Title

Wheels for All: Ensuring Equitable Access to Dockless Mobility in Los Angeles

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Publication Date

2019

DOI

10.17610/T6X59K

Wheels for All:

Ensuring Equitable Access to Dockless Mobility in Los Angeles

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A comprehensive project submitted in partial satisfaction of the requirements for the degree Master of Urban and Regional Planning.

June 2019

UCLA Institute of Transportation Studies

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
	N/A	N/A
4. Title and Subtitle Wheels for All: Ensuring Equitable Access to Dockless Mobility in Los Angeles		**5. Report Date** 2019
		6. Performing Organization Code UCLA-ITS
7. Author(s) Karina Schneider		**8. Performing Organization Report No.** LAS1907
9. Performing Organization Name and Address Institute of Transportation Studies, UCLA 3320 Public Affairs Building Los Angeles, CA 90095-1656		**10. Work Unit No.** N/A
		11. Contract or Grant No.
12. Sponsoring Agency Name and Address The University of California Institute of Transportation Studies www.ucits.org		**13. Type of Report and Period Covered**
		14. Sponsoring Agency Code UC ITS
15. Supplementary Notes DOI: doi:10.17610/T6X59K		

16. Abstract

As the Los Angeles Department of Transportation (LADOT) embarks on a one-year dockless mobility pilot program, both LADOT staff and the residents they serve have raised concerns over equity and access. Dockless mobility refers to dockless or free-floating bicycles, electric bicycles, and electric scooters available for short-term rental that have begun to proliferate in cities across the country. LADOT staff have permitted eight companies with an accumulated 36,000 vehicles. Because the distribution of scooters across Los Angeles neighborhoods is far from even, LADOT staff are currently using CalEnviroScreen 3.0 to identify disadvantaged communities where regulations incentivize operators to deploy their scooters. However, CalEnviroScreen 3.0 is a metric developed to identify communities likely affected by environmental injustices and as such prioritizes environmental exposure factors over those that may affect transportation access.

The purpose of this project is to first address the CalEnviroScreen limitations in analyzing dockless mobility equity by developing an access-focused Dockless Equity Map that locates the most socioeconomically and access disadvantaged communities in Los Angeles. LADOT staff could then produce regulations that promote enhanced dockless outreach and service in these areas. I constructed this map using data on socioeconomic characteristics (e.g. poverty level, race, etc.) and spatial access indicators (e.g. job accessibility by transit, car ownership, etc.). The Dockless Equity Map includes areas in the San Fernando Valley, East Los Angeles, South Los Angeles, and the Harbor that may be the most appropriate targets for dockless mobility equity policies.

While developing an appropriate Equity Map is a crucial step, simply dropping scooters in underserved areas will not translate to equitable access. The final section of this report identifies actions that LADOT staff can take during the one-year pilot and beyond to ensure equitable access in the Dockless Equity Map areas. Through interviews with community-based organization representatives, I developed the following recommendations: 1) engage with residents in the Dockless Equity Map target areas in order to educate them on dockless mobility, 2) utilize data collected during the one-year pilot to set specific equity goals, and 3) address infrastructure and safety concerns.

17. Key Words	18. Distribution Statement
equity new mobility	No restrictions.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	47	N/A

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

Acknowledgements

This project was made possible through the support of the Los Angeles Department of Transportation (LADOT), UCLA Luskin School of Public Affairs, and UCLA Institute of Transportation Studies.

I would first like to thank LADOT staff. Marcel Porras, Jose Elias, Robin Aksu, and Monique Ho, thank you for supporting me throughout both my internship and this project. Grappling with emerging mobility technology is a challenge, but it has been thrilling to be on the front lines with you. I am deeply grateful for your insightful feedback and ideas to make dockless mobility as safe, accessible, and equitable as possible for riders in Los Angeles.

Next, I would like to thank UCLA affiliates. To all the faculty members who contributed to my Urban Planning education at the Luskin School of Public Affairs: thank you for your lessons and your passion! I have learned a lot from all of you. I am especially indebted to my Client Project advisor Brian Taylor, whose guidance and advice has been a major source of support and inspiration. I would also like to thank my Client Project instructor Hugo Sarmiento and my client project classmates for reviewing the first drafts of my report.

Lastly, I would like to thank my family. This journey would not have been possible without their continuous support, encouragement, and patience.

Disclaimer

This report was prepared in partial fulfillment of the requirements for the Master in Urban and Regional Planning degree in the Department of Urban Planning at the University of California, Los Angeles. It was prepared at the direction of the Department and of Marcel Porras as a planning client. The views expressed herein are those of the authors and not necessarily those of the Department, the UCLA Luskin School of Public Affairs, UCLA as a whole, or the client.

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Executive Summary

As the Los Angeles Department of Transportation (LADOT) embarks on a one-year dockless mobility pilot program, both LADOT staff and the residents they serve have raised concerns over equity and access. Dockless mobility refers to dockless or free-floating bicycles, electric bicycles, and electric scooters available for short-term rental that have begun to proliferate in cities across the country. LADOT staff have permitted eight companies with an accumulated 36,000 vehicles. Because the distribution of scooters and bikes across Los Angeles neighborhoods is far from even, LADOT staff are currently using CalEnviroScreen 3.0 to identify disadvantaged communities where regulations incentivize operators to deploy their vehicles. However, CalEnviroScreen 3.0 is a metric developed to identify communities likely affected by environmental injustices and as such prioritizes environmental exposure factors over those that may affect transportation access.

The purpose of this project is to first address the CalEnviroScreen limitations in analyzing dockless mobility equity by developing an access-focused Dockless Equity Map that locates the most socioeconomically and access disadvantaged communities in Los Angeles. LADOT staff could then produce regulations that promote enhanced dockless outreach and service in these areas. I constructed this map using data on socioeconomic characteristics and spatial access indicators taken from the U.S. Census and University of Minnesota's *Access Across America* project (Owen & Murphy 2018).

The indicators and percentile ranking methodology per block group in Los Angeles are shown in Table ES-1 and ES-2, and the final Dockless Mobility Benefit scoring methodology is shown in Table ES-3. The index construction is similar to the method used for CalEnviroScreen. Figure ES-1 displays the Dockless Mobility Equity Map, which includes hot spots of the block groups in Los Angeles that rank at or above the 75th percentile (See Appendix C). According to my analysis, the most appropriate targets for dockless mobility equity policies include neighborhoods in the San Fernando Valley, East Los Angeles, South Los Angeles, and the Harbor.

Table ES-1: Socioeconomic Characteristics for Block Group 060371175201

Indicator	*Density Value*	*Percentile*
Poverty (people per sq. mi.)	16,696	91.3
Non-White (people per sq. mi.)	15,351	90.2
Limited-English speaking (households per sq. mi.)	5,132	85.7
Low educational attainment (people per sq. mi.)	9,121	89.5
Unemployment (people per sq. mi.)	2,849	91.6
Component Score (Average Percentile Rating)	**-**	**89.6**

Table ES-2: Spatial Access Characteristics for Block Group 060371175201

Indicator	*Raw Value*	*Percentile**	*Percentile Weighting*
Job Accessibility by Transit	29,027	66.6	66.6 x 4= 266.4
Job Accessibility by Walking	10,674	52.9	52.9 x 4= 211.6
Zero Car Households (per. sq. mi.)	3,199	80.6	80.6
Ratio of cars to adults	0.54	80.8	80.8
Component Score (Average Percentile Rating)		(226.4+211.6+80.6+80.8) ÷ 10 = **63.9**	

