.
Spin	Monthly subscription for unlimited rides of 30 minutes or less.
Wheels	Monthly subscription for unlimited rides of 30 minutes or less.
Link (Superpedestrian)	Unlimited 30-minute rides

³⁷ Tu, Marilyn. "Can Wheels Get More Underserved Angelenos to Ride E-Bikes? - Dot.LA," March 18, 2022. <https://dot.la/wheels-scooters-2656982454.html>.

³⁸ LADOT. Year One Snapshot, 60.

Challenges in Addressing the Problem

One challenge for improving micromobility in Los Angeles is the tension between public and private sector interests. Scooter companies are for-profit entities whose legally mandated goal is to increase the value of their company for their shareholders. On the other hand, public agencies regulate the distribution of resources and goods. This produces tension between the operators, who seek to deploy in the areas that maximize ridership and revenue, and the agencies, who seek to deploy scooters in areas underserved by other transportation modes. Thus, our policy alternatives must attempt to meet both goals. If the new policy is too costly for the operators, they can leave Los Angeles, a threat already manifested in the departures of Lyft and Spin. On the other hand, if the policy does not lead to equitable deployment, LADOT will not reach its equity goals. Micromobility would continue to concentrate in high-demand areas. To address this challenge, we considered the consequences of the policy for both LADOT and operators in our criteria for policy evaluation.

Another challenge for us is the lack of data transparency from operators. Operators provided trip counts and point data on trip origins and destinations to LADOT, which LADOT provided for us. However, operators do not report consumer prices per trip which LADOT or we could use to model optimal fee structures. App open data is similarly unavailable, measured by the number of users who open the app but do not use a scooter. This data could identify latent demand and optimal scooter deployment locations for low-deployment areas.

Though more data would be helpful for this policy analysis, we could still address our policy question with the data we obtained. The next section describes our data sources and methods used for analysis.



Data & Research Methods

Data and Research Methods

We used a mixed methods approach to analyze our policy options, including structured interviews, descriptive statistics, and economic analysis. Additionally, we extracted data from case studies of cities in the U.S. with micromobility programs, Bird and Wheels Application Programming Interfaces (API), and LADOT.

Qualitative Analysis: Structured Interviews & Case Studies

We developed questions based on the main components of the LADOT Dockless Year One Report and the 2021 On-Demand Mobility Rules and Guidelines. We aimed to gather the perspectives of stakeholders in the micromobility program.

Table 6: Stakeholder Structured Interviews	
Stakeholder Type	Interviewees
Operators	Bird, Lime, Lyft, Superpedestrian
Community-Based Organizations	Los Angeles Walks, Bike LA, Change Lives
LADOT	For-Hire Policy and Enforcement Division
Outside of LA	Move PGH (Pittsburgh, PA), KCMO (Kansas City, MO)

We conducted structured interviews from November 2022 through February 2023 with staff members from four operators: Bird, Lime, Lyft, and Superpedestrian. Our intention for these interviews was to discover more about their micromobility services in the City of Los Angeles by asking across several operations themes:

- Deployment Strategy
- Equity
- Response to LADOT Year One Report
- Relationship with LADOT
- Policy Options for Improving Equitable Deployment

In January and February 2023, we interviewed staff from partnering Community Based Organizations (CBOs), including Los Angeles Walks, Bike LA, and Change Lives. We sought to understand their perspective on the relationship dynamic between operators, organizations, and LADOT and equitable outreach methods to reach low-income riders.

We met biweekly from September 2022 to March 2023 with the LADOT For-Hire Policy and Enforcement Division to update them on our progress and inquire about the micromobility data and program policies.

Lastly, we also facilitated interviews with program staff from two micromobility programs: Move PGH in Pittsburgh, PA, and KC in Kansas City, MO. We focused on understanding other cities' equity policies, limits on operator permits, and general reflections about their micromobility program to apply their lessons to LADOT's program.

We recorded the interviews and then synthesized lessons about the strengths and challenges of the program. We placed the interview responses from all involved parties in the appropriate policy options section.

For the case study analysis, we selected eight cities by consulting our faculty advisor to identify different approaches to achieve mobility and equity goals. The eight cities are: Atlanta, GA; Boulder, CO; Chicago, IL; Denver, CO; Pittsburgh, PA; Portland, OR; San Francisco, CA; and Washington, D.C. We evaluated their micromobility programs by reviewing their public reports and then assessing which city performed the best in terms of each of our six initial policy options. We included the case study findings throughout the policy options analysis.

One limitation of our qualitative analysis was the response rate from operators and CBOs. We could not interview operators such as Wheels and Spin, although their contact information is public on LADOT's Micromobility website. LADOT also approved two new operators, Veo and Tuk Tuk, to replace the departed Lyft and Spin. Due to the project's time constraints, we could not interview them. For CBOs, we could only interview three out of six CBOs with a current partnership with an operator. A greater response rate from the CBOs would have also increased the variability in themes about the City's micromobility program.

Descriptive Statistics: LADOT CPRA Data, API Data, and Ride Report Data

We obtained origin-destination trip counts, deployment averages, and MyLA 311 service request data from LADOT via a CPRA. LADOT provided the data at the Neighborhood Council level from January 2019 to September 2022. We uploaded, transformed, and plotted the data in R. We mapped the data on Esri's Arc Geographic Information Systems (ArcGIS) software. All raw data, transformed data, plots, and maps are in GitHub. We can identify trends in ridership, deployment, and MyLA311 requests with the data, plots, and maps. More detailed information on the processes used to develop the data is in Appendix A.

For our maps, we downloaded Neighborhood Council shape files from LA GeoHub.³⁹ LADOT also provided shape files for the four zones (SOZ, EFMDD, MDD, SPD).

We also obtained a vehicle point dataset provided openly by dockless mobility firms. The data adheres to the General Bikeshare Feed Specification (GBFS), a format maintained by the North American Bike Share Association (NABSA).⁴⁰ We scraped the APIs in Python from January 18, 2023, to February 16, 2023. Only data from Bird and Wheels were available through the application. The information was updated continuously, and we collected the scooter locations hourly. For the Wheels data, we began the scrape on January 23, 2023, but

³⁹ "Neighborhood Councils (Certified)." Accessed April 13, 2023.

<https://geohub.lacity.org/datasets/lahub::neighborhood-councils-certified/about>.

⁴⁰ "General Bikeshare Feed Specification." 2015. Reprint, MobilityData IO, April 13, 2023.
<https://github.com/MobilityData/gbfs>.

ended at the same time as the Bird scrape. For our analysis, we selected the scooter location at noon each day to represent the location for the entire day.⁴¹

Lastly, we collected micromobility data from Ride Report's Global Micromobility Dashboard to compare average trip costs across cities by the number of permitted operators. We gathered the average distance per trip and average speed from the dashboard. We collected the number of operators per city by searching for the city's micromobility reports. We gathered the average price per minute by looking at the price for a scooter rental for each operator in each city using the operator's smartphone application.

A major limitation of descriptive statistics is that we cannot infer causation. We can demonstrate trends and correlations. However, we cannot state whether one variable causes another because we do not have data about what would have happened if LADOT's policies were not implemented. Additionally, since the CPRA data is at the Neighborhood Council level, we cannot provide a more granular analysis for making a map of optimal deployment zones. Nonetheless, the Neighborhood Council level data was still useful for drawing other inferences about trends and relationships.

Economic Analysis: Literature Review and Devising an Economic Model

Since one policy option involved changing the fees, we also conducted an economic analysis to understand the impact of fee changes on deployment. The CPRA and API data do not include trip cost data which would help us approximate the price elasticity of demand, which is the percent change in rides demanded driven by a percent change in price. Thus, we could not use our data to approximate the change in ridership and deployment due to fee changes. Instead, we looked into the academic literature on the elasticity estimates for micromobility. We were unable to find specific studies on the price elasticity of demand for scooter rides, but we found the cross-price elasticity of demand for scooters which is the change in scooter demand due to other price changes, like gasoline and transit.

With the cross-price estimate, we determined a range of estimates for the price elasticity demand of scooters. Given that scooters compete with modes like private automobiles and mass transit for riders, it's reasonable to expect that riders are sensitive to changes in the price of other modes and might substitute scooter trips depending on scooter prices. Using these cross-price elasticity estimates, we could roughly approximate the scooter price elasticity of demand, enabling us to estimate the impacts of fee increases and monopolization.

⁴¹ Earlier we noted that we counted all trips, deployment, and 311 requests in neighborhoods that contained SOZs as the SOZ counts. For the API scrape, we were able to count the number of vehicles in the Venice SOZ apart from the entire neighborhood, likewise for the Downtown LA and Hollywood SOZs since the data was provided at the point level.



Policy Options

Policy Options

In this section, we identify six policy areas within the “On-Demand Mobility Rules and Guidelines”⁴² that could increase the deployment of micromobility vehicles in EFMDDs. These six areas and the respective policy options are within LADOT’s ability to adopt and enforce. We describe each policy area and policy option in the sections below. We narrowed the policy options to three specific options based on the feasibility of evaluating the policy options, our project’s time constraint, and the data availability. We describe the process of narrowing down our policy options after this section.

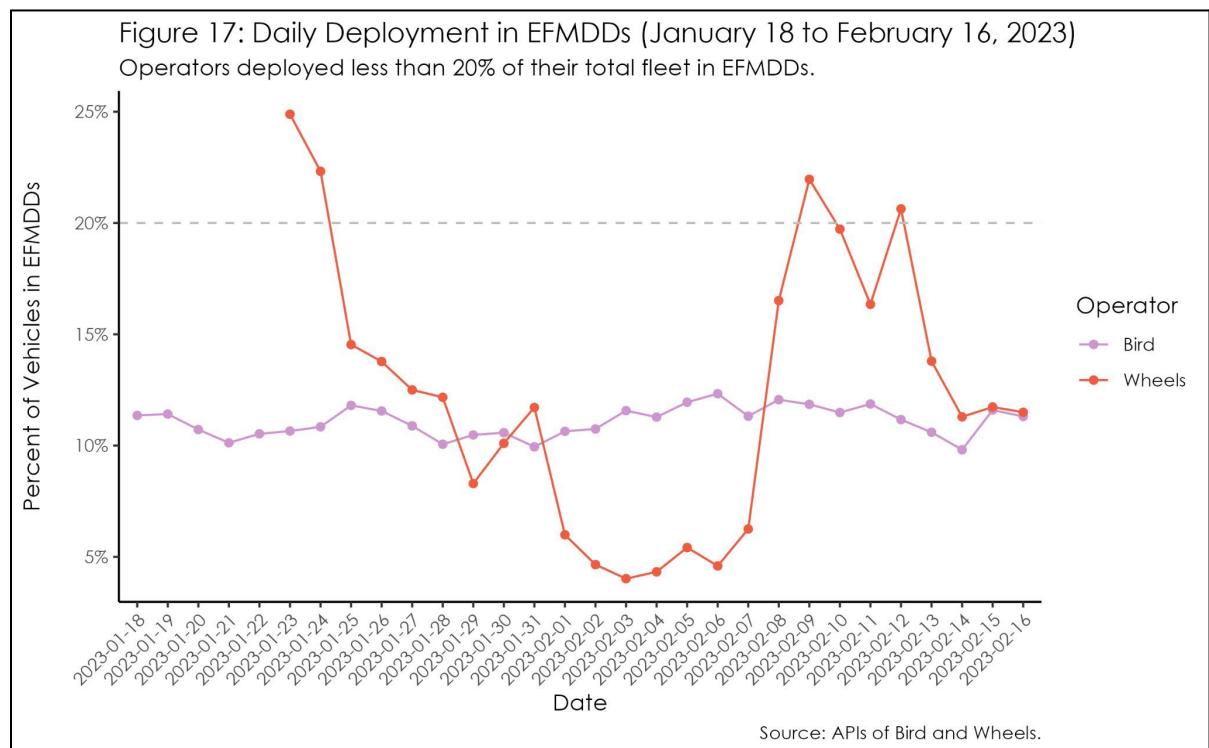
Table 7: Policy Areas and Specific Policy Options

Policy Area	Specific Policy Options
Fleet Size and Distribution	Fleet minima in equity zones, percentage distribution requirements
Penalties	Leniency on penalties sustained in the SFV
Fee Schedules	Increased fees in non-EFMDDs, 50% discount for all trips in EFMDDs
Outreach and Equity Programs	Enhancing LADOT’s role to oversee partnership with operators and CBOs and the publicizing of low-income fare programs
Administrative Enhancement	Reduction in operator size, enforcement of deployment norms
Geographic Enhancements	Subdividing EFMDDs

⁴² City of Los Angeles, 13, 15, 18, 26.

Fleet Size and Distribution

In the current LADOT guidelines, an operator must deploy at least 500 vehicles. They must also have 20% of their fleet deployed in EFMDDs if they choose to deploy in the Venice SOZ. However, data captured through APIs show that Wheels deployed, on average, 203 vehicles per day, which is below the minimum, but they met the 20% standard on four days.⁴³ Bird deployed, on average, 4,750 vehicles per day but did not meet the 20% requirement at all.⁴⁴



While these distribution guidelines are intended to ensure a baseline level of service quality, there may be more effective ways to promote equity in micromobility. Even with a minimum vehicle requirement, operators may concentrate their deployments in more high-demand areas, leaving others underserved. Changing the percentage, minimum, or maximum number of vehicles may not address these concerns absent strict enforcement and monitoring.

One possible recommendation could be eliminating the maximum number requirement, as it may not affect achieving equity deployment goals. In the 2019-2020 Pilot Report, LADOT allowed each operator to deploy 5,000 vehicles in SFV DACs compared to 3,000 vehicles in non-SFV non-DACs.⁴⁵ Operators never approached the 5,000-scooter maximum though it may have been an incentive to put more scooters in SFV DACs. Thus, the increased deployment maximum in the SFV DACs proved ineffective in stimulating equitable deployment.

Though maxima may not achieve the policy goal, retaining the minimum deployment and 20% requirement may ensure baseline service and allow for compliance monitoring.

⁴³ See Appendix B, Maps 3 for Wheel's specific deployment trends per Neighborhood Council.

⁴⁴ See Appendix B, Map 4 for Bird's specific deployment trends per Neighborhood Council.

⁴⁵ LADOT. Year One Snapshot, 8.

Penalties

When an operator is not compliant with the City's micromobility guidelines, operators accumulate penalty points, translating to fines. Penalty points can come from technical issues, such as failing to report scooter trips with all the necessary details. We are particularly interested in the penalty points accumulated through 311 requests. When operators fail to address 311 requests within the appropriate time frame (one hour for safety violations and two hours for other violations), operators accumulate penalty points. MyLA311 requests include vehicle improperly parked (laying down); unpermitted company and/or vehicle; parked on private property; damaged or unsanitary vehicle; low battery; sidewalk riding; and vehicle listed as available but not available. The most common 311 requests are for improperly parked vehicles. The issued penalty points accumulate throughout the year, and LADOT charges a fine, according to Tables 8 and 9.