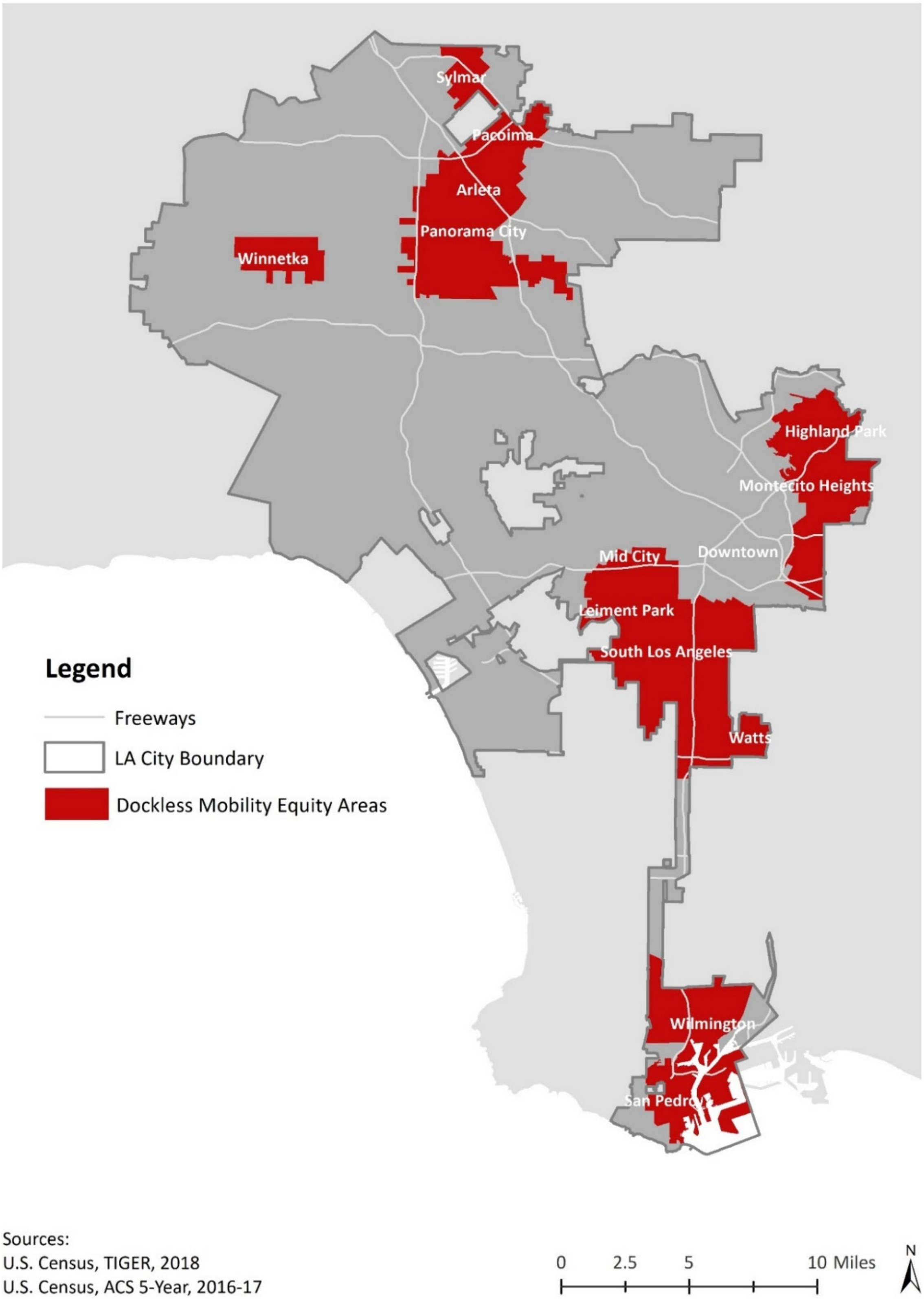
*Percentiles were inverted for job accessibility and cars-to-adults ratio. Block groups with a lower number of jobs and lower ratio were placed in a higher percentile so that block groups with low access received a higher score.

Table ES-3: Calculation of Dockless Mobility Benefit Score for Block Group 060371175201

	Socioeconomic Characteristic	*Spatial Access Characteristic*
Component Score (average percentile)	89.6	63.9
Scaled Component Score	(0.896 ÷ 0.998*) x 10 = **8.98**	(0.639 ÷ 0.918*) x 10 = **6.96**
Dockless Benefit Score	8.98 x 6.96 = **62.5** A score of **62.5** places this block group in the 95-100 percentile or **top 5%** of all dockless mobility benefit scores citywide.	

*The block group with the highest socioeconomic and spatial access score in Los Angeles.

ES-1: Dockless Mobility Equity Map



Sources:
U.S. Census, TIGER, 2018
U.S. Census, ACS 5-Year, 2016-17

While developing an appropriate Equity Map is a crucial step, simply dropping scooters in underserved areas will not translate to equitable access. The final section of this report identifies actions that LADOT staff can take during the one-year pilot and beyond to ensure equitable access in the Dockless Equity Map areas. Through interviews with community-based organization representatives, I developed the following recommendations: 1) adequately educate and engage with residents in the Dockless Equity Map target areas, 2) utilize data collected during the one-year pilot to set specific equity goals, and 3) address infrastructure and safety concerns.

1. Introduction

In only a couple of years, cities across the globe have seen a remarkable rise in dockless mobility options. Dockless mobility refers to bicycles, electric bicycles (e-bikes), and electric scooters (e-scooters) that can be rented per trip, and picked-up and dropped-off almost anywhere. These new services typically require a mobile device with a data plan and access to credit, and they are taking some communities by storm, particularly affluent parts of big cities with many millennial residents. Whether and to what extent these new services should be welcomed, discouraged, or regulated by the public sector is the subject of considerable debate.

In Los Angeles, the Department of Transportation (LADOT) began a One-Year Dockless Mobility Permit in March 2019 for companies operating dockless bicycles, e-bikes, and e-scooters. Like many other transportation departments across the country, LADOT staff took several months to develop permit regulations as these modes began proliferating on city streets suddenly and without warning. Although City officials and LADOT staff recognized the potential of these affordable dockless devices to address the so-called "first/last mile problem" in connecting to public transit stops and stations, decision makers also expressed concern over the unequal distribution of and access to these new vehicles.

The purpose of this project therefore is to develop a transportation access equity metric that can be used to generate a Dockless Equity Map ("Equity Map" or "Map") that identifies and locates spatially and socioeconomically disadvantaged communities that may benefit most from the introduction of new dockless mobility options. LADOT staff can use this Map to facilitate equitable deployment and use of dockless devices following the one-year pilot. However, simply providing these services in disadvantaged communities does not ensure equitable access due to a number of socioeconomic and historic barriers, such as language and infrastructure disinvestment. I recommend that LADOT staff take additional steps to overcome these barriers, including educating disadvantaged community members and prioritizing infrastructure improvements in the Equity Map areas.

2. Dockless Equity in Los Angeles

As dockless vehicles began to arrive on the streets of Los Angeles in 2017, LADOT's New Mobility team took notice. With a city as large and complex as Los Angeles, LADOT staff recognized the importance of ensuring that dockless mobility was accessible to everyone who wanted to use them, regardless of income or location. In drafting the Dockless On-Demand Personal Mobility Rules & Guidelines ("Rules & Guidelines"), staff incorporated equity lessons learned from bike share programs across the country (discussed further in the Literature Review Section) and reviewed dockless pilot regulations from peer cities.

Three sections of the Rules & Guidelines include equity requirements and incentives for operators: Fleet Size, Outreach & Equity, and Fees. The Rules & Guidelines consider affordability for low-income users and geographic equity through incentivizing deployment in disadvantaged areas as defined by CalEnviroScreen 3.0. The following text is included in the Draft Rules & Guidelines (LADOT 2018):

Fleet Size

...

f) No Operator may exceed a maximum fleet of 3,000 Vehicles. Operators may expand their fleet beyond this maximum only if vehicles are added within disadvantaged communities as defined by the CalEnviroScreen 3.0, as detailed below.

g) Operators may add up to 2,500 vehicles in communities that scored at or above the 75th percentile as defined by the CalEnviroScreen 3.0. Operators may be allowed up to 5,000 additional vehicles in disadvantaged communities in the San Fernando Valley.

...

Outreach & Equity

a) Operators must attend meetings with City's Business Improvement Districts, Neighborhood Councils, Council Districts, surrounding municipalities, Transportation Management Organizations/Associations, Disability Rights Organizations/Centers for Independent Living, and any other community-based organization as stipulated by the City to introduce the Operators to them and make these communities aware of the Program and how it may affect the communities.

b) Vehicles will be available at rates that are clearly and understandably communicated to the Customer prior to Vehicle use.

c) Operators are responsible for educating the public on the Program, and on how to use the Vehicle safely.

d) Operators are required to have a non-smart phone option for Customers to use the dockless Vehicle system.

e) Operators are required to have a non-credit card option for Customers to use the dockless Vehicle system.

f) Operators will offer a one-year low-income Customer plan that waives any applicable bicycle/e-scooter deposit and offers an affordable cash payment option and unlimited trips under 30 minutes to any customer with an income level at or below 200% of the federal poverty guidelines, subject to annual renewal.

Fees

Annual Permit Fees	$20,000/year	Administration of the Permit. Fees shall be due prior to issuance of permit.
Annual Vehicle Fee	$130/vehicle per year	An increase in fleet size shall incur additional charges and must be paid prior to deployment.
Discounted Vehicle Fee*	$39/vehicle per year	*Discounts extend to vehicles deployed and maintained in CalEnviroScreen 3.0 Disadvantaged Communities. The discount represents a 70% reduction.

One of the most crucial elements of the Rules & Guidelines is the requirement to reach unbanked and non-smart phone users. As of 2015, only 79 percent of Angelinos owned smartphones (Nielsen 2015). In the Los Angeles Metropolitan Area, approximately 9 percent of households are unbanked (FDIC 2018). Without proper regulations in place, anywhere between 20 and 30 percent of L.A. residents would be barred from using dockless vehicles by default. These two requirements, supported by the one-year low-income pricing plan, should open dockless mobility opportunities for a significant number of low-income residents to use dockless services.

Applying CalEnviroScreen 3.0 to Dockless Mobility

In 2004, the California Environmental Protection Agency (CalEPA) passed an Environmental Justice Action Plan to identify and address environmental issues in California communities (OEHHA 2017). The Agency developed the California Communities Environmental Health Screening Tool (CalEnviroScreen) as part of the implementation of this Plan. CalEnviroScreen identifies census tracts throughout California most burdened by and vulnerable to pollution pursuant to Senate Bill 535 (De León, Chapter 830, Statutes of 2012). The primary purpose of identifying these neighborhoods is to determine where the State can prioritize proceeds from cap-and-trade auctions. While this is a commendable step toward environmental justice, the same formula may not be ideal for transportation equity.

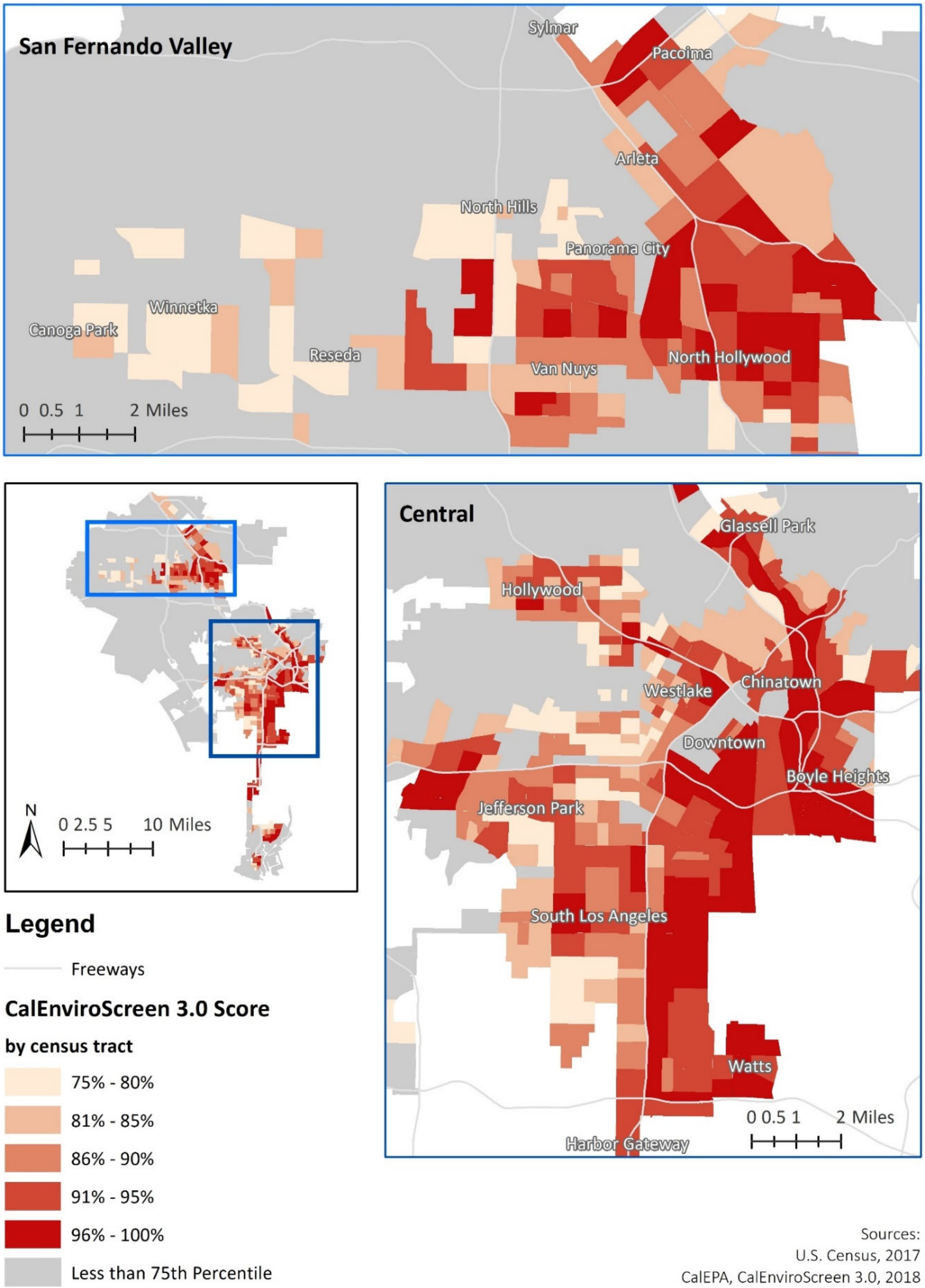
Figure 2-1 shows census tracts within the City of Los Angeles that rank in the 25 percent most vulnerable in the CalEnviroScreen 3.0 rankings. One of the key concerns in using this map for dockless geographic equity is that it includes Central Los Angeles and Downtown

– neighborhoods where dockless operators are already keen to locate. While Downtown does have pockets of low-income and non-White residents, it is also an incredibly dense area with many potential dockless users per square mile compared to other areas of the city. If regulators incentivize dockless companies to operate in disadvantaged neighborhoods as defined by CalEnviroScreen, operators will likely inundate Downtown rather than locate in mobility-underserved areas like the San Fernando Valley and South L.A.

Furthermore, the formula for CalEnviroScreen omits or undervalues factors that are fundamental to transportation equity. SB 535 requires CalEPA to classify disadvantaged communities based on geographic, socioeconomic, public health, and environmental hazard criteria. Although some of the socioeconomic factors included are relevant to transportation equity, such as poverty level and linguistic isolation, the CalEnviroScreen index does not consider ethnicity[1] or car ownership (Table 2-1). Table 2-2 provides the calculations used to determine a CalEnviroScreen score for an example census tract.

[1] The Office of Environmental Health Hazard Assessment (OEHHA) claims that this removal was to make the tool more widely applicable to state entities prohibited from including racial factors in their decision-making processes (Faust et al, 2013).

Figure 2-1: CalEnviroScreen 3.0 in Los Angeles



Sources:
U.S. Census, 2017
CalEPA, CalEnviroScreen 3.0, 2018

Table 2-1: CalEnviroScreen Indicators

Pollution Burden		*Pollution Characteristics*	
Exposure Indicators	*Environmental Effects Indicators*	*Sensitive Population Indicators*	*Socioeconomic Factor Indicators*
Ozone PM2.5 Diesel Particulate Matter Drinking Water Contaminants Pesticide Use Toxic Releases from Facilities Traffic Density	Cleanup Sites Groundwater Threats Hazardous Waste Generators and Facilities Impaired Water Bodies Solid Waste Sites and Facilities	Asthma Cardiovascular Disease Low Birth Weight Infants	Educational Attainment Housing Burdened Low Income Households Linguistic Isolation Poverty Unemployment

Table 2-2: Calculation of CalEnviroScreen Score for tract 6019000300

	Pollution Burden		*Population Characteristics*	
	Exposure Indicators	*Environmental Effects Indicators**	*Sensitive Population Indicators*	*Socioeconomic Factor Indicators*
Component Score (Average Percentile Ranking)	80.4	(0.5 x 40.70) = 20.35	97.66	81.16
Average of Component Score	100.75 ÷ (1 + 0.5) = **67.17**		178.82 ÷ 2 = **89.41**	
Scaled Component Scores (Range 0-10)	(67.17 ÷ 81.19**) × 10 = **8.273**		(89.41 ÷ 96.43***) × 10 = **9.272**	
CalEnviroScreen Score	8.273 x 9.272= **76.71** A score of 76.71 puts this census tract in the 95-100 percentile or top 5% of all CalEnviroScreen scores statewide.			

* The Environmental Effects component was given half the weight of the Exposures component.
** The tract with the highest Pollution Burden score in the state had a value of 81.19.
*** The tract with the highest Population Characteristics score in the state had a value of 96.43.

Source: CalEPA & OEHHA, 2017

These findings suggest that CalEnviroScreen 3.0 is not the ideal metric for transportation equity. LADOT staff are concerned that dense areas with high-quality transit service, areas where dockless companies already want to operate, are included and that tracts where residents might benefit substantially from the addition of dockless mobility are omitted. Utilization of low-income pricing plans, bankless memberships, and non-smartphone options will likely be low if communities that could most benefit from dockless mobility are not sufficiently targeted and informed about the new services. This raises the need for a Dockless Equity Map that properly incorporates the myriad factors that affect transportation equity and access, as well as recommendations on how to ensure equitable access in these communities.

Accordingly, the two questions this project seeks to answer are:

1. In which disadvantaged areas should LADOT incentivize or require dockless companies to operate?
2. What steps should LADOT take to ensure equitable access in these areas?

3. Literature Review

Transportation Equity

Access to key destinations, and economic transactions and social interactions at those destinations are at the heart of city life. The ability to reach goods and services, employment, and social and recreational activities with ease is critical to the well-being of a city dweller. This concept of accessibility is commonly used to assess social outcomes of urban transportation systems. Greater levels of accessibility have been associated with shorter commutes, increased employment rates, and higher activity participation rates (Kawabata & Shen 2007; Merlin & Hu 2017; Paez et al. 2009). Scholars also find that greater accessibility reduces the risk of social isolation, and instead fosters social inclusion (Garrett & Taylor 1999; Lucas 2012).

Accessibility is not only a function of mobility, but of spatial characteristics (e.g. the relative locations of where people live, work, and play) and individual socioeconomic factors (e.g. the ability to afford a vehicle or speak English) as well (Hanson 1982; Geurs & Van Wee 2004). Equity refers to the fairness with which the impacts of an intervention are distributed (Litman 2002). Transportation equity policies, therefore, attempt to distribute services like dockless mobility in ways that address both spatial and socioeconomic barriers to access. Variables associated with these two factors should be considered in an equity index for dockless mobility.