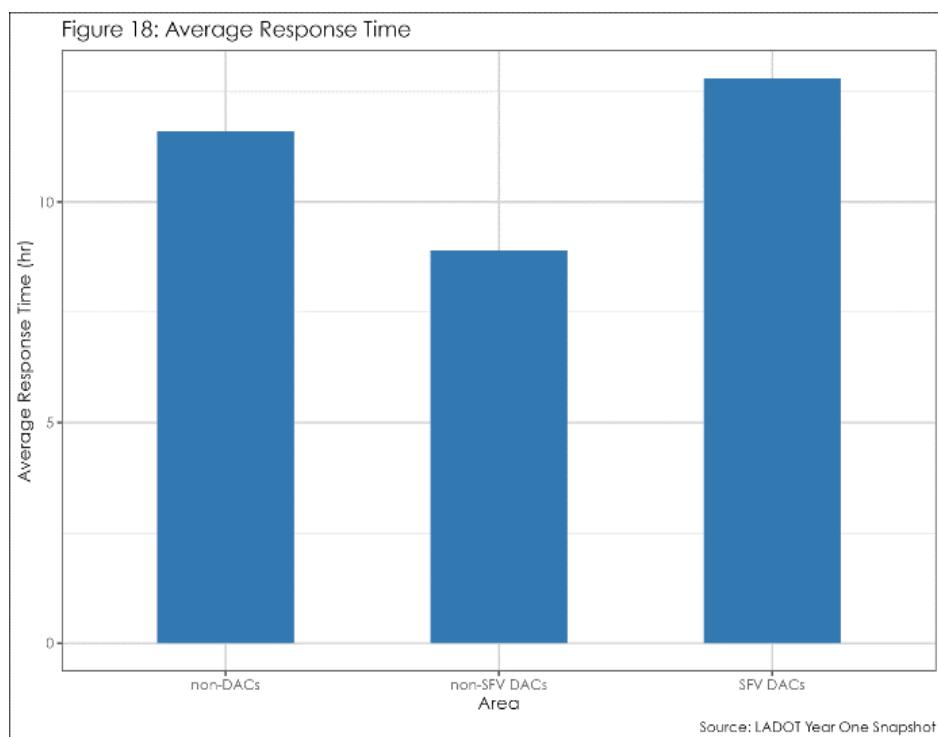
Table 8: Penalty Fees

Points	Fine	Points	Fine
1-9	Written warning	110-119	\$55,000
10-19	\$5,000	120-129	\$60,000
20-29	\$10,000	130-139	\$65,000
30-39	\$15,000	140-149	\$70,000
40-49	\$20,000	150-159	\$75,000***
50+	\$25,000*	160-169	\$80,000
60-69	\$30,000	170-179	\$85,000
70-79	\$35,000	180-189	\$90,000
80-89	\$40,000	190-199	\$95,000
90-99	\$45,000	200+	\$100,000****
100+	\$50,000**		

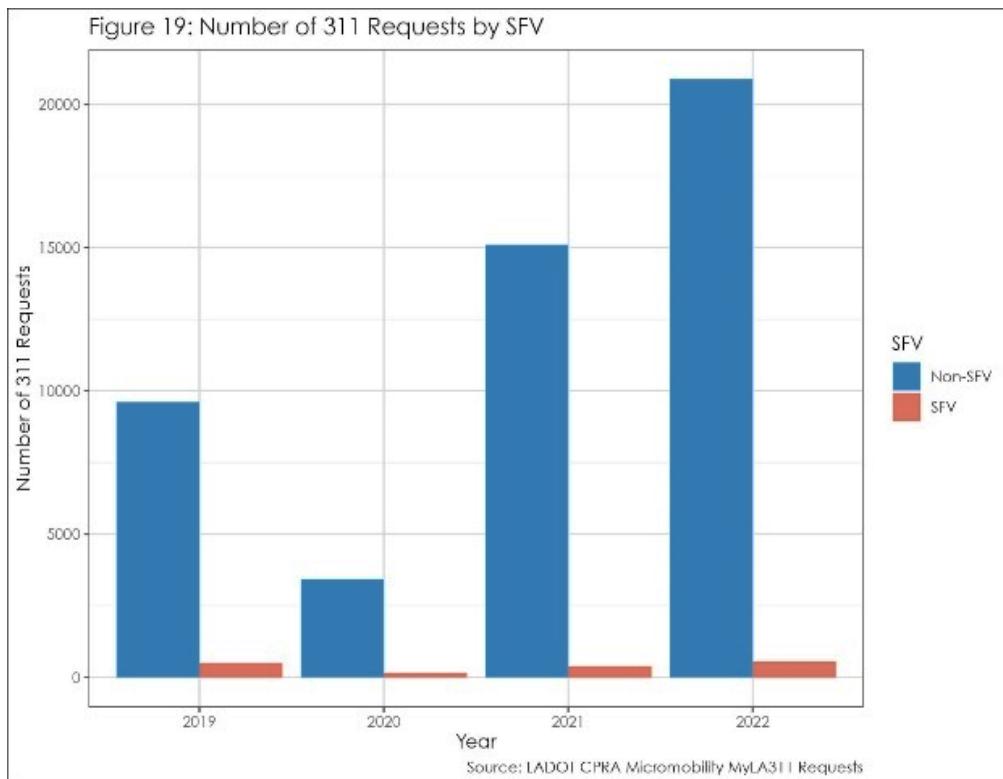
Table 9: Program Point Thresholds

Points Accumulated During Permit Year	Fine/Penalty	Percent of Fleet Suspended and Suspension Time
50	\$25,000	*10% of Fleet for Seven Days
100	\$50,000	**50% of Fleet for Ten Days
150	\$75,000	***100% of Fleet for 30 Days
200	\$100,000	****Potential Permit Revocation

Though operators recognize the importance of the penalty schedule, they stated that the uniform application of this penalty schedule across the City deters them from deploying in the SFV, according to our interviews with operators. In high-demand areas like Venice, addressing vehicle 311 requests is more accessible since their operations center is in Downtown LA and West LA, which is closer to these high-demand areas. Also, operators can address more violations in areas with greater deployment in a shorter period since the scooters are nearer to each other. But addressing violations in the SFV is more onerous because the operator's representatives need to travel further to reach fewer scooters. During the pilot, the SFV DACs had the longest average response time at 12.8 hours, while the average response time for non-SFV DACs was 8.9 hours and 11.6 hours for non-DACs (Figure 18).⁴⁶ In response, most operators chose to deploy minimally, if at all, in the SFV.



⁴⁶ LADOT. Year One Snapshot, 60.



A policy alternative to overcome this obstacle is to set a separate penalty schedule for vehicles in the SFV that either reduces the penalty points or increases the time frame for operators to respond. As a result, operators would be less averse to deploying in the SFV and, in particular, the equity zones in the SFV.

Fee Structure

The City's current guidelines outline four geographies based on transportation needs that determine the fee structure. The per-trip fees collected from the operator fund the administration of the micromobility program. The lower per-trip fee applies for trips that begin in one geography and end in another. For instance, if a trip starts in a SOZ and ends in an EFMDD, the fee is \$0.00. (For details of the current fee schedule, see Table 3 in the Overview of the Current On-Demand Shared Mobility Permit Program). Theoretically, the lower or \$0 fees should have incentivized operators to deploy more scooters in EFMDDs and MDDs, and yet the distribution of vehicles remains uneven.

In April 2021, LADOT replaced its per-vehicle trip with its current per-trip fees charged differently by zones. Given that the policy went into effect in April 2021, we looked at deployment and trips, a proxy for demand, across the city from February to May 2021 to determine whether demand patterns shifted under differentiated pricing. Figure 20 and 21 and Map 6 below suggests that the effect of the initial zonal fee schedules on aggregate demand was relatively small. SOZ deployment and ridership remained much larger than EFMDDs.

Figure 20: Deployment from February to June 2021
Deployment is reported as the average number of vehicles available each day by month.

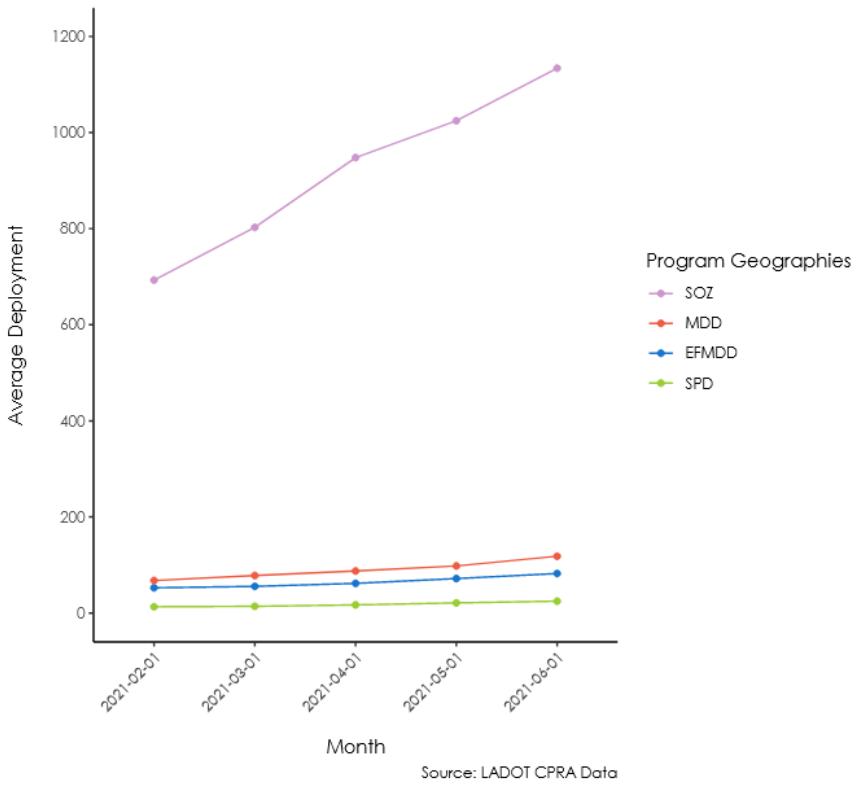
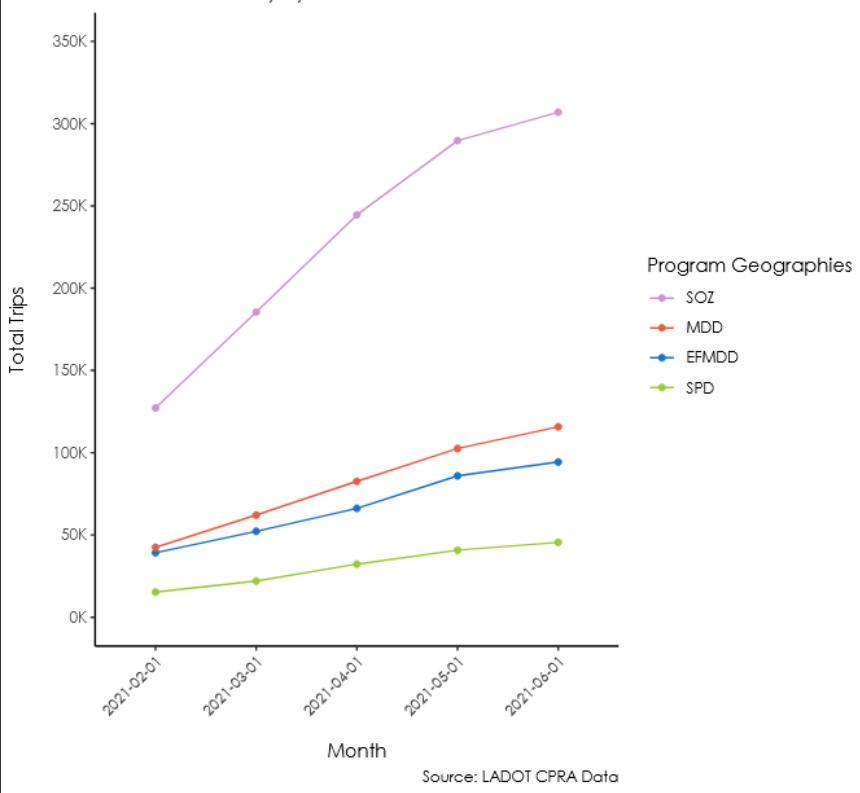
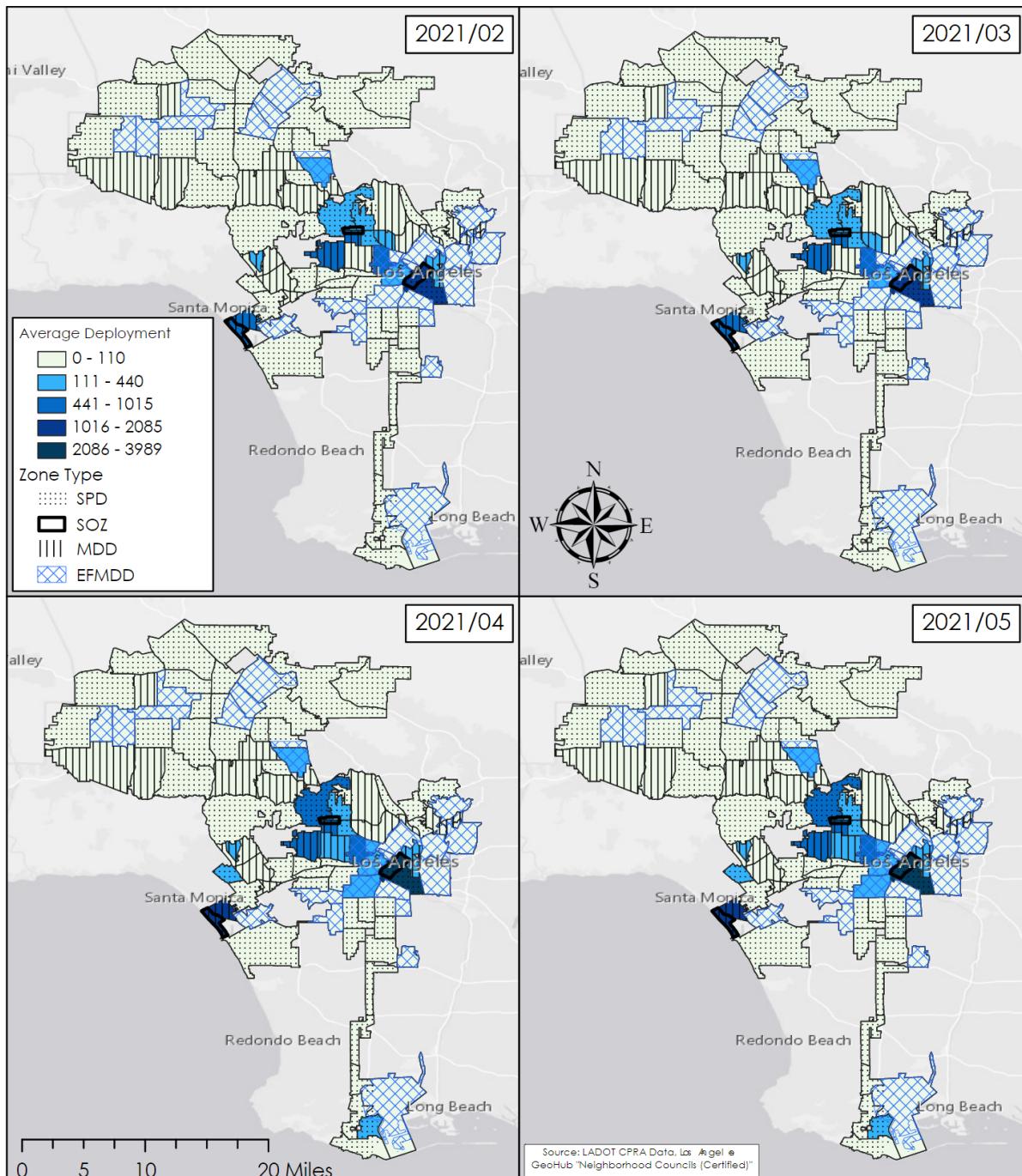


Figure 21: Total Trips from February to June 2021
Deployment is reported as the average number of vehicles available each day by month.



Map 6: Average Deployment per Neighborhood Council from February to May 2021



One alternative is to increase the trip fees further. In November 2022, LADOT proposed to the Los Angeles City Council an updated trip fee schedule to cover the increasing administrative costs on LADOT to run the micromobility program. One significant distinction from the previous per-trip fee structure is that the new amount reflects where the trip ends. If a trip originates in an EFMDD and ends in a SOZ, the fee will be \$0.75. The proposal has yet to be approved by the City Council.

Table 10: Trip Fees by Zone (Pending)

Geography	Applicability	Per Trip Fee*
Equity-Focus Mobility Development District	Trips that end in the Equity Focus Mobility Development District	\$0.00 / No Cost
Mobility Development District	Trips that end in the Mobility Development District	\$0.25
Standard Permitted Zone	Trips that end in the Standard Permitted District	\$0.50
Special Operation Zone	Trips that end in the Special Operations Zone	\$0.75

*Trips that end outside the city boundaries shall use the fee from their point of origin.