Spatial Factors

The built environment is a critical component of transportation equity. A great deal of literature examines the distribution of people and destinations and its impact on access. Ewing and Cervero (2010) completed a meta-analysis of built environment-travel literature that explored the effect of so-called D-variables on travel behavior: density (residential or job), diversity (of land uses), design (of streets), destination accessibility (to jobs), and distance to transit. Their analysis showed that the combined effect of several of these built environment variables could be substantial. For example, vehicle miles traveled is strongly related to job accessibility, while transit use is equally related to proximity to transit and street network design variables, with land use diversity being a secondary factor.

In the case of dockless scooters and bicycles, advocates have touted their benefit as a first/last mile solution in reducing the distance to and from transit stops and stations. Indeed, the absence of dedicated last-mile solutions, such as connecting transport or lack of information, can reduce access to and from transit (Tilahun et al. 2016). Car owners burdened by the cost of their vehicle may be more inclined to transition to public transit if dockless vehicles could more easily connect them to buses and trains. For people who lack access to a private vehicle, improving transit connectivity could increase transit use, reduce commute times, and increase destination and job accessibility.

Because employment provides financial stability and reduces social exclusion, job access has emerged as a key indicator in evaluating transportation equity across space (Shen 1998; Banja, Leete, & Coulton 2008). Both lower levels of transit (generally associated with more suburban areas) and distance from employment opportunities can negatively affect employment outcomes. For example, Sanchez (1999) found that access to public transit is a significant factor in determining average labor participation rates in Atlanta and Portland. Allard and Danziger (2002) found that proximity to employment opportunities in the Detroit metro area is associated with a higher probability of working and leaving welfare. Therefore, identifying areas outside the reach of convenient transit service, especially to jobs, is important in addressing the spatial access gap.

Although much has been written on the relationships among space, transportation, and access, it remains complex and difficult for scholars and policy makers to fully understand and address. Dockless vehicles may be one solution to the last mile problem, but physical, place-based, and social barriers are also part of the problem. Physical connectivity issues, such as the lack of comprehensive and protective bike lanes, may deter people from using dockless devices even if they are readily available. Furthermore, the variation in household location preferences and land use environments make equality of access nearly impossible. Even so, city officials must explore ways to reduce spatial and socioeconomic vulnerability and optimize access.

Socioeconomic Factors

In order to account for overall social inequities, equity policies should favor socially and economically disadvantaged groups (Rawls 1971). Scholars have engaged in a wide-range of studies confirming the impact of socioeconomic factors on access and mobility. In general, low-income, immigrant, and minority households have access to fewer cars, tend to rely on non-driving modes, and take fewer trips than higher-income and White households (Blumenberg & Pierce 2014; Blumenberg & Evans 2010). This phenomenon has been called a "modal mismatch" due to the relative advantage between those who have access to automobiles and those who that do not (Taylor & Ong 1995).

Owning a vehicle has many returns compared to other modes in modern cities. Vehicle travel is much faster, on average, than other modes, enables job seekers to search more widely for employment, and gives women, particularly single mothers, access to a variety of household-supporting destinations (Blumenberg 2017). Furthermore, because much of American infrastructure is centered around the car, the lack of vehicle access leads to greater isolation.

Mobility-disadvantaged groups extend beyond low-income and minority. A University of Westminster study evaluated local accessibility (e.g. access to bus stops) and regional accessibility (e.g. access to employment opportunities) and found significant mobility constraints for seven socially disadvantaged groups: young people (16-24), older people (60+), Black and Minority Ethnic people, people with mental or physical disabilities, travelers with young children, unemployed people, and shift workers (Wixey et al. 2003). Transportation equity policies are intended to improve the quality and affordability of transportation choices available and expand economic and social opportunities for these groups. As discussed in the next section, similar groups also face barriers in access to docked bike share.

Lessons from Docked Bike Share

Because dockless bikes and scooters are essentially the next generation of docked bike share, reviewing lessons learned in docked bike share equity may offer insight on dockless mobility. Discrepancies in bike share use among socially disadvantaged groups has been the case for many bike share systems. A survey of Washington, D.C., Capital Bikeshare users found that members had higher education levels and were more likely to identify as Caucasian than the city population as a whole (Buck et al. 2013). Other underrepresented groups among bike share users nationwide include lower-income, female, and older residents (Shaheen et al. 2014). Studies of docked bike share users have emphasized the importance of locating bikes equitably across space, conducting intensive outreach, and addressing cost and payment barriers.

Researchers have found station siting to be critical to participation and access. Smith et al. (2015) found that only four of 42 larger bike share systems located over 40 percent of stations in communities categorized as having high economic hardship. Ursaki & Aultman-Hall (2016) found an inequitable distribution of bike share access in seven cities, with significant differences in access based on race, education, and income variables among the population groups. Addressing equity in station siting is a must to ensure that disadvantaged community members even get a chance to try the service. Although station siting is an important step in increasing bike share access, it cannot guarantee access on its own.

One early study found that siting stations in low-income communities in Minneapolis yielded limited ridership, likely due to a lack of ongoing community engagement (Stewart, Johnson & Smith 2011). In low-income communities in Chicago, Philadelphia, and Brooklyn, many residents viewed bike share as a positive thing for their neighborhood, but people of color and lower-income residents faced barriers to using bike share and bicycling in general. Concerns about the cost of bike share and liability for the bikes were among the primary impediments. Even when programs existed to address these barriers, knowledge about their existence (and about how to use the system generally) was lacking (Broach et al. 2017). Howland et al. (2017) surveyed 56 bike share system representatives and half cited the obstacle of price and payment related barriers, including cost to use the system, lack of credit or debit card, and lack of internet and smart phone access.

The most important takeaway from bike share literature is that identifying mobility-disadvantaged groups through an Equity Map and mandating deployment of dockless devices in those locations will not guarantee that targeted groups will use the devices. The combination of low-income pricing, non-smartphone and cash options, data collection, and concentrated outreach in these areas will be essential in addressing transportation equity.

People versus Place

This report proposes an Equity Map as a place-based method to provide enhanced dockless mobility to disadvantaged communities. Many scholars, though, have compared the benefits of people- versus place-based aid and have generally argued in favor of people-based approaches.

Winnick (1966) and Glaeser (2005) analyze the means and ends of place-based and people-based policies and find that people-based aid is less wasteful and better targeted. Investing in disadvantaged places does not guarantee that resources actually reach disadvantaged people, and likely neglects disadvantaged people living in more privileged areas. Similarly, not all people living in poor neighborhoods are poor. Reaching intended beneficiaries of transfer payments, for example, is easier and more equitable if based on income or housing costs rather than location alone. Transfer payments also allow residents of disadvantaged communities to move to areas with better opportunities without relinquishing aid.

This argument, however, falters when comparing transfer payments to dockless vehicles. The provision of a subsidized scooter, for example, should be dependent on socioeconomic characteristics *and* location. If a recipient of a dockless scooter moves from a low-accessibility area to an access-rich neighborhood, the benefit of owning a dockless scooter would decrease. Furthermore, the value of a dockless system is in its nature as a shared good network.[2] Dockless devices are meant to be flexible and on-demand, to be used and left wherever and whenever is most convenient. Owning the device imposes greater responsibility on the recipient, introduces the risk of theft or loss, and does not guarantee access to a device when needed (unless taken everywhere).

Crane and Manville (2008) also argue that people-based aid advocates hit the mark in addressing individual poverty, but overlook spatial market failures that are difficult to treat solely with individual aid. Due primarily to redlining and racial covenant practices popular throughout the mid-20th century, many American neighborhoods experience historical underinvestment and inadequate provision of spatial public goods (Rothstein 2017). Because poverty is often spatially concentrated and imperfectly documented, particularly with immigrant populations, place-based aid can at times reduce targeting costs.

Benefits distributed through the proposed Dockless Equity Map will indeed be placed-based and may suffer from some of the shortcomings asserted by people-based policy advocates, particularly in overlooking disadvantaged people living in affluent areas. However, LADOT's Dockless Mobility Pilot Program will take advantage of both people- and place-based policies. Low-income pricing plans, bankless memberships, and non-smartphone options will be available to all qualified users of dockless devices, regardless of location. The Map can be used to target access poor and mobility-disadvantaged neighborhoods for dockless deployment and enhanced outreach on the availability of people-based programs.

4. Methodology

The primary goal of the Dockless Equity Map is to provide more options to the most socially vulnerable and mobility impacted communities in Los Angeles. The Map incorporates a dockless mobility benefit score calculated for each block group in Los Angeles. I also reached out to representatives at community-based organizations (CBOs) to gather input on the map and recommendations to improve dockless mobility equity in the Map-identified communities. LADOT staff may then focus dockless deployment incentives or requirements in the Equity Map areas and consider policy recommendations to ensure access in these areas.

[2] A shared or common good refers to a good that is shared among all members of a given community. Dockless devices are shared among all users of the service.

Data Description

Based on the existing transportation equity and access literature cited in the previous section, I used the indicators in Table 4-1 to identify the areas in Los Angeles that would gain the greatest benefit from dockless mobility access.