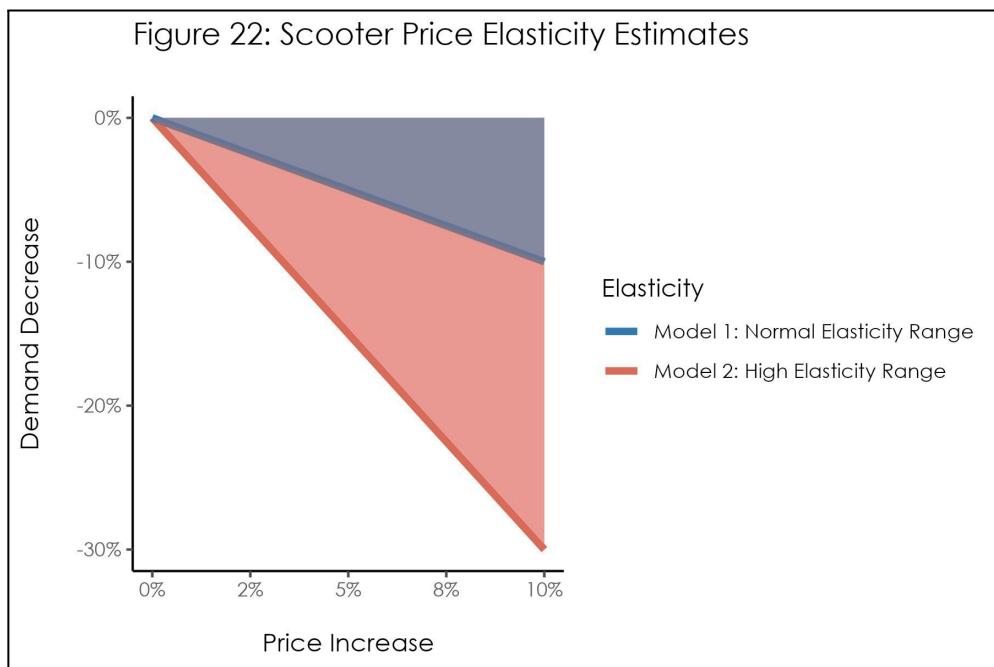
Another option is a 50% reduction in fares whenever a trip starts, passes, or ends in an EFMDD. Move PGH from the City of Pittsburgh adopted the 50% discount policy in their equity zones due to the low uptake in the low-income program offered by the operator, Spin. Our interview with Move PGH indicated that this intervention increased ridership in the equity zones and upheld its aim to get people to and from transit systems without using private vehicles.

If LADOT implemented a new fee structure, we must consider its effects on consumer demand. Figure 22 models potential consumer reactions to fee increases. In Younes et. al.'s paper, they concluded that scooter users are very sensitive to changes in gas prices.⁴⁷ In other words, the cross-price elasticity of gasoline and scooter trips is high. "A 1% increase in mean gas prices is associated with a ... 3.13% [increase] in DSS (Dockless Scooter Share) usage."⁴⁸ Scooter trips are also highly substitutable with gas prices and walking, public transit, and biking.⁴⁹ For highly substitutable goods, the price elasticity demand of that good is $-1 > E_D > -\infty$. Model 1 in Figure 22 is under normal elastic conditions where $E_D = -1$, meaning that a 2% increase in price is associated with a 2% decline in trips. Model 2 assumes a highly elastic demand curve where $E_D = -2$, meaning that a 2% increase in price is associated with a 4% drop in trips. LADOT should further study scooter demand elasticity to understand the demand-side impacts of fare increases better since the figure provides broad estimates.

⁴⁷ Younes, Hannah, Zou, Zhenpeng, Wu, Jiahui, Baiocchi, Giovanni "Comparing the Temporal Determinants of Dockless Scooter-share and Station-based Bike-share in Washington, D.C.", Transportation Research Part A: Policy and Practice, Volume 134, 2020

⁴⁸ Youne,et al., "Comparing the Temporal Determinants," 315.

⁴⁹ Wang and Qian concluded that scooters have varying but significant degrees of substitutability with walking, transit, and bike riding. In a study in Beijing, China, scooter trips replaced walking and transit. https://www.researchgate.net/publication/357605173_What_travel_modes_do_shared_e-scooters_displace_A_review_of_recent_research_findings; <https://www.jtlu.org/index.php/jtlu/article/view/1983>



Overall, since scooters are highly substitutable with other forms of transportation, a fee increase would lead to a substantial drop in ridership. Though operator revenues are unaffected by fee increases, they will still respond to decreased demand by decreasing deployment. Additionally, a 50% discount for price in EFMDDs would mean that operators would lose revenue and may reduce deployment in EFMDDs apart from deployment distribution requirements.

Outreach

Another policy area to pursue is the expansion of the outreach guidelines in the City's micromobility program. The current "Outreach and Equity" section of the On-Demand Mobility Rules and Guidelines features requirements for education about scooter usage and safety, clear communication on pricing before riding, and non-smartphone and non-credit card options for starting trips. Additionally, "operators must partner with a CBO approved by the LADOT for the duration of its permit."⁵⁰ The City also requires operators to offer a low-income discount program "to any customer with an income level at or below 200% of the federal poverty guidelines, subject to annual renewal."⁵¹

These "Outreach and Equity" measures are intended to promote ridership from people who would otherwise not ride scooters. However, these measures lack specificity on the goals of the relationship between operators and CBOs. The guidelines only ask the operator to report to LADOT the CBO name and contact information with no other proof or documentation. Based on our interviews with CBOs, they all deemed the partnership a formality, sharing that operators would not contact them for long periods.

To remedy the outreach requirements, we propose that LADOT create and enforce new rules that promote greater partnerships between operators and CBOs. LADOT should exercise

⁵⁰ City of Los Angeles, 26

⁵¹ City of Los Angeles, 26

more oversight on operators' compliance with promoting the low-income discount program and scooter safety to people in EFMDDs. LADOT can routinely follow up with the partnering CBOs to ensure operators comply with their outreach plans. Compliance with the outreach plan should play a role in the annual contract renewal with the City.

By improving the outreach of the equity programs, more people would be aware of micromobility services. Therefore, more people would sign up for the discount program and ride the scooters. When the outreach measures are paired with the other policy options intended to increase deployment, people will see more scooters in their area and are more likely to ride them due to increased visibility.

Administrative Enhancement

The administrative features of the program refer to the annual fees, number of permitted operators, and reporting frequency by operators which are all potential policy options.

The most significant potential change in the administration of LADOT's program would be to change from an open-entry system to a closed-market system. Currently, any operator can operate in Los Angeles, provided they pay the annual and per-trip fees. Moving to a closed-market system would mean that a limited number (between one and three) of operators are awarded contracts to operate, typically through a Request for Proposals (RFP). LADOT would choose operators based on how well each RFP scores on equity, safety, and technological advancement measures.

The nature of the closed-market model is variable, and municipalities across the United States have applied them differently. Pittsburgh, for example, has entered into a contract with one operator, Spin, for an extended multi-year contract.⁵² However, violating the contract terms regarding distribution requirements, the equity program, and scooter safety allowed Pittsburgh to identify a new operator at any point during the contract. Similarly, Boulder split operations between docked and dockless mobility hubs, partnering with Lime for their dockless operations and BCycle for their docked operations.⁵³ By contrast, some cities have elected to pursue RFPs that seek two or three operators to manage micromobility demand. Portland, for example, launched an RFP for two operators to operate e-scooters in the city through 2025 with more comprehensive entry standards than their pilot.⁵⁴ Similarly, San Francisco has awarded three permits to operators for one-year terms, with optional extensions.⁵⁵ The program initially had a capacity for up to five operators, but SFMTA revised the number to three after analyzing their pilot program.

⁵² City of Pittsburgh Mobility and Infrastructure. "Move PGH Mid Pilot Report." July 2022. Accessed April 10,

[https://apps.pittsburghpa.gov/redtail/images/19169_Move_PGH_Mid_Pilot_Report_\[FINAL\]_v2.pdf](https://apps.pittsburghpa.gov/redtail/images/19169_Move_PGH_Mid_Pilot_Report_[FINAL]_v2.pdf)

⁵³ "Boulder Partnering with Lime, BCycle to Launch New Shared Micromobility Program | City of Boulder." Accessed April 13, 2023.

<https://bouldercolorado.gov/news/boulder-partnering-lime-bcycle-launch-new-shared-micromobility-program>.

⁵⁴ "Next Steps 2022-2023: Transition to a Long-Term E-Scooter Program | Portland.Gov." Accessed April 13, 2023. <https://www.portland.gov/transportation/escooterpdx/next-steps-2022-2023>.

⁵⁵ SFMTA. "Powered Scooter Share Permit Program." Text. San Francisco Municipal Transportation Agency, May 22, 2018. <https://www.sfmta.com/projects/powerd-scooter-share-permit-program>.

Reducing the number of operators or moving to a monopolized system could also involve adjustments in the permitting requirements. The annual permit fee, for example, could be increased to reflect the larger market share the company or companies would receive. The terms of the engagement with the operator could also be lengthened, and more stringent provisions could be added in tandem with the more significant market opportunity provided. LADOT can prioritize RFPs with strong outreach and equity programs, and LADOT would be able to enforce those requirements with fewer operators more easily. Additionally, LADOT could require permitted operators to join regular meetings with CBOs, facilitated by LADOT, to discuss program compliance, improvements, and enforcement.

Geographic Enhancements

The four program geographies created after the pilot program did not significantly improve deployment from the pilot program's Disadvantaged Communities classification. In the pilot program, non-Disadvantaged Communities had a 95% greater deployment volume than SFV DACs.⁵⁶ After the pilot program, operators deployed 87 vehicles per month in EFMDDs and 898 vehicles in SOZs which is about a 90% difference. LADOT's transition to more nuanced equity zones like EFMDDs did not improve deployment in LA's underserved communities.

One policy option suggested by the operators is to identify smaller areas within EFMDDs that are optimal for deployment, such as community centers, commercial zones, and pedestrian corridors. LADOT could use the same data inputs as when they initially created the EFMDD designation. However, the staff who created those geographies have since left LADOT, and the new staff does not have the documentation.

Another policy option is modeled after the 2020 Chicago Department of Transportation (CDOT) E-Scooter Pilot Program's Equity Priority Area. These areas contain residents who face high economic, health, and mobility barriers. The Equity Priority Areas covered approximately 45% of the pilot area.⁵⁷ CDOT required operators to deploy 2.5% of their fleet to 20 sub-areas (summing to 50% overall) within the Equity Priority Area. The operators complying with the deployment standards varied: Spin met 98.8% of pilot days, while Bird met the requirement of 44.7% of pilot days. Almost one-fourth of all rides from the pilot program originated or ended in the Equity Priority Area.

LADOT can follow a similar approach to CDOT to subdivide the EFMDDs and establish a 2%-3% deployment requirement per EFMDD parcel. However, we cannot identify smaller parcels within EFMDDs since LADOT no longer has the original documentation for creating EFMDDs.

⁵⁶ LADOT. Year One Snapshot, 60.

⁵⁷ City of Chicago. "2020 E-Scooter Pilot Program Evaluation." May 2021. <https://www.chicago.gov/content/dam/city/depts/cdot/Misc/EScooters/2021/2020Chicago%20E-scooter%20Evaluation%20-%20Final.pdf>

Narrowing the Policy Options

While each policy option identified has the potential to improve equitable deployment, some are more actionable and more potentially fruitful than others. By considering the feasibility and efficacy of each option, we eliminated the following three policy options: fleet size and distribution requirements, fee structure, and geographic enhancements.

Fleet Size and Distribution

The existing program has fair requirements for deployment: a minimum of 500 vehicles and 20% of the total fleet in EFMDDs. An increase in the minimum would likely not affect equitable deployment since operators can generate more revenue by deploying more vehicles, even in the presence of equity requirements. An increase in the 20% requirement would not increase deployment but would only further burden operators. If operators cannot meet the 20% standard, they will certainly not be able to meet a higher requirement apart from LADOT's enforcement. Given LADOT's limited administrative capacity to monitor and enforce the distribution requirements, fleet size and distribution requirements adjustments would not significantly increase scooter deployment in EFMDDs.

Fee Structure

Fee schedule changes have not led to significant improvements in deployment in EFMDDs though the per-trip fee is \$0 in those zones. Thus, further increasing the fees in other zones while keeping EFMDDs at \$0 would likely not impact deployment. Beyond the ineffectiveness of fee structures to encourage equitable deployment, we are limited by gaps in the literature on the price elasticity of demand for micromobility. We can provide a range of elasticity estimates by inferring from the cross-price elasticity of gas and scooters. However, we cannot accurately project the effect of price increases on scooter demand. As a result, it is not feasible for us to evaluate this policy option.

Geographic Enhancements

We considered redesigning the EFMDD zones to identify smaller zones ripe for ridership. However, the data we obtained via the CPRA request was organized at the Neighborhood Council level, which is still a relatively large geography. We cannot subdivide the neighborhoods into smaller zones since deployment and ridership are not equally distributed across the whole neighborhood. Additionally, the methods used to determine the EFMDDs are not public, and LADOT does not have institutional records. Therefore, reweighting the variables involved in EFMDD creation would require a ground-up redesign with inputs and instructions we do not have. This does not mean reconsidering zones, including the expansion of EFMDDs, is out of the scope of consideration for LADOT. LADOT can still revise its geographic definitions, which is beyond this report's scope.

The Selected Policy Options

The three remaining policy options are:

1. Administrative Enhancements, specifically reducing the total number of operating permits towards a single or 2-3 operator model.
2. Outreach, where operators are held to a higher standard of engagement with CBOs and are required to promote better and administer low-income fare programs
3. Penalty Changes, whereby operators are penalized less for MyLA311 infractions and response delays in the San Fernando Valley (SFV).

These policy options are not mutually exclusive but rather mutually beneficial through each other's application. We propose that LADOT implement all three options to improve equitable deployment.

Administrative Enhancement

We recommend that LADOT change from an open market system to a closed market system that only grants permits to one to three operators. The open system allows any operator to deploy scooters as long as they agree to the guidelines, which include administrative fees, deployment minima, and a signed partnership with a CBO. A closed system would require operators to compete via a procurement process. LADOT can then rate the applications on various equity criteria, including the quality of the proposed low-income discount programs, outreach plans to advertise the discount program, minimum distribution requirements in the equity zones, and scooter safety education. Additional criteria include past performance (including performance in other cities), sufficient labor to support operations, and scooter device requirements.⁵⁸

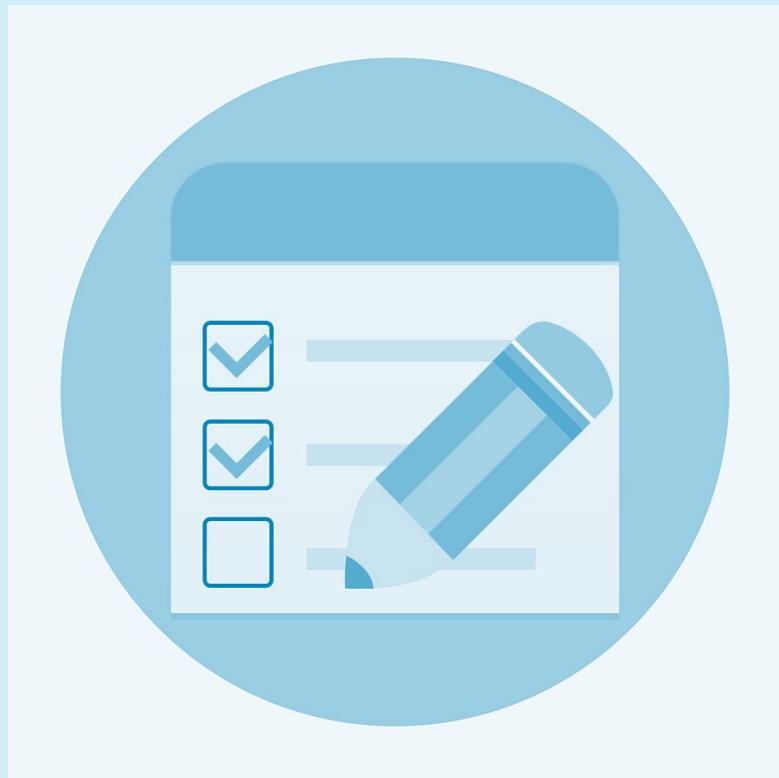
Outreach

We recommend that LADOT increase its involvement in scooter equity and outreach program development. While operators are currently required to form an outreach plan in partnership with a CBO, LADOT is not part of the creation or evaluation process. There are also no established equity metrics to assess the quality of the plans. Operators' plans should include rider education, safety training, and low-income discount advertisement. Their advertisements should include non-digital advertisements since more residents in EFMDs will likely not have internet and smartphone access. Operators should promote discount advertisements, at the very least, through the CBO's network, services, and programs. LADOT should also create procedures to monitor adherence to the outreach agreements constantly. To incentivize operator participation, LADOT should weigh the operator's compliance and success in their outreach plan during the annual renewals.