Table 4-1: Dockless Mobility Benefit Indicators

Socioeconomic Characteristics	*Spatial Access Characteristics*
Limited-English speaking households	Job Accessibility by Transit
Low educational attainment	Job Accessibility by Walking
Non-White population	Zero car households
Poverty	Ratio of cars to adults
Unemployment	

While it makes sense that CalEnviroScreen 3.0 uses census tracts as the level of analysis to compare locations across the state, a smaller level of analysis is more useful in looking across a city. In order to target specific neighborhoods, block groups are the ideal level of analysis for this map.[3] The socioeconomic data listed in Table 4-1 are available from the 2016 and 2017 U.S. Census 5-Year American Community Survey. For the socioeconomic characteristics, I calculated the density of each, in square miles, per block group. I used the density of zero-car households, the ratio of cars to adults, and access to jobs by transit and walking to evaluate spatial disparities. The University of Minnesota's *Access Across America* dataset estimates the number of jobs available within a 30-minute transit trip and walking trip per block (Owen & Murphy 2018). For the walking dataset, jobs reachable within ten minutes are weighted most heavily, and jobs are given decreasing weights as travel time increases up to 60 minutes. In GIS, I averaged the number of jobs accessible by transit and by walking per block within each block group.

Although people with disabilities, young people, and older adults are identified as socially vulnerable groups in my literature review, I did not include these groups in the index. Children younger than 18 are not permitted to ride shared dockless devices and older people are less likely to use dockless vehicles that require substantial physical balance. Persons with disabilities may benefit from dockless mobility depending on the type of disability, but the Census does not specify disability type. Therefore, I could not meaningfully apply disability data to the dockless mobility benefit index.

[3] Census tracts and block groups are common levels of analysis in geographic analysis and are determined by the U.S. Census.

Scoring Methodology

Time and resources did not allow me to conduct a detailed multi-variate statistical analysis to relate my variables of interest to particular access outcomes, though the link of each variable used for access equity is supported by the literature reviewed above. Instead, I employed a metric construction approach similar to the one used by CalEPA and OEHHA to develop CalEnviroScreen (See Section 2). Before initiating index calculations for each block group in the city, I first identified block groups with a population below 20 people and excluded them from the score calculations. I then computed the area for each block group in GIS to allow for density calculations. For a given block group, I calculated scores for both socioeconomic and spatial access indicators as described below.

Socioeconomic Characteristics

To determine socioeconomic scores for each block group, I first calculated the density, or square mileage, of each socioeconomic indicator per block group. For example, I used Census data on limited-English-speaking households to find the number of these households per square mile for each block group. This step prevented the size of the block group from affecting the final scores. Once I found the raw value for each indicator per block group, I then determined the percentile ranking of each block group per indicator. For example, there are 16,696 people in poverty per square mile in the example block group in Table 4-2, which means that this block group has more people in poverty per square mile than 91.3 percent of the block groups in Los Angeles.

To find the final score for the socioeconomic component, I averaged the percentiles for the individual socioeconomic characteristics across each block group. As I lacked any basis to differentially weight these variables based on their relative contributions to access outcomes, I chose to weight each characteristic equally as each is a strong indicator of socioeconomic burden impacting both spatial and social mobility. Poverty, non-White, and limited-English characteristics represent communities that have been historically underserved, while low educational attainment and unemployment reflect limited resources for economic growth and a need for increased job accessibility. The Map prioritizes block groups where the average socioeconomic percentile ranking is highest.

Table 4-2: Socioeconomic Characteristics for Block Group 060371175201

Indicator	*Density Value*	*Percentile*
Poverty (people per sq. mi.)	16,696	91.3
Non-White (people per sq. mi.)	15,351	90.2
Limited-English speaking (households per sq. mi.)	5,132	85.7
Low educational attainment (people per sq. mi.)	9,121	89.5
Unemployment (people per sq. mi.)	2,849	91.6
Component Score (Average Percentile Rating)	**-**	**89.6**

Spatial Access Characteristics

I performed similar calculations on the spatial access indicators with a couple of notable differences. First, I inverted the percentiles for the ratio of cars to adults and job accessibility by transit and walking so that block groups with lower accessibility received a higher score. Second, I decided to place a higher weight on the job accessibility variables. Job accessibility, particularly by walking, reflects the level of density within and surrounding the block group. If a resident can walk to many jobs within a 10-minute walking trip, she likely lives in a dense area where dockless companies already want to operate.

Furthermore, because lower car ownership is often associated with high transit access and dense areas—areas that are not a priority for the dockless mobility benefit index—I gave percentiles of the zero car household densities and the ratio of cars to adults a quarter of the weight given to the job accessibility indicators. I experimented with several weighting schemas to determine the proper weight for the job accessibility factors. See Appendix A for a comparison of Raw Index Maps with different spatial access characteristic weightings. Weighting the job accessibility factors by four produces the most desired results by excluding dense and transit-accessible areas from the index. Table 4-3 shows the final calculations for Spatial Access.

Table 4-3: Spatial Access Characteristics for Block Group 060371175201

Indicator	*Raw Value*	*Percentile**	*Percentile Weighting*
Job Accessibility by Transit	29,027	66.6	66.6 x 4= 266.4
Job Accessibility by Walking	10,674	52.9	52.9 x 4= 211.6
Zero Car Households (per. sq. mi.)	3,199	80.6	80.6
Ratio of cars to adults	0.54	80.8	80.8
Component Score (Average Percentile Rating)			(226.4+211.6+80.6+80.8) ÷ 10 = **63.9**

*Percentiles were inverted for job accessibility and cars-to-adults ratio. Block groups with a lower number of jobs and lower ratio were placed in a higher percentile so that block groups with low access received a higher score.

Dockless Mobility Benefit Score

Before combining the component scores for the two data categories, I first scaled the socioeconomic and spatial access scores so that they had a maximum value of 10 and a possible range of 0 to 10. To accomplish this, I divided the component score by the maximum value observed in the city and then multiplied by 10. Scaling ensures that both components contribute equally to the overall dockless mobility benefit score.

I computed the overall dockless benefit score by multiplying the scaled socioeconomic and spatial access scores. I chose to multiply the scores so that the index identified the most socioeconomic and spatially disadvantaged block groups. I then ordered the geographic areas from highest to lowest disadvantage, based on their overall score, from which I calculated percentiles. A geographic area's overall dockless mobility benefit percentile equals the percentage of all ordered dockless mobility benefit scores that fall below the score for that area. Tables 4-4 shows how to calculate the final dockless mobility need score.

Table 4-4: Calculation of Dockless Mobility Benefit Score for Block Group 060371175201

	Socioeconomic Characteristic	*Spatial Access Characteristic*
Component Score (average percentile)	89.6	63.9
Scaled Component Score	(0.896 ÷ 0.998*) x 10 = **8.98**	(0.639 ÷ 0.918*) x 10 = **6.96**
Dockless Benefit Score	8.98 x 6.96 = **62.5** A score of **62.5** places this block group in the 95-100 percentile or **top 5%** of all dockless mobility benefit scores citywide.	

*The block group with the highest socioeconomic and spatial access score in Los Angeles.

Interviews

To test whether the areas identified via the calculations described above were consistent with the experiences and perceptions of community leaders, as well as to gather these leaders' input on dockless mobility equity policies, I interviewed the following representatives from community-based organizations (CBOs) in Los Angeles:

- Veronica Padilla, Pacoima Beautiful[4]
- Oscar Monge, T.R.U.S.T. South LA[5]

[4] Pacoima Beautiful is a grassroots environmental justice organization in the San Fernando Valley.
[5] T.R.U.S.T. South LA is a community-based initiative to stabilize the neighborhoods south of downtown Los Angeles.

- Noami Iwasaki, Investing in Place[6]
- Río Oxas, People for Mobility Justice[7]

I chose these CBOs based on the mobility-focused outreach of their work and the geographical areas within which they work. Representatives from these organizations agreed to meet with me for interviews that ran between 30 minutes and an hour. The interview began with questions about the representative's background and the work of their organization, and then moved into feedback on the map. I ended the interviews by asking about their concerns with dockless mobility, with a focus on inequities and policy recommendations they might have. See Appendix B for the list of interview questions.

5. Findings

In this section, I assess the maps I developed out of my block group indicator scores, as well as the final index scores and final Equity Map. I first compare the maps showing the most socioeconomically disadvantaged areas and spatial access disadvantaged areas in Los Angeles (Figures 5-1 and 5-2). I then review the raw combined index and the smoothed final Equity Map (Figures 5-3 and 5-4).

Socioeconomic and Spatial Access Findings

After calculating the average percentile rankings for the socioeconomic indicators, I mapped the highest-ranking block groups in the 50th and 75th percentile to display the most socioeconomically disadvantaged areas in Los Angeles based on my indicators. Both the socioeconomic and spatial access indicator maps feature the top two quartiles to show where the socioeconomic and spatial access disadvantaged areas could potentially overlap in the final Dockless Equity Map. Figure 5-1 shows the block groups with the top-ranking combined average of the following socioeconomic indicators:

- Poverty
- Non-White population
- Limited-English speaking
- Low educational attainment
- Unemployment

Most of the socioeconomically disadvantaged neighborhoods shown in Figure 5-1 are in Central and South Los Angeles and in the San Fernando Valley. As these neighborhoods are

[6] Investing in Place is a team of advocates for safe and livable communities in Los Angeles with a core mission to support transportation investments.
[7] People for Mobility Justice is a group of educators, facilitators, and advocates for mobility justice for communities of color in Los Angeles.

home to largely low-income communities of color, the findings for this map are as expected. This map does include, however, dense areas where dockless companies already seek to operate due to the high number of potential customers in the area. If regulations were to incentivize operators to expand their dockless fleet in the areas identified in Figure 5-1, which excludes spatial access indicators, operators would likely place all of their additional devices Downtown and in Central Los Angeles, leaving neighborhoods like South L.A. untouched. This is essentially the issue that LADOT staff is grappling with now under CalEnviroScreen 3.0. This first mapping exercise highlights the importance of combining the socioeconomic map with a limited spatial access map to construct a final Dockless Equity Map.