⁵⁸ We borrowed these ideas from the scoring system used by the respective DOTs (Department of Transportation) in Atlanta, Georgia, and Washington, D.C. Their scoring system can serve as a helpful guide in developing LADOT's scoring methodology. (Atlanta, Georgia: <https://www.atlantaga.gov/home/showdocument?id=50930>; Washington, D.C.: <https://dcregs.dc.gov/Common/DCMR/SectionList.aspx?SectionNumber=24-3317>)

Penalties

We recommend that LADOT ease the penalty structure for MyLA311 requests in the San Fernando Valley. Specific options include increasing the required response time for SFV 311 requests, reducing the penalty points accumulated in the SFV by a factor less than one, or reducing the monetary cost of penalties in the SFV. Any of these options would alleviate the operator's deployment burden in the Valley.



Criteria for Evaluation

Criteria for Evaluation

For each policy option, we analyzed them through the following five criteria: consequences for deployment, LADOT, operators, the public, and trip cost.

Consequences for Deployment

This criterion for vehicle deployment aims to assess how well the policy option will increase the deployment of vehicles in the EFMDDs. LADOT's main concern is equitable scooter deployment according to the 2035 Mobility Plan. The greater the increase in deployment through the policy option, the more effective the policy is in improving equity.

Consequences for LADOT

LADOT is the main administrator of the micromobility program. Therefore, we must assess the policy option based on the cost and benefits to LADOT if they implement the policy option. The anticipated costs include potentially reduced trip fee revenues and increased administrative labor to enforce new policies. Benefits for LADOT include potential increased fee revenue and reaching its shared mobility goals in the 2035 Mobility Plan. We want to minimize costs and maximize benefits for LADOT.

Consequences for Operators

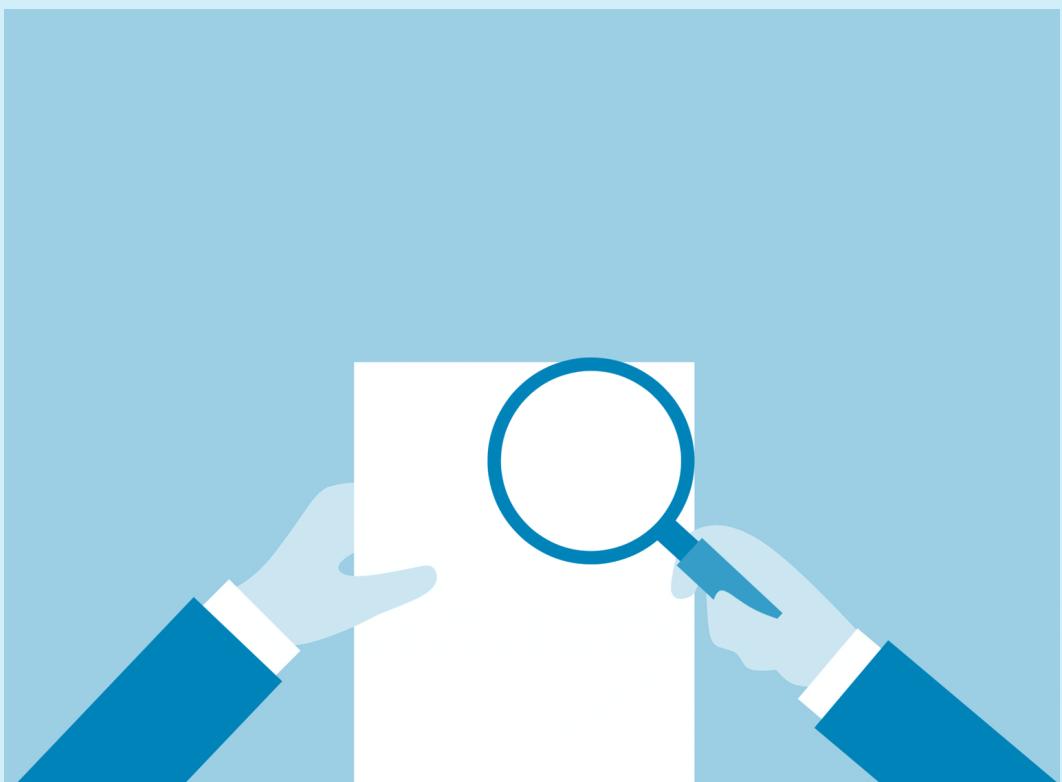
This criterion assesses the costs and benefits for operators if LADOT implements a policy option. Some costs include higher administrative fees, increased marketing and outreach costs, and greater revenue loss from new low-income discount program uptake. Benefits for the operators who do not exit Los Angeles include greater revenue from a single or limited operator system and decreased penalty fees. Decreased competition would allow operators to increase their revenue. We want to minimize costs and maximize benefits for operators.

Consequences for Public Perception

The policy proposal must consider the public's view of the safety, fairness, and reliability of micromobility. If the policy option leads the public to think that the micromobility program is safer, fair, and more reliable, then the policy option is preferred. We evaluate these criteria by reviewing our policy options against our interviews with CBOs.

Consequences for Trip Cost

The cost of micromobility services is essential when evaluating policy options for deploying vehicles. This criterion assesses what would happen to the trip cost of micromobility services if the proposed policy option is implemented. If the policy option increases trip costs, we expect ridership to drop due to the high substitutability of micromobility and other transportation modes. The policy that minimizes increased trip costs is the preferred option.



Evaluation of Policy Options

Evaluation of Policy Options

Table 11: Evaluation of Policy Options					
Policy Option	Consequences for Deployment	Consequences for LADOT	Consequences for Operators	Consequences for Public Perception	Consequences for Trip Cost
Administrative Enhancements	Deployment can be easily enforced in EFMDDs. Marginal to no decrease in deployment.	Fewer operators should entail easier program administration. Minimal to no decrease in revenue.	Only one or a few operators will benefit. Other operators will be excluded.	May not view monopolies favorably. May enjoy navigating through fewer options.	Prices increase and rise minimally to none.
Outreach	More outreach could grow latent demand. Greater demand should follow with a greater supply.	Potential uptake on ridership. More involvement by holding stakeholder meetings.	Increased costs for non-digital marketing. Potential revenue loss for more low-income rider uptake.	Acceptable to the public.	Marginal increase in prices to recover outreach costs.
Penalties	Increased deployment in the SFV.	Minimal revenue loss.	Reduced costs for operators.	May lead to a sense of unfairness.	No effect.

Administrative Enhancements

Currently, LADOT has an open entry system with no cap on the number of operators. Los Angeles is unique in its approach compared to other cities like Pittsburgh and Chicago, where they limit the number of operators to 1 to 3 and require approval via RFPs. We propose that LADOT move to an RFP process and limit the number of operators to at most 3.

Consequences for Deployment

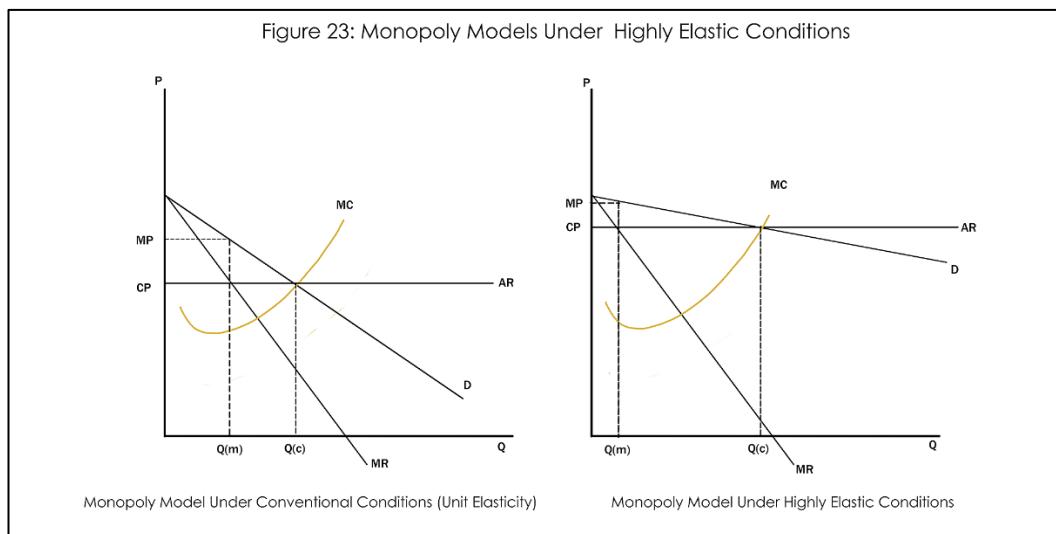
With fewer operators to oversee, LADOT would be able to enforce its equity requirements more easily. An open entry system makes it hard for LADOT to enforce deployment standards since they need to regulate deployment for eight or more operators. By contrast, cities like Chicago reduced the number of operators from 10 providers in 2019 to 3 in 2020.

In the program transition, they enforced their rebalancing requirements and achieved a 25% trip origination rate in equity zones.⁵⁹ An operator cap would likely enable LADOT to monitor deployment ratios better and enforce existing and future standards.

Also, we anticipate that a limited operator system would marginally decrease deployment but would potentially shift deployment patterns as well, as operators are forced to compete less in the highest-margin areas. A limited operator system could also be called a monopolistic model if only one operator exists. With 2 to 3 operators, the system is a duopoly. The effects of the monopoly model are diminished within the duopoly system, but for the sake of simplicity, we only compare the monopoly model with the competitive model.

Under conventional monopoly conditions, the monopoly price is significantly higher than the price in a competitive market, as depicted in the graph on the left. However, as established earlier, the scooter market is likely highly elastic. Under highly elastic conditions, the monopoly price is not much greater than the competitive price.

The monopoly price could converge on a competitive market under very elastic conditions, meaning that the change in consumer price would be small, as seen in Figure 23.⁶⁰ Since LADOT could implement a system with 2 to 3 operators, the price would be even closer to the competitive price. Since the price would nearly be the same in a monopoly and competitive setting, the quantity demanded should converge, too. Thus, we should see a small difference in deployment between a monopoly, duopoly, or competitive setting. Research suggests that a 1% contraction in scooter supply reduces demand between 1.4% and 2.2%.⁶¹



⁵⁹ City of Chicago, 5.

⁶⁰ Conventional Monopoly with Unit Elasticity (Left) vs. Highly Elastic Monopoly (Right), graphing price vs. quantity (P, Q). Marginal Revenue (MR), Demand (D), Marginal Cost (MC), and Average Revenue (AR). As demand becomes more elastic, the monopoly price (MP) converges on the CP, or competitive price. CP is equivalent to the firm's average revenue. The difference between the Monopoly Price (MP) and Competitive Price (CP) becomes smaller.

⁶¹ Reck, Daniel J., He Haitao, Sergio Guidon, and Kay W. Axhausen. "Explaining Shared Micromobility Usage, Competition and Mode Choice by Modelling Empirical Data from Zurich, Switzerland." *Transportation Research Part C: Emerging Technologies* 124 (March 1, 2021): 102947. <https://doi.org/10.1016/j.trc.2020.102947>.

Consequences for LADOT

The immediate consequences of a limited operator model are increased administrative burden in overseeing the program and minimal to no decrease in fee revenue since scooter demand marginally decreases.

Shifting towards a limited operator system would shift organizational focus towards monitoring and cooperation and away from contract maintenance. The data pipeline required for monitoring under a system with limited operators would become smaller since there are fewer operators to track. A single dashboard would provide a sufficient overview of the entire system. Thus, deployment imbalances can be addressed immediately. Additionally, a competitive RFP process allows LADOT to select operators with a robust equitable deployment record. This competition would drive operators to draft their best plan for the initial RFP, and operators would likely work diligently to meet the distribution requirements since there is always the possibility of not being renewed.

As for the financial consequences for LADOT under a limited operator system, exact projections require better data. However, our economic analysis suggests that a limited operator system would marginally decrease trip demand or not decrease it at all. As a result, per-trip fee revenues would marginally decrease or none at all. If there were to be any slight trip drops, the proposed fee increases suggested by LADOT in November 2022 could recover the lost revenue with the increased revenue from trips not ending in an EFMDD.

Consequences for Operators

While moving to a limited operator model would mean the exit of certain operators from the market, interviews with operators in the Los Angeles region indicated that they favored a competitive RFP process where only a few operators are granted permits. From one operator: *"The dockless program in Los Angeles allows unlimited competitors. I think that that's probably the biggest issue with the program right now."* From another: *"The [micromobility] program can improve by reducing the number of operators. No question."* Operators prefer the stability of longer-term contracts with the City and are familiar with the requirements of competitive RFP processes.

It is also important to consider the underlying direction of the micromobility industry, which is trending toward consolidation. Several companies, including Spin and Lyft, have exited the Los Angeles market and have significantly reduced operations elsewhere. The competitive market in LA has forced out two large operators already. On a national scale, Bird's current operations are subject to ongoing concern. Only Lime has claimed its first year of profitability. Overall, micromobility seems to be trending toward fewer operators nationwide. As a result, operators prefer a limited operator model so that the competition is not as strong. In return, they would be able to capture a larger share of the market.

Consequences for Public Perception

Consumers are generally wary of monopolies in both the private and public sectors.⁶² The

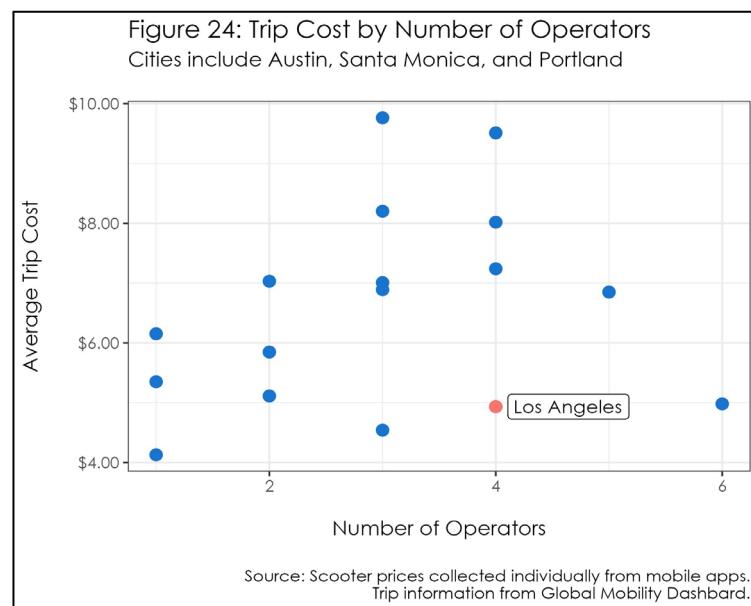
⁶² Dayen, David. "Attacking Monopoly Power Can Be Stunningly Good Politics, Survey Finds." The Intercept, November 28, 2018. <https://theintercept.com/2018/11/28/monopoly-power-corporate-concentration/>.

public also has mixed attitudes about public-private partnerships.⁶³ However, whether consumers know about the unlimited e-scooter options is unclear. If they only see a few scooter companies regularly, they will still see only a few companies when the limited operator system is implemented. For this reason, they may not be as concerned about a limited operator system. Also, from a user experience, users can find it cumbersome to navigate many different apps and payment systems to use micromobility. There would also be fewer operators applying for the low-income program. The ease of using micromobility service may offset concerns about monopolization.