Figure 5-2 maps the block groups in the top two quantiles for the spatial access indicators, or areas where residents face the most challenges in spatial access. These block groups rank highest in the following categories:

- Limited Job Accessibility by Transit
- Limited Job Accessibility by Walking
- Zero car households
- Low ratio of cars to adults

Mapping only these (and not the socio-economic indicators) in Figure 5-2, we can see that the least accessible neighborhoods are in the outer regions of the San Fernando Valley and the suburban areas surrounding Bel Air, South Los Angeles, and San Pedro. Because a significant number of neighborhoods identified in Figure 5-2 are wealthy suburban communities, such as Bel Air, but cannot be reasonably characterized as "access disadvantaged" despite access limitations.

Given that neither the socioeconomic nor the spatial access indicators alone account for all of the factors relevant to determining access disadvantaged neighborhoods, I concluded that combining these two sets of factors was essential in designing a dockless mobility benefit index and Dockless Equity Map.

Figure 5-1: Socioeconomic Indicators Ranking

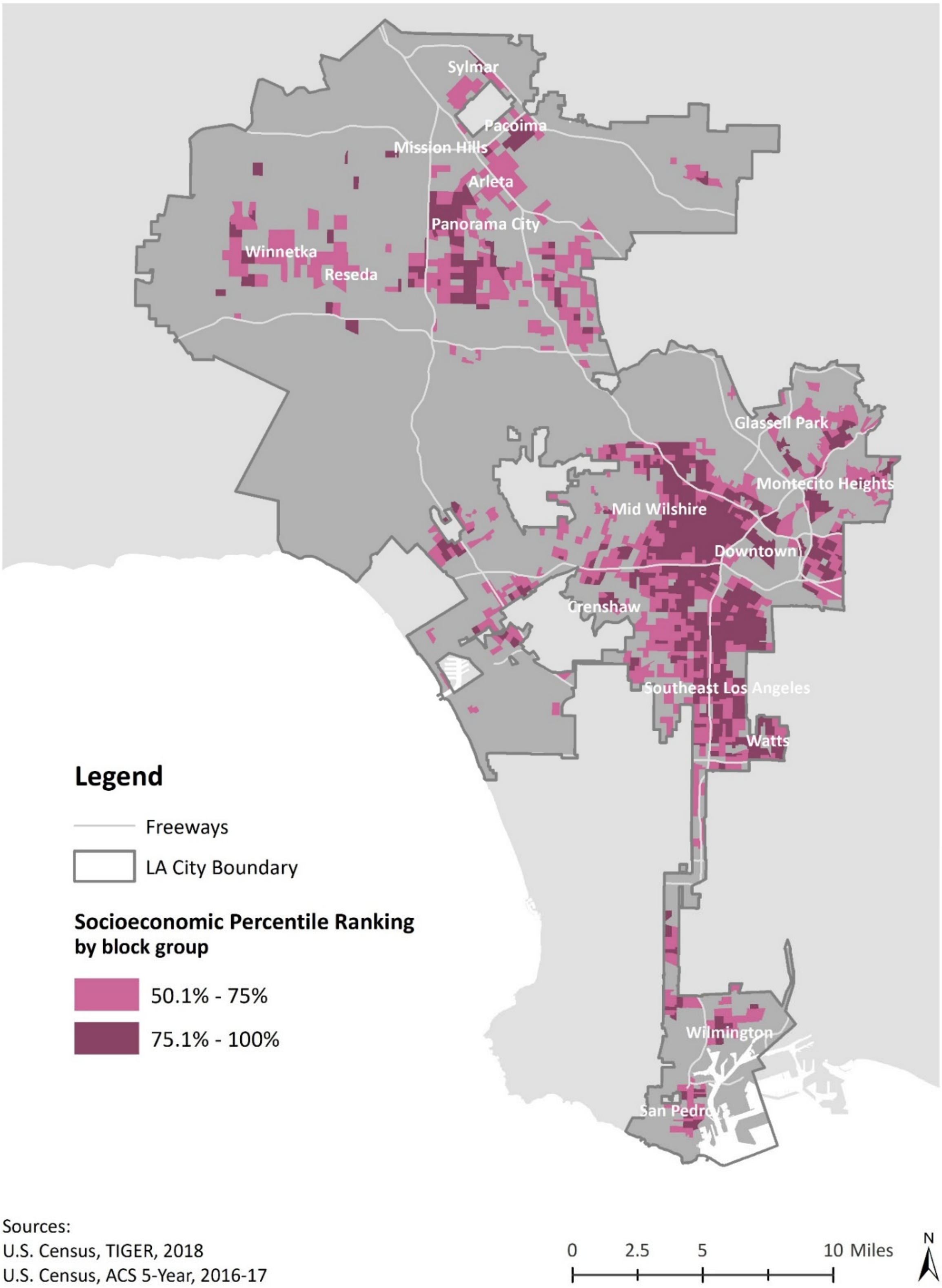
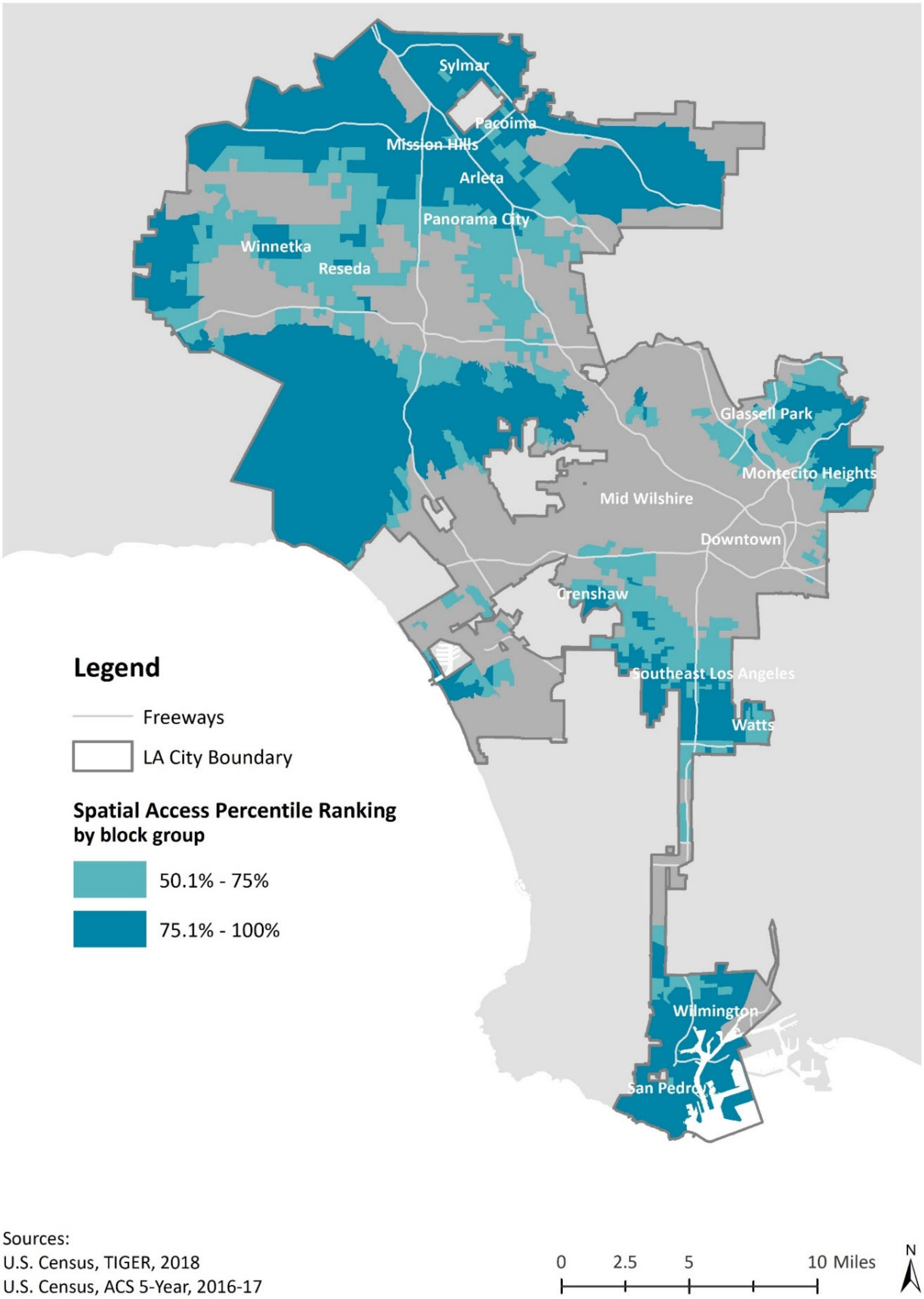


Figure 5-2: Spactial Access Indicators Ranking



Sources:
U.S. Census, TIGER, 2018
U.S. Census, ACS 5-Year, 2016-17

The Dockless Mobility Benefit Index

The Dockless Mobility Benefit Index combines the socioeconomic and spatial access components by multiplying their scaled percentile scores. Figure 5-3 shows this combined percentile ranking and displays the block groups scoring in the 75th percentile, the same threshold used for CalEnviroScreen 3.0. As seen in Figure 5-3, block groups in the 75th percentile are concentrated in the following regions: San Fernando Valley, Northeast Los Angeles, South Los Angeles, and the Harbor. These areas have both limited public transit accessibility and are home to largely low-income residents of color.