Consequences for Trip Costs

The stated purpose of the open entry system in Los Angeles is to introduce market dynamics that keep prices low and supply abundant. However, our economic analysis has shown that the monopoly price approaches the competitive price under highly elastic demand conditions. Trips will not be significantly higher.

In addition to the economic model, we evaluated average trip costs and the number of operators by city. Figure 24 shows no apparent relationship between the average trip price and the number of competing entities. This is likely because scooters are an expensive alternative to walking, driving, and public transit. A scooter ride in Los Angeles costs \$4.93 to travel just under a mile. The average fuel cost in LA in an automobile is roughly \$0.15 per mile, and the fixed cost of public transit in LA is \$1.75. The relatively high prices of scooter rides are products of the underlying economics. Most companies are not profitable and have persistently high charging and depreciation costs they make up for in trip fares.



Additionally, while precise estimates are not available, data from the cross-price elasticity of e-scooter demand with gasoline (a measure of the change in scooter trips given a change in

⁶³ Boyer, Eric J., and David M. Van Slyke. "Citizen Attitudes Towards Public-Private Partnerships | Request PDF," April 2018.

https://www.researchgate.net/publication/324484916_Citizen_Attitudes_Towards_Public-Private_Partnerships.

gasoline prices) suggests an elasticity between 1.0 and 2.0 which is highly elastic.⁶⁴ The primary driver of consumer prices is, therefore, likely not competition from other operators but intermodal competition and the underlying economics of the service. It seems unlikely, given these dynamics, that a move to a monopoly service would result in a significant change in consumer prices since operators would continue to compete with cars, transit, and walking.

Outreach

For this policy option, we recommend that LADOT closely oversee the operators' outreach program. Operators must have a robust partnership with an LADOT-approved CBO for each permit year beyond signing an agreement. At the very least, operators should promote their low-income programs through the CBO's network, events, and clients. Operators must also provide public education events on scooter safety and discount programs and must have options for those without smartphones or access to banks.

Consequences for Deployment

Through the strengthened outreach requirements, more people in EFMDDs will hear about the discount programs, sign up, and ride the scooters. With increased demand, operators will respond with increased deployment. Greater deployment is a secondary benefit of improved outreach since the first order of impact is on ridership. Nonetheless, deployment will improve as a result of tapping into the latent demand. One CBO shared with us that it is easy and incorrect to think that since there is no ridership, there is no demand, and thus people in EFMDDs may not want scooters. This framework incorrectly assumes that not using a good equates with not wanting a good. Rather, the CBO reframed the discussion: there is latent demand, and operators have not tapped it. If operators deploy more scooters and people hear more about the discount program, they will ride them because they see the scooters and have the discounts.

Consequences for LADOT

Strengthened outreach requirements entail that LADOT actively oversees the outreach programs. LADOT needs to establish a more significant presence within the CBO and operator partnership so that operators would follow through with their outreach proposals. In our interviews, the CBOs mentioned the absence of oversight from LADOT in guiding the dynamic between CBOs and operators. CBOs wanted to know how LADOT verified the relationship status and if LADOT was checking operators on their outreach plans to increase low-income program enrollees. LADOT confirmed that they only check that the relationship exists. The lack of administration leads to disjointed outreach efforts and fluctuating relationships. For instance, in one of our interviews, a CBO indicated that they would not renew the partnership with the operator due to the lack of communication by the scooter company.

The program would likely benefit from LADOT increasing its involvement in administering CBO partnerships and equity goals by hosting roundtable stakeholder meetings. In these meetings, LADOT can bring CBOs and operators together to discuss improvements to

⁶⁴ Pan He, Zhenpeng Zou, Yongping Zhang, and Giovanni Baiocchi, "Boosting the eco-friendly sharing economy: the effect of gasoline prices on bikeshare ridership in three U.S. metropolises", April 2020. <https://iopscience.iop.org/article/10.1088/1748-9326/abbb52/pdf>

LADOT's and operator's equity and outreach goals. Greater involvement from LADOT in enforcing the outreach program would lead to greater progress in reaching the deployment equity goals for the same reason stated in the previous section on Consequences for Deployment. However, LADOT would need to bear the administrative costs of enforcing these policies. Nonetheless, CBOs and people in EFMDDs benefit immensely from explicit expectations and improved outreach requirements.

Consequences for Operators

If stronger outreach requirements were enforced, costs would outweigh the benefits to the operators because they would need to bear the costs of non-digital advertising and greater low-income program uptake. In low-income areas in the City of Los Angeles, like Pacoima and South LA, the number of homes with internet and smartphone access has not been keeping pace with other areas across the city.⁶⁵ More importantly, 19% of households in Los Angeles County lack internet connection or smartphones.⁶⁶ Our interview with Bike LA noted the tendency of operators to conduct digital advertising of their scooters in low-income areas. Low access to the internet and smartphones in these areas diminishes the effectiveness of the operators' marketing campaigns. Another technological barrier that Change Lives indicated is that residents do not have adequate technology (government-issued phones cannot scan QR codes) to unlock the dockless vehicles. Even though it is a requirement for operators to have alternative options for unlocking scooters, awareness of non-smartphone and unbanked options is relatively low.

To mitigate technological barriers and increase the visibility of the low-income discount program, operators should conduct more non-digital outreach, such as door-to-door knocking, mailers, and market presence. Operators establishing their presence in the community through events or flyers on people's doors may increase participation in the low-income discount programs and awareness of options to unlock scooters for unbanked or non-smartphone users. An uptake in low-income ridership would mean revenue losses for the operator since LADOT does not subsidize the discounts. Furthermore, the proposed examples of intentional outreach methods may increase costs for the operators. The operators can reduce costs for intentional outreach in EFMDD zones by using their CBO partner's existing network of distributing information to residents.

Consequences for Public Perception

The public will likely view more intentional outreach and increased presence from the operators and LADOT as favorable. After being exposed to the scooter companies' discount programs and education events, residents may have a more positive attitude towards riding and having scooters in their communities. In turn, they would be more likely to incorporate scooter rides into their option for transportation modes.

⁶⁵ City of Los Angeles, "Smart LA 2028: Technology for a Better Los Angeles." December 2020. <https://ita.lacity.gov/sites/g/files/wph1626/files/2021-05/SmartLA2028%20-%20Smart%20City%20Strategy.pdf>

⁶⁶ Mackovich-Rodriguez, Ron. "California Surpasses 90% Internet Access, Low-Income Homes Still Lacking." USC News, March 30, 2021. <https://news.usc.edu/183952/california-internet-access-usc-survey-broadband-connectivity/>.

Consequences for Trip Cost

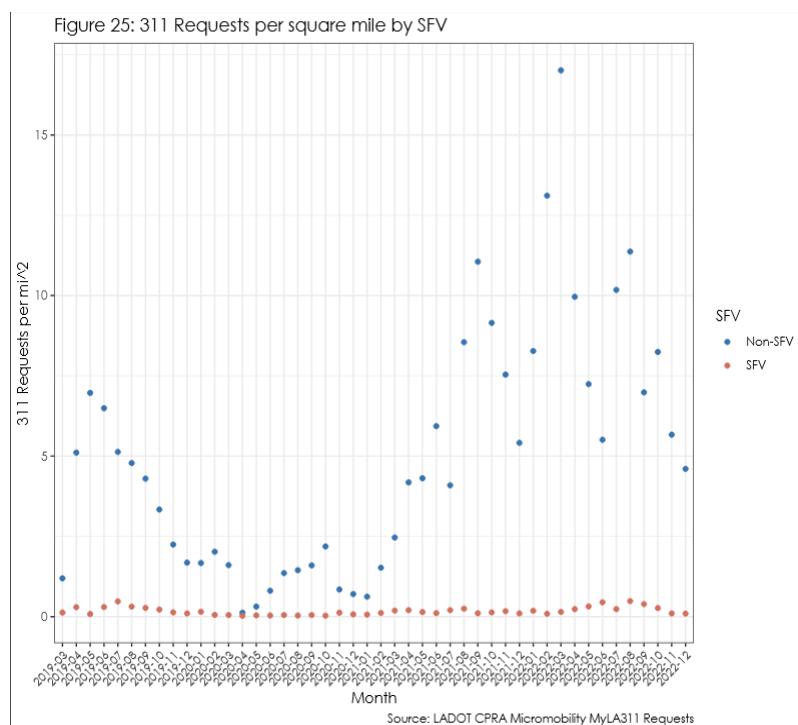
If LADOT and the operators implement this policy option, we expect prices to increase marginally. LADOT might need to increase the per-trip fees to cover the administration costs for enhanced oversight of partnerships and reaching equity goals. Similarly, operators might raise their rates to meet the increased outreach costs.

Penalties

This policy option aims to alleviate the burden of addressing 311 requests in the SFV. The policy should encourage operators to deploy more scooters in the Valley. In terms of the five criteria, we estimate that the gains in deployment and subsequent trips will offset the decreases in penalty revenue.

Consequences for Deployment

Operators are hesitant to deploy in the SFV because of the difficulty in servicing requests in a sprawling area. Based on 311 requests, the number of requests per trip does not differ significantly between SFV and non-SFV areas (see Figures 8 and 16), which means that 311 requests and trip counts are tracked closely. Deployment continued to lag in the SFV and never reached the peak in the pilot program (see Appendix Figure 3). This suggests that modifying the penalty schedule would not result in significant losses in revenues (at present, the mean value of penalties per square mile in SFV NCs is near 0) but may induce deployment. Examining the evolution of penalty differentials between SFV and non-SFV NCs is also illustrative. Over time, penalties per square mile continued to rise in non-SFV NCs while falling in SFV NCs, mirroring the change in deployment ratios between SFV NCs and non-SFV NCs. This suggests adaptive behavior from the operators deploying less after facing penalties in the relatively harder-to-service SFV. Interviews with operators reaffirm this, and most operators expressed willingness to deploy under lighter penalty conditions.



Consequences for LADOT

As a result of pursuing differential penalty structures for the SFV, LADOT may lose penalty revenue. However, the data suggest that most penalties arise in non-SFV areas, so losses from the switch would be minimal. Ideally, the revenue loss would be either small or fully offset by the increase in SFV deployment, although additional considerations should be made for the administrative burden of creating and enforcing these modified guidelines.

Consequences for Operators

Operators benefit from this policy, but only insofar as they increase SFV deployment. They would have more time to address 311 complaints and thus not accrue violations as quickly. This represents a direct windfall to operators and an effective SFV-specific subsidy. Given the competition for riders in more popular zones like SOZs, frameworks like this one might encourage experimentation and market-building in the SFV by operators.

Consequences for Public Perception

Our proposed penalty fee schedule mainly targets the SFV. There is a risk that the SFV residents may view these changes as unfavorable and unfair because LADOT is condoning operators for not complying with the rules that should ensure the safety of the users and abate the nuisances of improperly parked scooters. Given the relative obscurity of the penalty schedule within the micromobility program and the program's nascent in the public consciousness, we believe this revision would not provoke strong public disapproval. Nevertheless, LADOT should engage with the impacted communities to assess the potential public response.

Consequences for Trip Cost

This policy may not affect the trip cost. The reduction in fines would lead to increased profits for the operators, meaning consumer prices would remain stable. However, these SFV penalty fees likely represent a small share of the total operations cost, so consumer prices will likely not change under this assumption. Therefore, it is unlikely that this policy option would significantly change the consumer's trip cost.

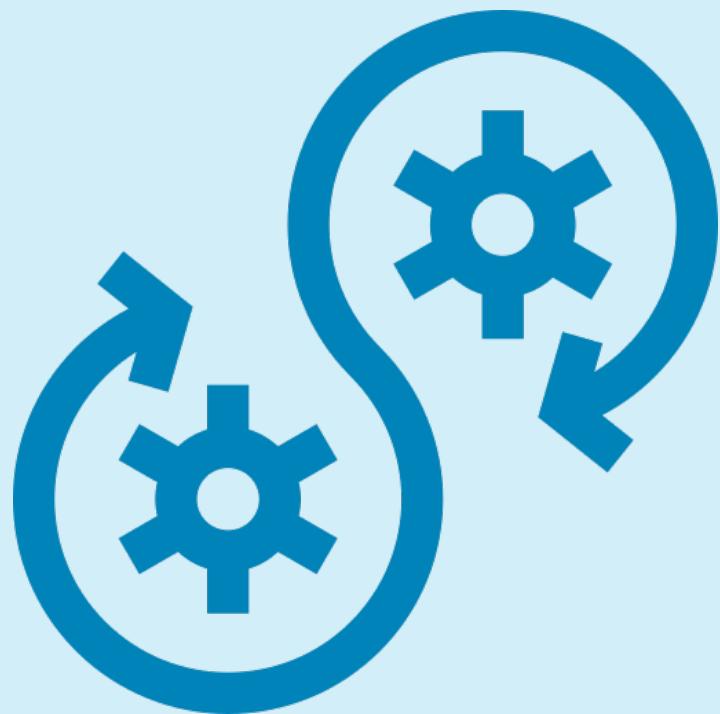
Recommendations

While all policy options present opportunities for greater equity in EFMDDs, they have dimensions that are enhanced by introducing other options. Some require new institutional frameworks and understandings that would be enabled by enacting other policy options. For this reason, this report proposes an “order” of implementation that would maximize each policy option’s effectiveness:

1. Switch to a limited operator system.
2. Enforce and strengthen the operators’ outreach requirements.
3. Modifying the penalty schedule to decrease penalties in the SFV.

A limited operator program via a competitive bidding process would permit LADOT to delineate more specific goals for the overall program. It also would provide greater leverage in enforcing and monitoring the program since LADOT could revoke the permit at any time. In our interview with representatives from Pittsburgh, PA, the City’s DOT implemented a single-operator system and reported more frequent meetings with the operator, more community presence and outreach, and more responsiveness to rebalancing and deployment concerns. If LADOT were to implement the single or limited operator model, they would likewise be able to monitor and enforce the program more closely.

While improvements to the outreach requirements and modifications to the 311 system would likely incentivize deployment in EFMDDs and the SFV, their impact would be weakened unless LADOT moves forward with the limited operator model. Both operators and CBOs suggested that a system overhaul, rather than incremental tweaks, would be the best solution to low deployment. Under a limited operator model, LADOT can enforce the outreach requirements more easily by requesting regular reports of its outreach efforts. As for the penalty structure, LADOT would have a direct channel with operators to discuss penalty violations and how to reduce penalties overall.



Opportunities For Further Study

Opportunities for Further Study

This report has several limitations. First, the response rate from operators and CBOs was mixed, and for those that did respond, time constraints meant less follow-up and pursuit of related stakeholders. While those interviewed represent the community involved in micromobility in Los Angeles, greater community engagement could help refine the specifics of the policy options.

Secondly, data limitations, such as missing or incomplete data, inaccuracies, and data that are anonymized/averaged to protect user privacy, may affect the study's validity. For example, it would be helpful to obtain user trip and price data to estimate the price elasticity of demand for scooter trips. However, we could not obtain that information since operators needed to protect user privacy.

Additionally, our case studies are limited because what worked in one location does not necessarily work in the other. We cannot assume all other factors are the same except for the micromobility policies. For example, Pittsburgh and Los Angeles' demographics vary significantly. The COVID-19 policies were extremely different in both cities, which would affect the post-COVID micromobility recovery. It is difficult to say that Pittsburgh and LA were the same in everything except for its micromobility program. Similarly, the study's generalizability is limited to the City of Los Angeles and is not necessarily applicable to other cities or regions with different policies or stakeholders.

Finally, we explored redesigning LADOT EFMDD zones to reflect potential mobility hubs in the EFMDDs. But the lack of public records on the methodology and the insufficient granular operator data prevented us from pursuing this policy option. LADOT can still revise its geographic definitions but must reconstruct the zones from scratch.

This report presents several opportunities for further research on micromobility programs and partnerships. Future studies could address the limitations identified in the report:

- Increasing the pool of operators and CBOs surveyed
- Scooter price studies
- Obtain point level scooter data

By conducting further research in these areas, policymakers, researchers, and industry professionals in sustainable transportation can advance the understanding of micromobility programs to enhance its effectiveness and equity.



Conclusion

Conclusion

Adapting micromobility, a developing and market-oriented transit system, to the needs of all Angelenos is challenging. Most public transit systems rely on significant public subsidies to ensure broad and equitable reach. Ultimately, as some operators leave the City and others face financial headwinds, a window is opening for a roadmap for the future. Many cities are using the industry's consolidation as an opportunity to create sturdier and longer partnerships requiring more significant buy-in than LADOT currently requires. This is reflected in all recommendations within this report. To achieve LADOT 2035 Mobility Plan goals, shared vehicle deployment, and use must increase significantly in underserved neighborhoods. Doing so requires buy-in from private micromobility operators who have no direct subsidy for equitable deployment but rely on trips in demand-rich zones to recover the costs of deploying in less profitable neighborhoods.

Our recommendations are the product of several months of research and interviews with all stakeholders in the micromobility program. Conversations with operators and community organizations reflected both frustration and optimism for the program. While ridership is dominant in demand-rich zones, many see a path to viability for areas traditionally underserved by transportation and technology. Additionally, the proposed reforms would benefit riders beyond the targeted zones. Low-income riders in all neighborhoods will still benefit from improved outreach programs. And those visiting the underserved zones will have more mobility options and potentially shift away from other modes. And lastly, issues from the unbridled competition - the oversaturation of scooters along roadways and a complicated set of apps to navigate for riders - will be mitigated by creating long-term partnerships with a few operators.

The proposed reforms require communication with all stakeholders, from operators to community organizations to neighborhoods, to better understand any risks to adoption and any prudent modifications. But the City's micromobility program has historically evolved successfully in tandem with the industry, and we hope this report helps provide a clear path forward.



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Appendix

Appendix

Appendix A: Detailed Process for the Quantitative Analysis

An essential piece of this analysis is the origin-destination trip count of all scooter rides in the City of Los Angeles from 2019 to 2022. The trip counts allow us to observe ridership trends dating back to the pilot program, where LADOT had different pricing and zonal policies. On October 24, 2022, we requested the origin-destination trip count from LADOT via a CPRA. Our team received the data on November 10, 2022, from the LADOT For-Hire Policy and Enforcement Division. The data in Microsoft Excel contains the origin-destination trip and average scooter deployment count by Los Angeles Neighborhood Council from January 2019 through September 2022. Likewise, we received .GeoJSON files for dockless vehicle deployment zones like SOZ and EFMDD. Before modifying the workbooks, we generated summary statistics on deployment patterns. Our team pivoted the data from wide to long-form, appending all workbooks by including a monthly column and deployment zones for each possible origin-destination pairing of Neighborhood Councils. After conducting these changes to the original data, our summary statistics still matched.

Next, we used LA GeoHub's API to acquire the Neighborhood Council GeoJSON files that reflect the name updates of these councils. We adjusted the names of the Neighborhood Councils in the CPRA data and the GeoHub files to reflect the naming conventions on GeoHub. All tables and outputs are in our team's GitHub repository, where we delineate the steps to transform the data. The Excel workbooks and R datasets allowed our team to develop maps illustrating deployment and ridership trends in the Neighborhood Councils on ArcGIS.

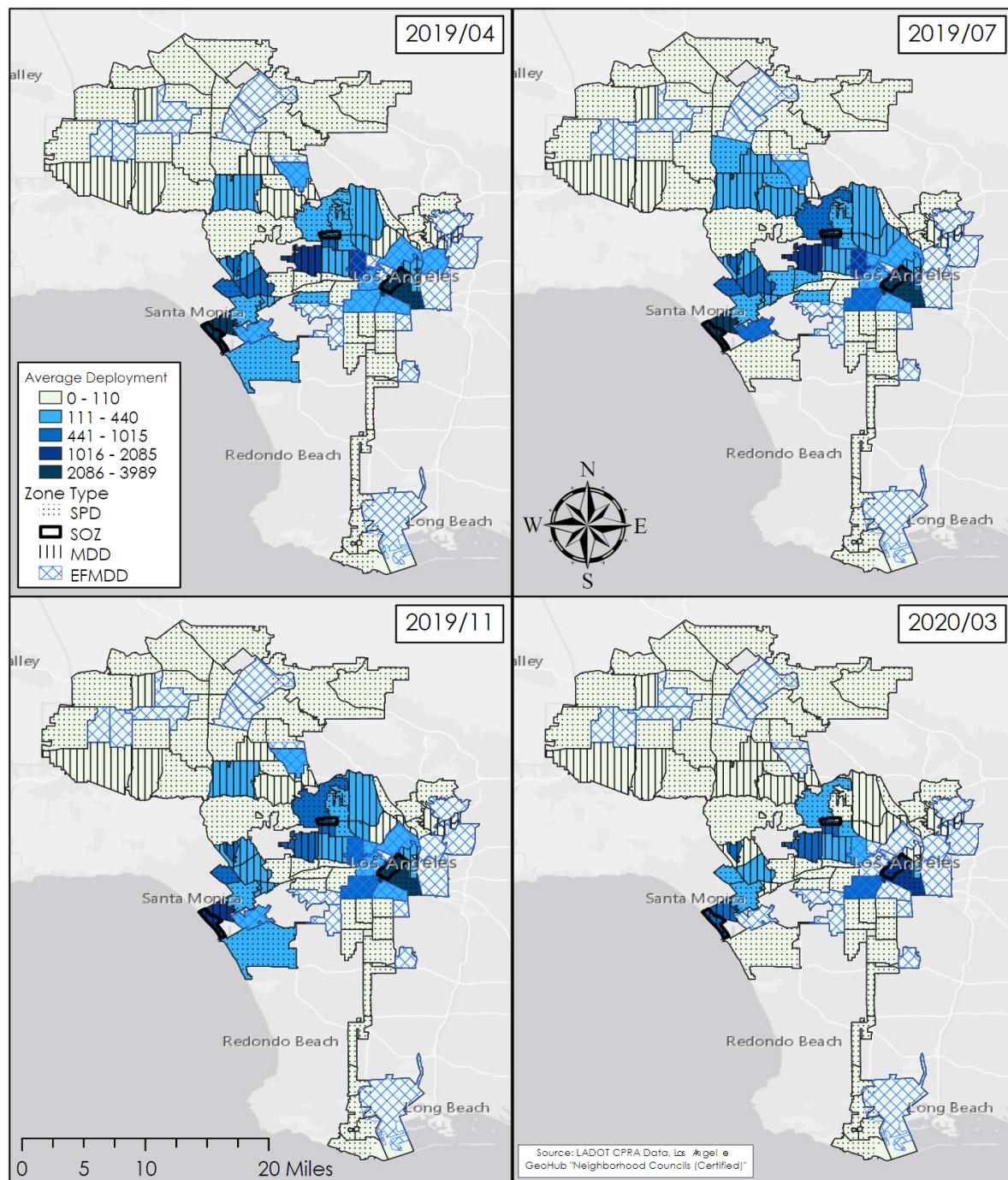
On another note, we used a GitHub repository (<https://github.com/kaye2929/APP>) that uses a function on R called R Shiny to gather dockless vehicle deployment API in the City of Los Angeles. The only operators with a valid API were Bird and Wheels. We collected the location for each scooter which then we used the point location to identify which Neighborhood Council it was in. The API scrape collected data every hour of both companies from January 16, 2023, through February 18, 2023. This dataset complements our origin-destination trip data from LADOT to observe the most prominent streets or areas for deployment.

Additionally, we stored the original files from the API scrape in our team's GitHub repository.

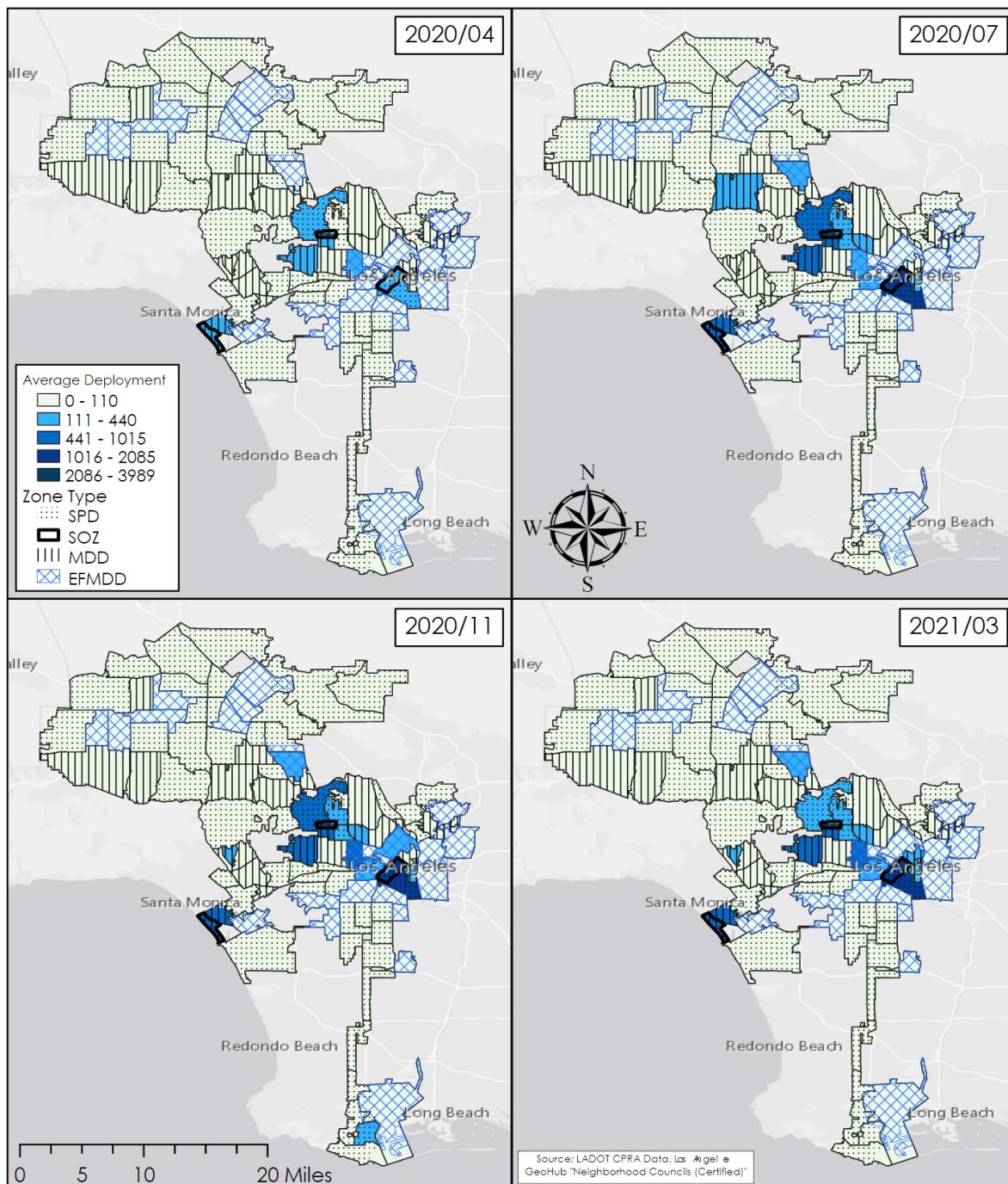
On March 2, 2023, we received MyLA311 requests in Microsoft Excel format, including the date, location (Neighborhood Council), and type of complaint from LADOT. For our last analysis, we used MyLA311 requests to identify the most common complaints and spatial distribution of the service requests.

Appendix B: Relevant Maps

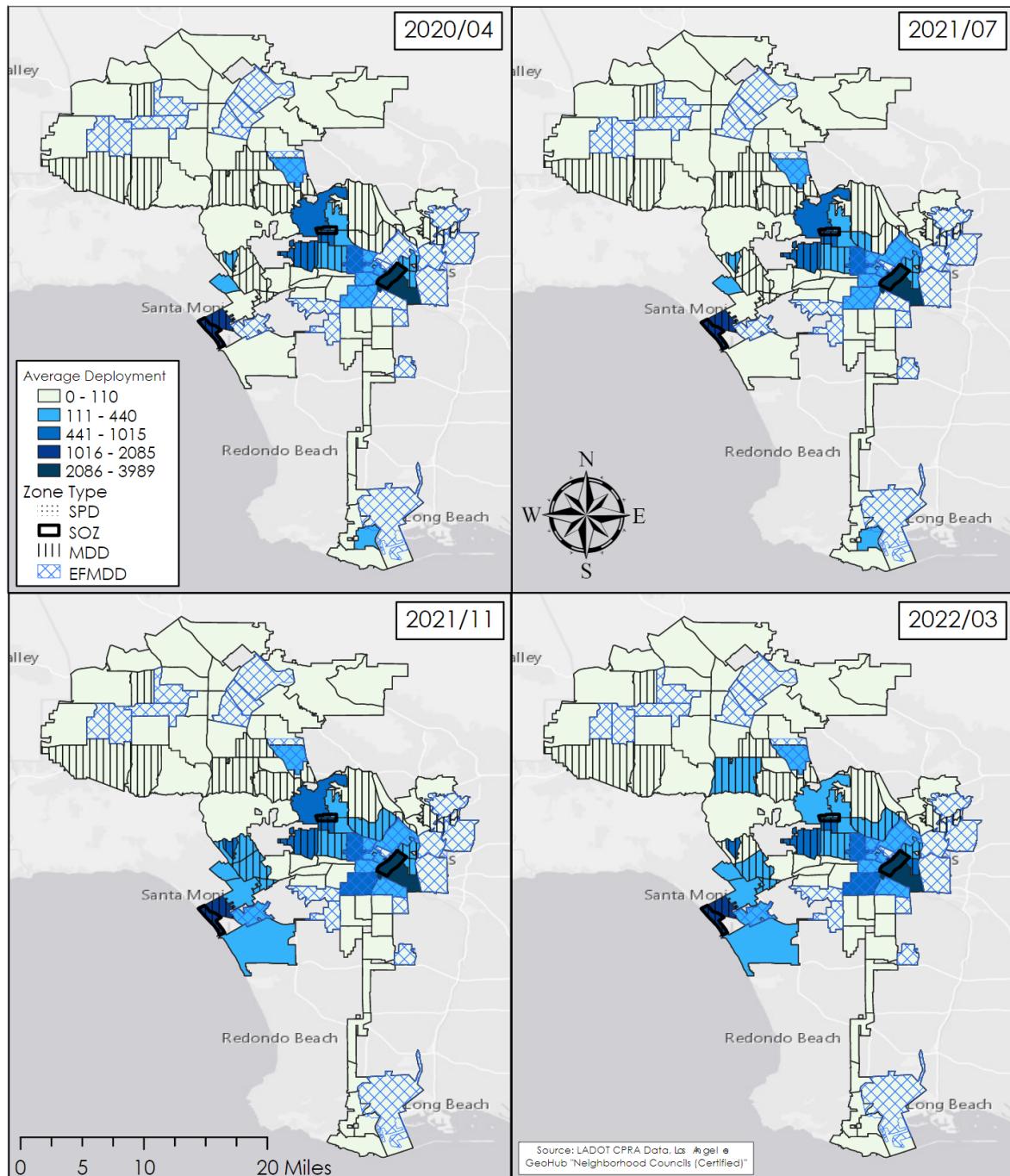
Appendix Map 1: Average Deployment per Neighborhood Council During Pilot Program