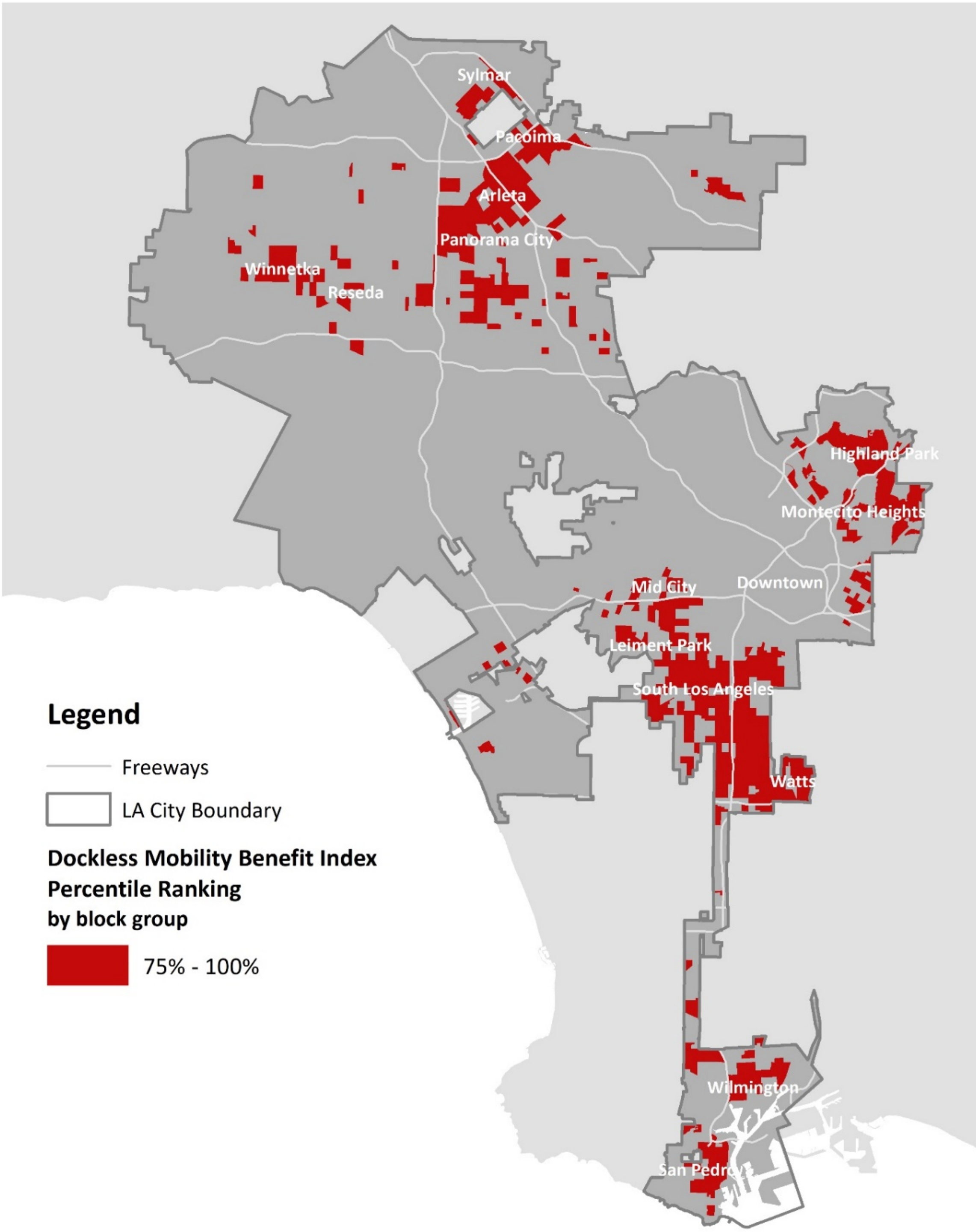
The general regions identified in this map more closely align with the types of communities that LADOT might target for dockless mobility equity when compared to the CalEnviroScreen 3.0 map. These communities face socioeconomic barriers and endure lower levels of public transit service and walkability. In other words, these are places where dockless companies would likely ignore absent regulatory and/or financial pressure from LADOT. However, the "raw index" displayed in Figure 5-3 would be difficult for LADOT staff to use as a policy tool and challenging for dockless companies to comply with as the selected block groups are so scattered. Easy to understand and enforceable regulations call for a map with more cohesive boundaries around targeted areas.

The Dockless Mobility Equity Map

Given that the raw index produces an atomized checkerboard pattern of block groups in the top scoring regions, clustering the highest-ranking block groups by using a Geographic Information Systems (GIS) spatial analysis tool can produce a more cohesive map. To achieve this, I used the Optimized Hot Spot Analysis tool in GIS to create a map of statistically significant hot spots using the Getis-Ord Gi statistic. This tool evaluates the final percentile rankings in the index and identifies hot spots or concentrations of high-ranking block groups to a 90, 95, and 99 percent confidence level.[8] The Dockless Equity Map I develop here includes block groups within the 95 percent confidence interval. See Appendix C for detailed instructions on how I used the Optimized Hot Spot Analysis tool. Figure 5-4 shows this final Dockless Equity Map.

[8] The Optimized Hot Spot Analysis tool creates a new Output Feature Class with a z-score, p-value and confidence level bin (Gi_Bin) for each feature in the Input Feature Class, in this case, the ranked block groups. The Gi_Bin field identifies statistically significant hot and cold spots, corrected for multiple testing and spatial dependence using the False Discovery Rate correction method. Features in the +/-3 bins (features with a Gi_Bin value of either +3 or -3) are statistically significant at the 99 percent confidence level; features in the +/-2 bins reflect a 95 percent confidence level; features in the +/-1 bins reflect a 90 percent confidence level; and the clustering for features with 0 for the Gi_Bin field is not statistically significant. The user may display the calculated hot spots at a confidence level of their choosing.