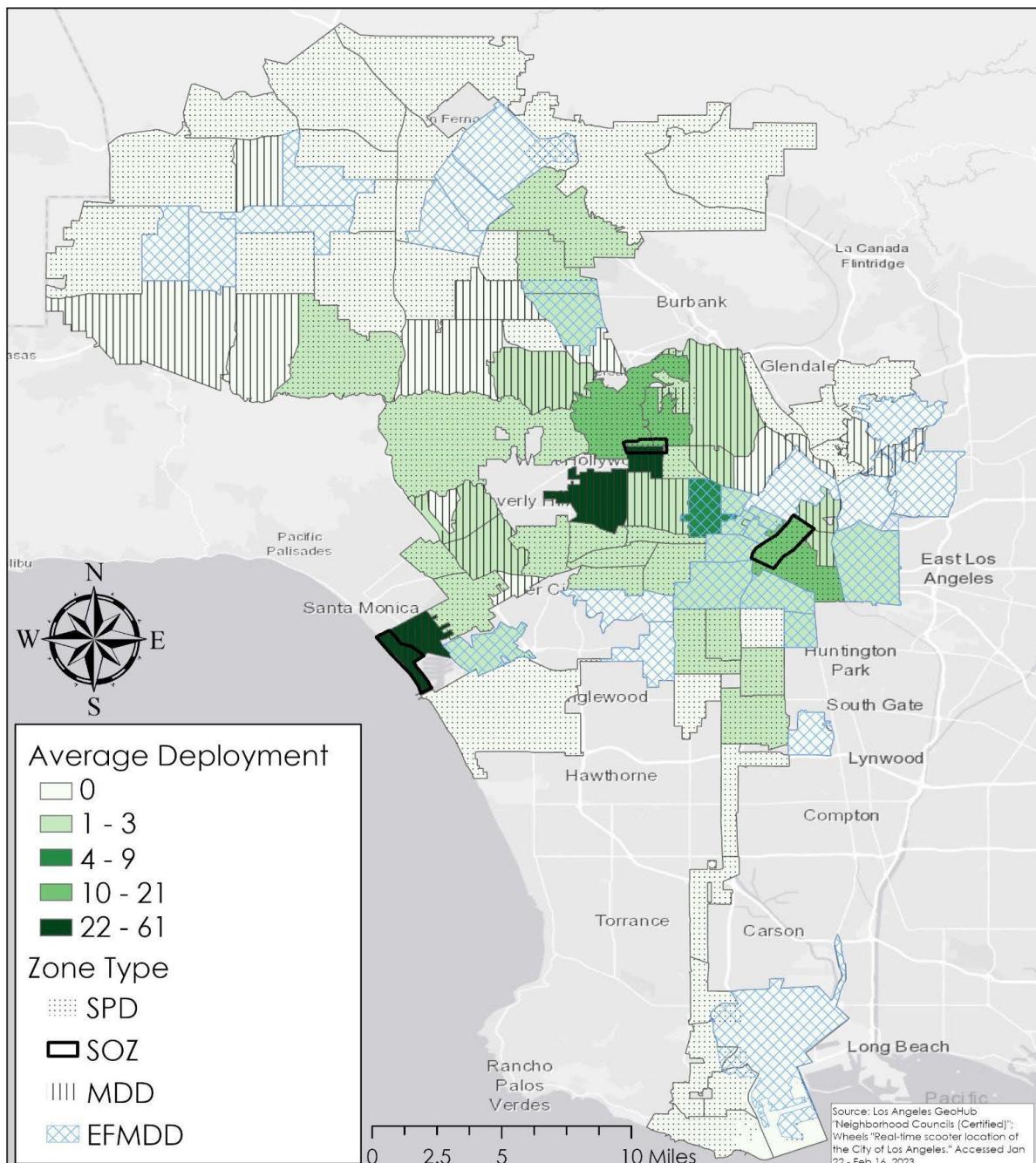
Appendix Map 2: Average Deployment per Neighborhood Council After Pilot Program



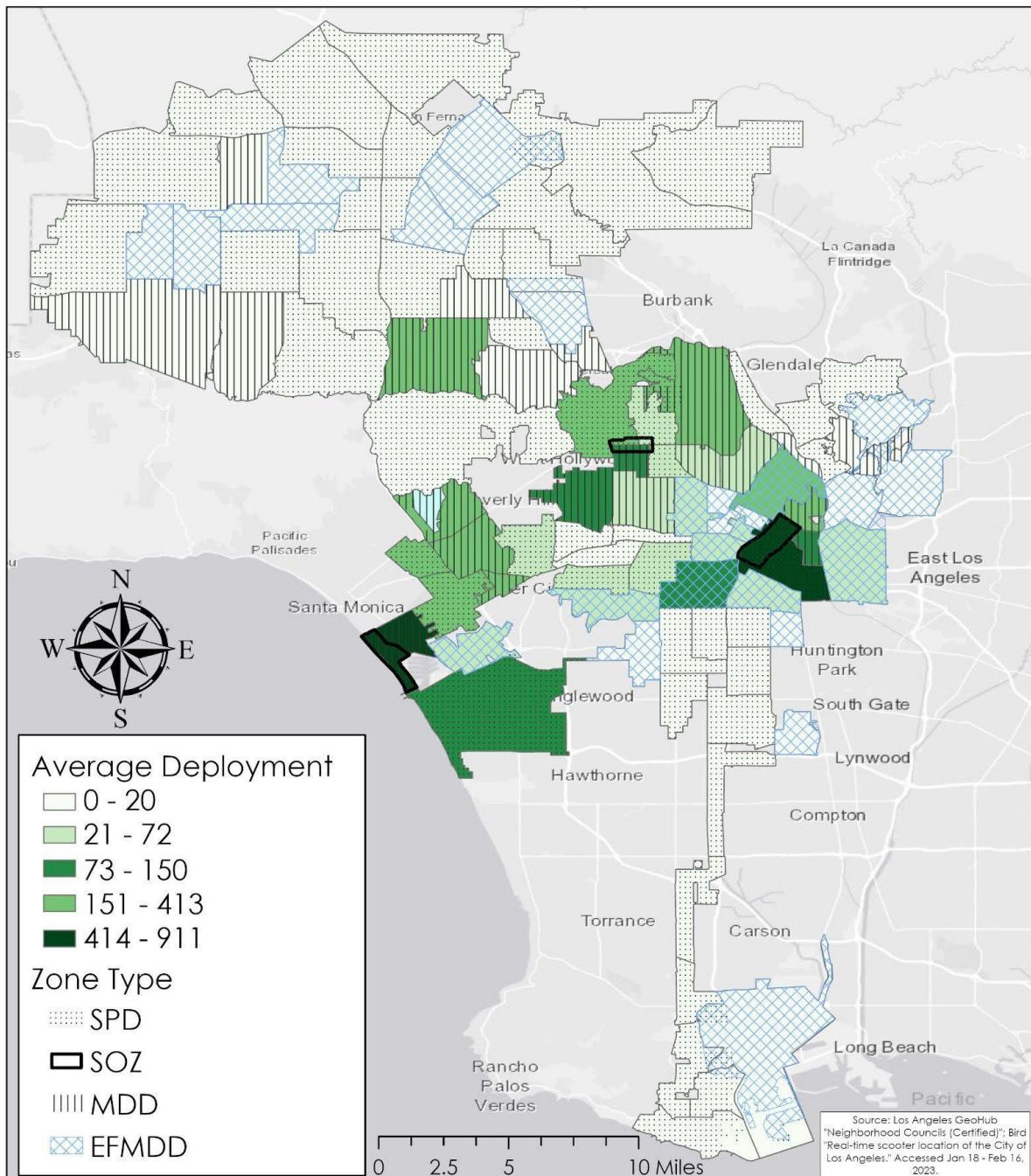
Appendix Map 2: Average Deployment per Neighborhood Council After Pilot Program (cont)



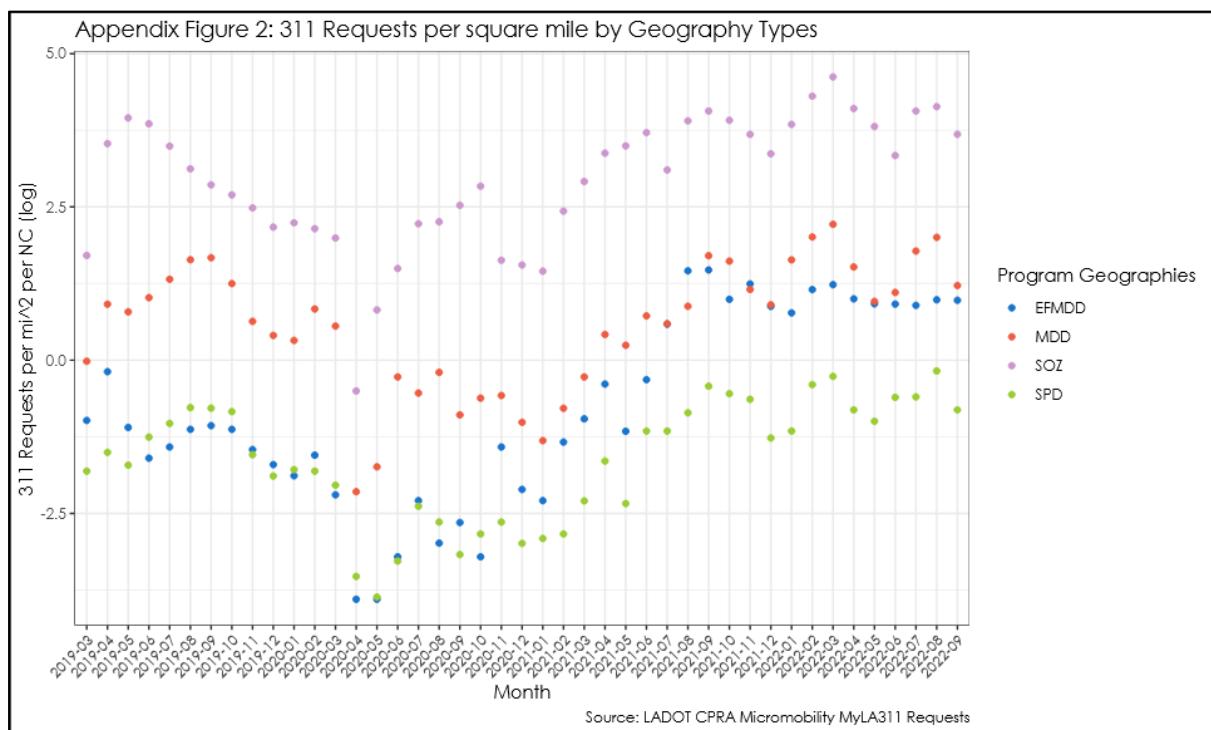
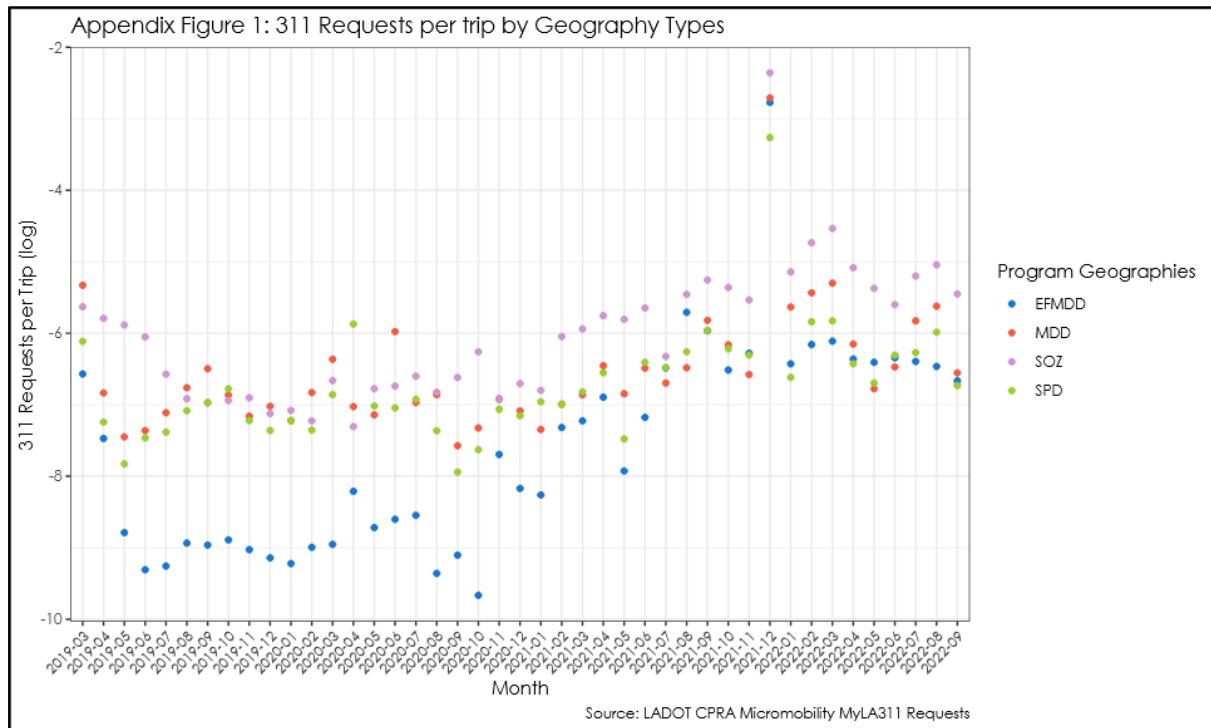
Appendix Map 3: Average Deployment of Wheels Vehicles per Neighborhood Council from Jan. 16, 2023 to Feb. 18, 2023

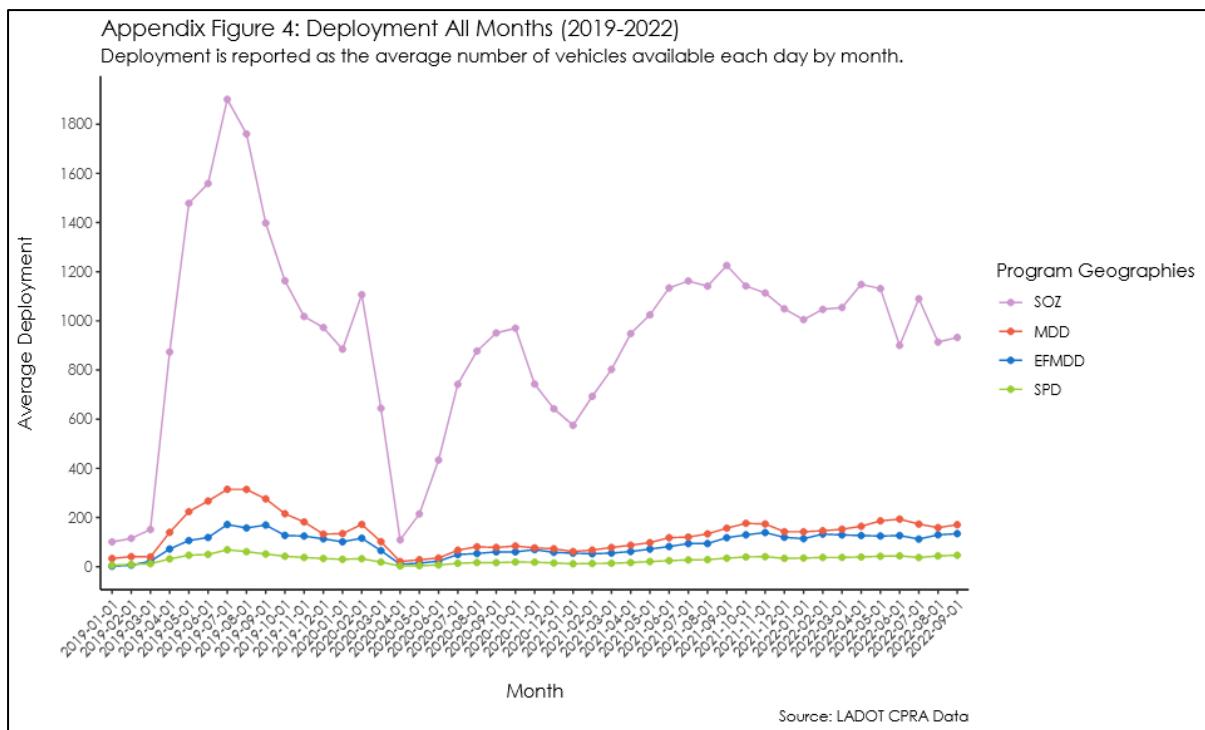
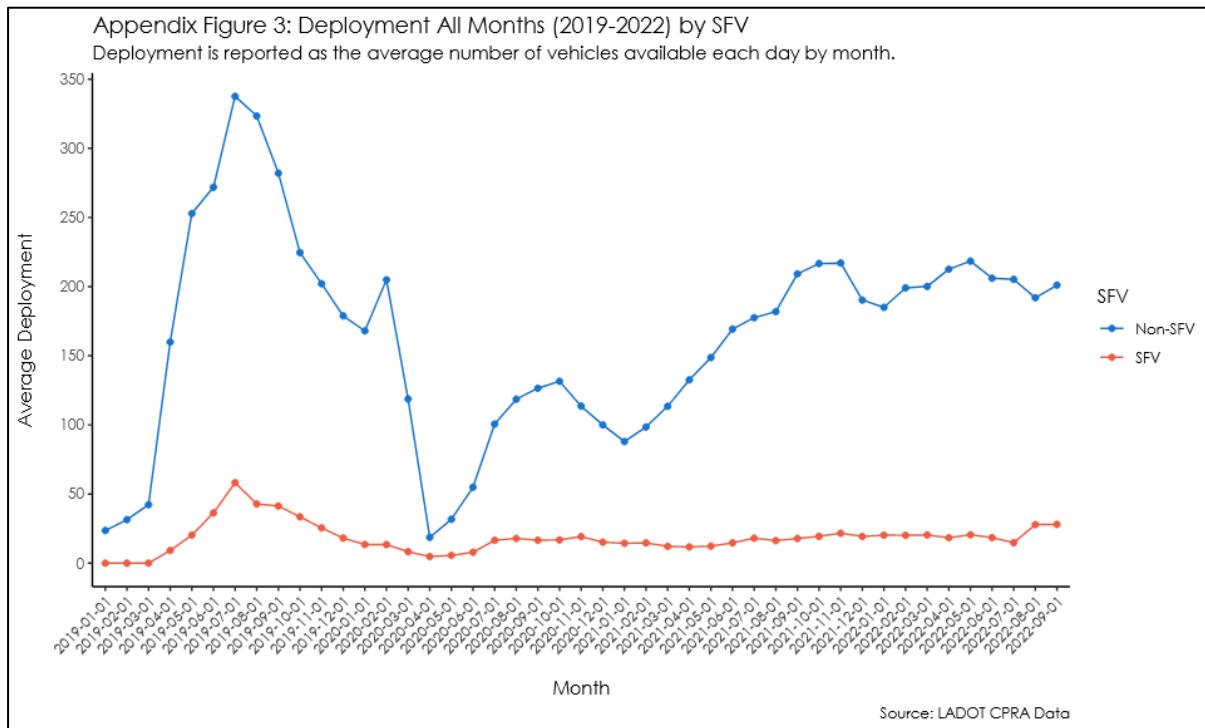


Appendix Map 4: Average Deployment of Bird Vehicles per Neighborhood Council from Jan. 16, 2023 to Feb. 18, 2023

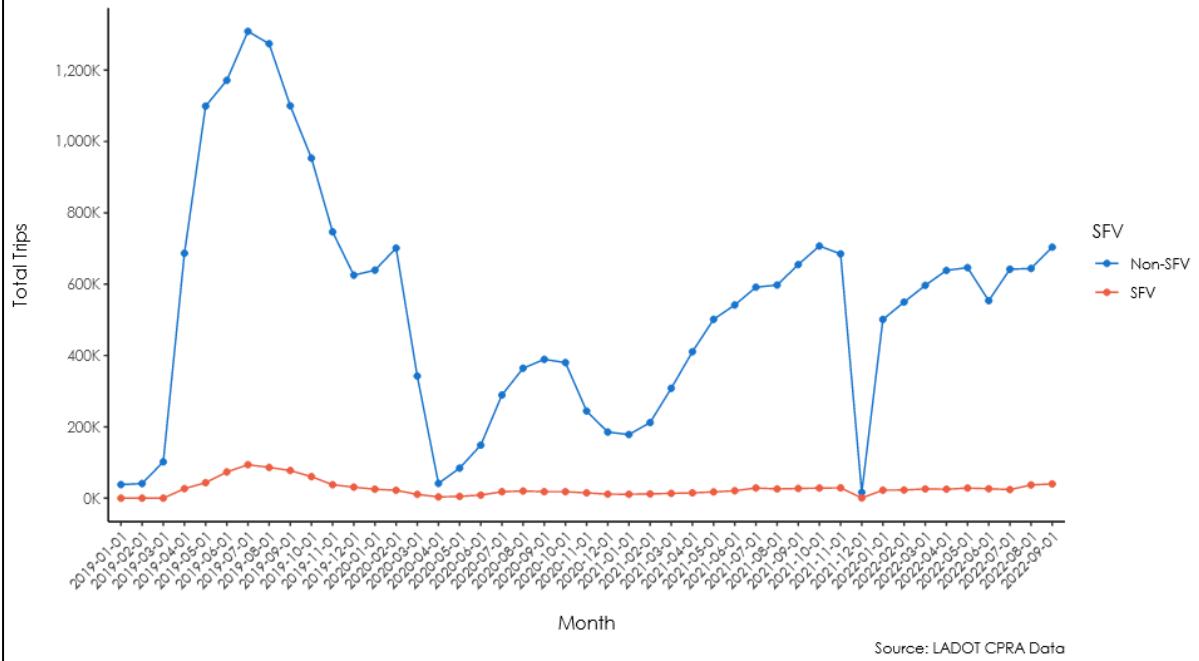


Appendix C: Relevant Figures

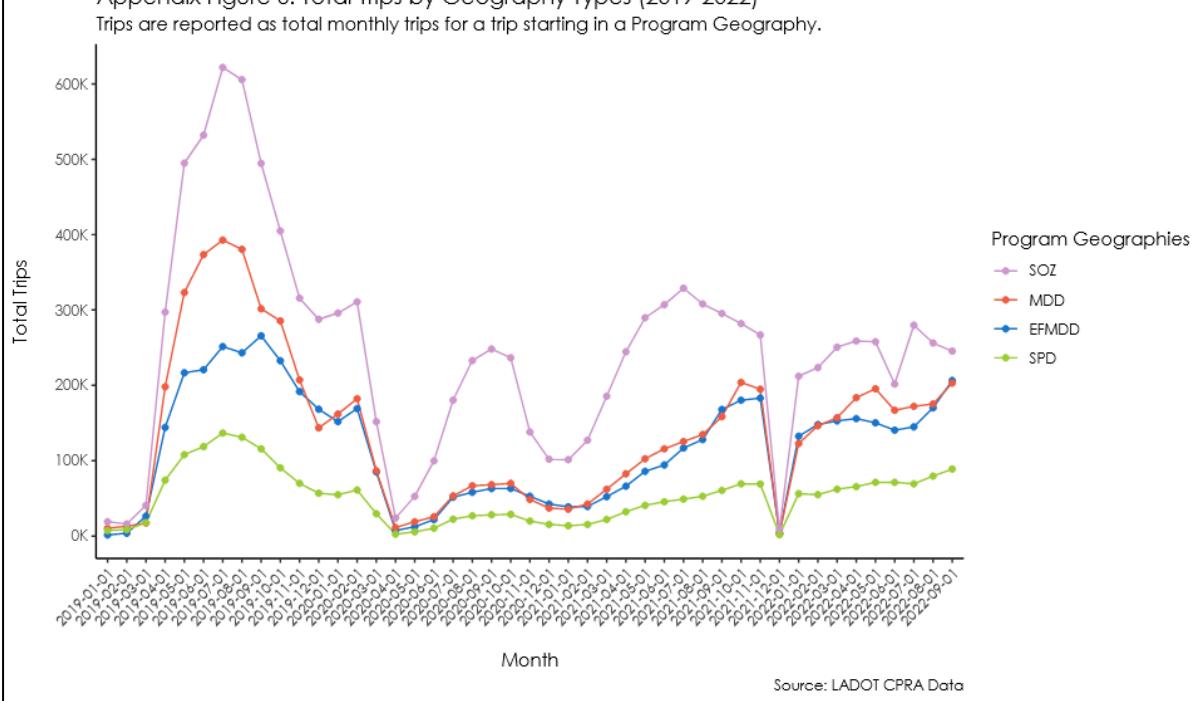




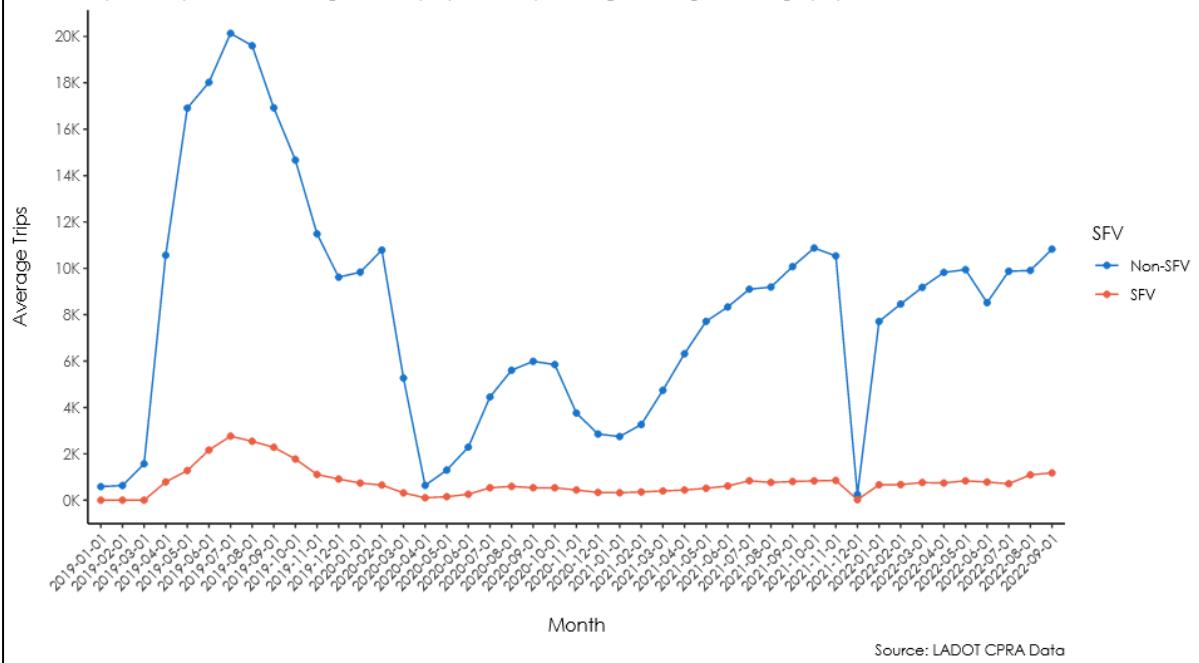
Appendix Figure 5: Total Trips by SFV (2019-2022)
Trips are reported as total monthly trips for a trip starting in a Program Geography



Appendix Figure 6: Total Trips by Geography Types (2019-2022)
Trips are reported as total monthly trips for a trip starting in a Program Geography.

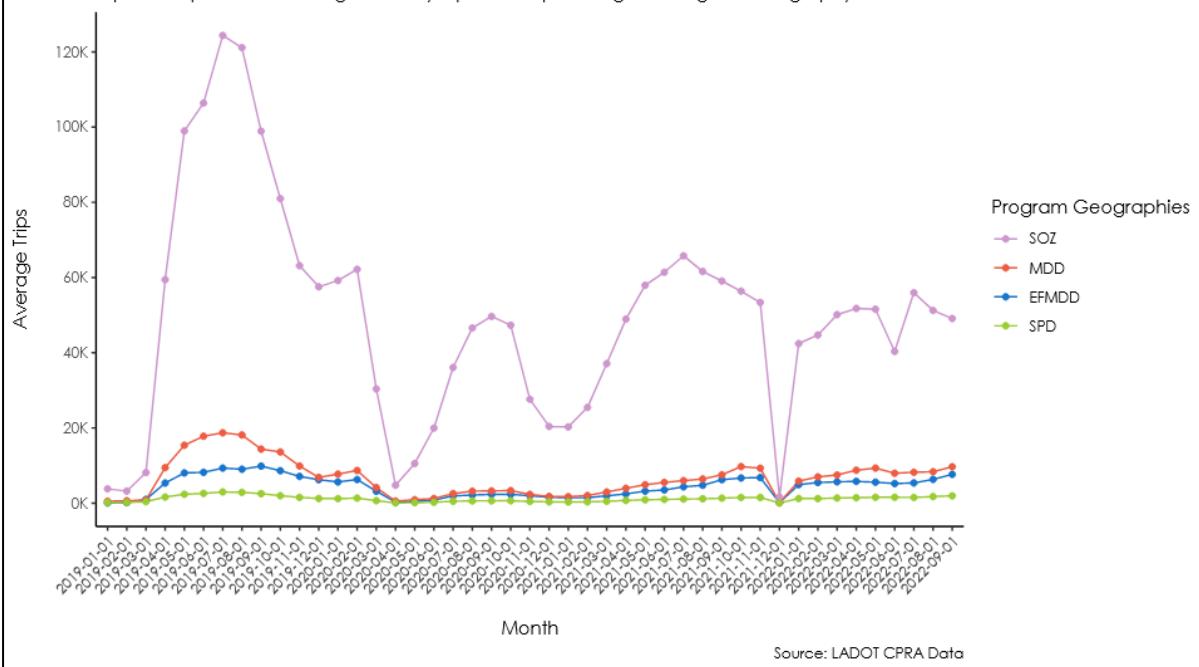


Appendix Figure 7: Average Trips by SFV (2019-2022)
Trips are reported as average monthly trips for a trip starting in a Program Geography



Source: LADOT CPRA Data

Appendix Figure 8: Average Trips by Geography Types (2019-2022)
Trips are reported as average monthly trips for a trip starting in a Program Geography.



Source: LADOT CPRA Data

Appendix D: Correlation Analysis

As stated earlier, all three variables are positively correlated. As deployment increases, trips increase. As trips increase, 311 requests increase. As 311 requests increase, the deployment also increases. Understanding this relationship helps us conclude that changes in deployment or the penalty structure should be followed by changes in ridership.

In R, we assessed the strength of the correlations using Spearman's Rho since the distribution of the variables is each very right skewed. Pearson's R would not be an appropriate method since it requires that the variables be normally distributed.

Spearman's Rho calculates the correlation by ranking the estimates. Kendall's Tau is another method like Spearman's Rho that accounts for the non-normality. See Appendix D for Kendall's Tau correlation estimates which all have a moderate to strong positive correlation and are all statistically significant as well.

Our test compared all pairwise combinations for 311 request counts, average deployment, trip destination count, and trip origin count at the Neighborhood Council level by month. Ninety-nine Neighborhood Councils, each having 43 month-level observations for each of the four variables, yielded 4,257 observations. The correlation is moderate to very strong for all combinations and is statistically significant ($p < 0.001$). In Appendix Table 1, the values are mirrored across the diagonal since the pairwise combination of requests and deployment is the same as deployment and requests. In summary, all three of these variables are strongly related. Thus, in our analysis, we chose trip origin to represent trips overall. And any increase in a variable is related to a strong increase in the other two variables.

Appendix Table 1: Correlation Matrix with Spearman's Rho				
	311 Requests	Deployment	Trip Destination	Trip Origin
311 Requests	1	0.646852***	0.627143***	0.626636***
Deployment	0.646852***	1	0.968556***	0.968679***
Trip Destination	0.627143***	0.968556***	1	0.997812***
Trip Origin	0.626636***	0.968679***	0.997812***	1

*** $p < 0.001$

Appendix Table 2: Correlation Matrix with Kendall's Tau				
	311 Requests	Deployment	Trip Destination	Trip Origin
311 Requests	1	0.527808***	0.502411***	0.501762***
Deployment	0.527808***	1	0.884499***	0.881675***

Trip Destination	0.502411***	0.884499***	1	0.969003***
Trip Origin	0.501762***	0.881675***	0.969003***	1
*** p < 0.001				