Figure 5-3: Dockless Mobility Benefit Index

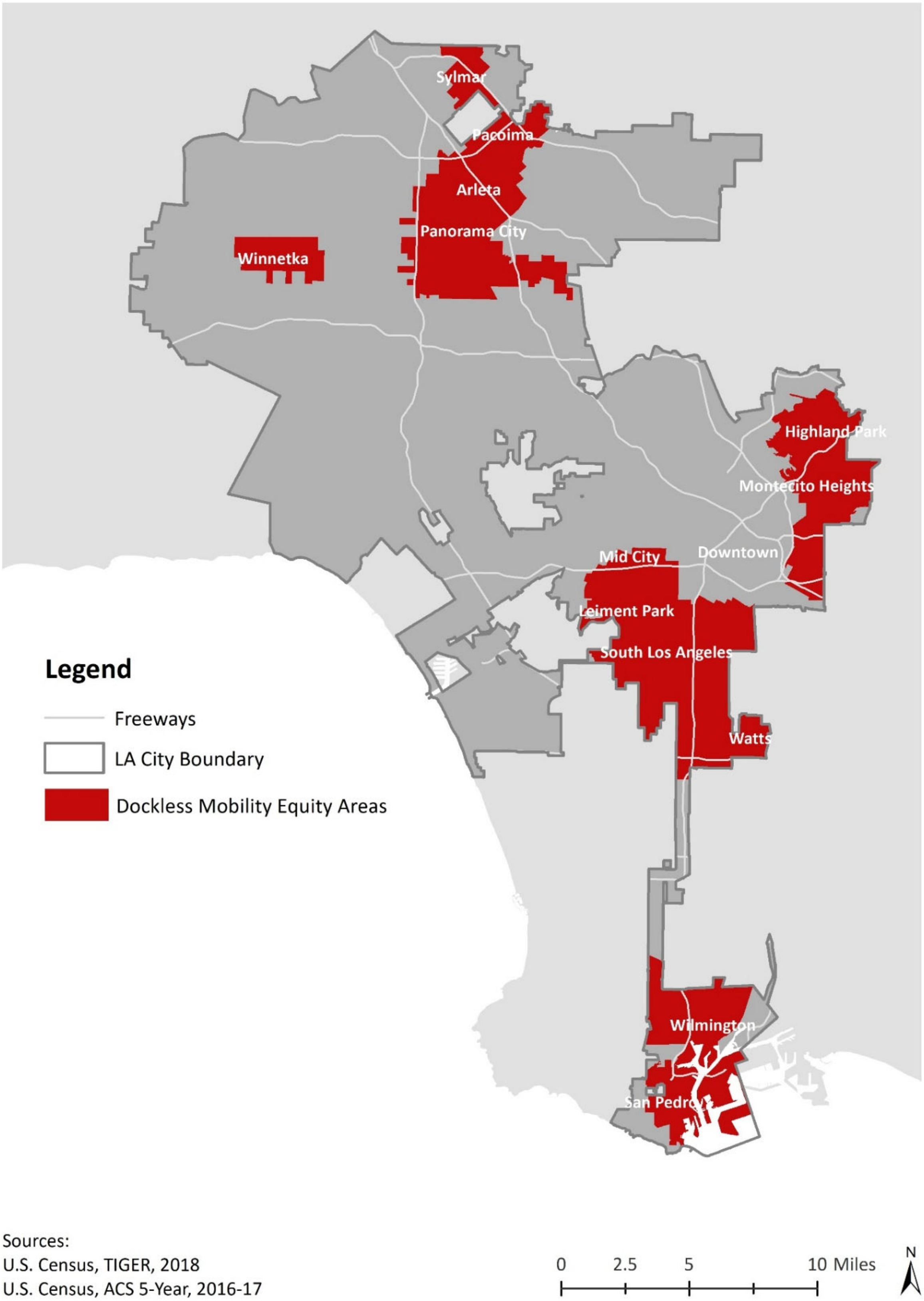


Sources:
U.S. Census, TIGER, 2018
U.S. Census, ACS 5-Year, 2016-17

0 2.5 5 10 Miles

N

Figure 5-4: Dockless Mobility Equity Map



Sources:
U.S. Census, TIGER, 2018
U.S. Census, ACS 5-Year, 2016-17

Interviews

After developing the Dockless Mobility Benefit Index, I interviewed four representatives from community-based organizations to obtain feedback on the map and on potential dockless equity regulations. Interviewees generally confirmed that the communities identified in the map are low-income and experience mobility challenges, and also offered recommendations on equitably implementing dockless mobility in these areas. Because interviewees provided valuable insight on equity concerns, I recommend LADOT staff address these concerns by taking the steps outlined in the following section.

6. Policy Recommendations

Both LADOT staff and CBO representatives laud the importance of developing an appropriate Dockless Equity Map, but recognize that this map is but the first step towards dockless mobility equity. While the areas I have identified on this map are much more conceptually linked to transportation access and the goals of the dockless mobility policy than the CalEnviroScreen 3.0 map, further action is necessary to achieve dockless equity.

This section reviews the concerns raised by representatives of community-based organizations in my interviews and my recommendations to LADOT staff to improve equitable dockless mobility access beyond what is suggested by the Equity Map. I recommend that LADOT finalize the Map and incorporate it in the dockless regulations once operators and LADOT staff conduct proper outreach and data collection in these communities during the one-year pilot. I also urge LADOT's New Mobility team to engage with other LADOT team members to ensure that the proper physical infrastructure is in place to support safe dockless mobility.

Learn, Listen, and Educate

Several CBO representatives recommended going to the Map-identified communities first to learn about mobility challenges residents currently face and how dockless mobility could or could not address these challenges. Naomi Iwasaki at Investing in Place noted the importance of asking community members if dockless could effectively serve them: "*Engagement should really revolve around what these communities' mobility needs are first, and whether scooters even fit into that, before talking about whether it makes sense to deploy a fleet in that neighborhood*."

Although some interviewees recommended completing these steps *before* allowing dockless companies to operate in these communities, several obstacles preclude this arrangement. Communities that experienced the first waves of dockless service were not consulted before initial deployment. Operators failed to inform both City staff and the communities that their devices would be coming and decided to ask for forgiveness rather than permission—a move learned from Transportation Network Companies like Uber and Lyft. Now that dockless companies have already deployed these mobility options, city leaders and councilmembers have advocated for providing dockless options across the city for the one-year pilot. Since the pilot began in March 2019, operators have already started deploying in the CalEnviroScreen 3.0 disadvantaged communities.

Ideally, LADOT staff and council district offices would have ample time to workshop with community members, particularly those in the Equity Map areas, before the pilot launch in order to learn about the key mobility challenges these communities face and determine how dockless mobility could address some of these challenges. Unfortunately, the pilot is already underway with little outreach completed in disadvantaged communities. LADOT staff and operators must now play catch up.

I recommend LADOT and dockless companies work together to engage with residents, especially with those living in the Dockless Equity Map areas, throughout the pilot to learn about their mobility challenges, listen to their concerns about dockless mobility, and educate them on dockless mobility rules and policies. Understanding exactly how dockless mobility could or could not assist residents in their daily life can help staff to shape policy in a meaningful way. Listening to the concerns held by community members will reveal ways in which the dockless program may still need improvement to address safety and equity. Finally, as residents living in the Dockless Equity Map areas face socioeconomic and language barriers in understanding how to use dockless mobility, I advise LADOT staff to focus education efforts in the Dockless Equity Map areas to ensure greater access and understanding.

Veronica Padilla from Pacoima Beautiful and Naomi Iwasaki stressed the importance of educating the community about every aspect of dockless mobility and doing so in a way the community can understand. Padilla said,

> *I think there's the need for a lot of education. Van Nuys got new protected bike lanes, but they're not used properly by folks. They're still riding on the sidewalk or riding in the wrong direction…I don't think bike riders understand that the protected lanes are for them*."

In many neighborhoods, Iwasaki asserts that, "*there's been no education as to how to access [dockless devices], how to use them, or what the rules of the road are.*" Padilla also noted that the many ethnic enclaves in the city should receive tailored outreach in their native language.

The education piece is key to the success of dockless mobility. I propose LADOT staff share policies on the pilot program, particularly regarding the cash payment option, non-smartphone option, and low-income pricing plan. Interviewees supported the availability of these options but noted the necessity of educating disadvantaged communities that these options even exist and how to use them. They also recommended that staff require operators to teach these community members how to unlock and ride these devices, as well as where these devices can be legally ridden and parked to avoid potential citations.

Use Data to Set Equity Goals

Because dockless mobility is so new, very little data exist on the demographics of riders, how these devices are used, and the purpose behind most trips, particularly in Los Angeles. I recommend LADOT staff use this one-year pilot as a learning opportunity to understand ways in which the Department can set equity goals in the future. The pilot regulations currently require operators to distribute an LADOT-provided survey, which will help answer some of these questions, and I encourage staff to distribute this survey throughout the length of the pilot to determine any shifts that might occur over the course of the year (i.e. if rider demographics change or if a greater share of riders use the low-income pricing plan).

The Pilot Rules & Regulations also require dockless companies to comply with Mobility Data Specifications, meaning that they must share trip data with LADOT in a standardized format. I urge Staff to analyze these trip data within the Dockless Mobility Equity Map areas to determine where riders are taking trips and how many trips are taken per device. This can help staff determine if companies are providing enough vehicles to support demand in these communities and, if not, how to revise incentives or requirements for operation.

Staff can also keep track of LADOT and operator outreach and the number of residents who sign up for the cash option, non-smartphone option, and low-income pricing plan. Overtime, staff can learn what types of outreach are most effective in reaching disadvantaged community members and how frequently to conduct outreach. If the City decides to continue with dockless mobility after the one-year pilot, LADOT staff could require minimum outreach types and frequencies based off lessons learned in the one-year pilot.

Finally, I recommend that staff track where the Los Angeles Police Department (LAPD) officers cite riders for unlawful scooter riding and who they are citing. Río Oxas of People for Mobility Justice expressed concern that riders of color may be specifically targeted: "*Increased enforcement in black and brown neighborhoods means higher amounts of incarceration. Is LADOT going to hold LAPD accountable for misconduct to ensure that riders feel safe and supported to navigate the streets?*" Although LADOT does not have the authority to cite riders on the sidewalk, LADOT staff can monitor citations throughout the pilot and hold LAPD accountable for patrolling neighborhoods fairly.

Address Infrastructure & Safety Impediments

Because dockless mobility users are legally prohibited from riding on sidewalks, on-street infrastructure is integral to safe dockless riding. All the CBO representatives expressed grave concerns regarding existing infrastructure in the Dockless Equity Map communities. Oscar Monge from T.R.U.S.T. South LA said, "*This [map] doesn't mean that these areas are equipped in terms of infrastructure*. *We need more investments to make South L.A.'s streets safer for pedestrians and folks traveling by bike or other shared use mobility options*." Iwasaki added, "*When we're looking at socioeconomic indicators, we're also likely looking at neighborhoods that have been underinvested in or disinvested in in terms of public infrastructure, so dropping scooters into a neighborhood that doesn't have clear lane lines or tons of potholes is dangerous. Is that really helping folk's mobility and access*?"

While Los Angeles is not widely considered a bicycle-friendly city, the bicycle infrastructure within the Equity Map areas does not differ much from other parts of the city. In fact, the Equity Map areas actually have more bikeway miles per square mile compared to the rest of the city. Although the Equity Map areas are only 22 percent of the total area of the city, they hold about 40 percent of the city's bikeway miles. Figure 6-1 shows existing bicycle infrastructure within the Dockless Equity Areas. The map shows that, while there is significant coverage, gaps in the network do remain.

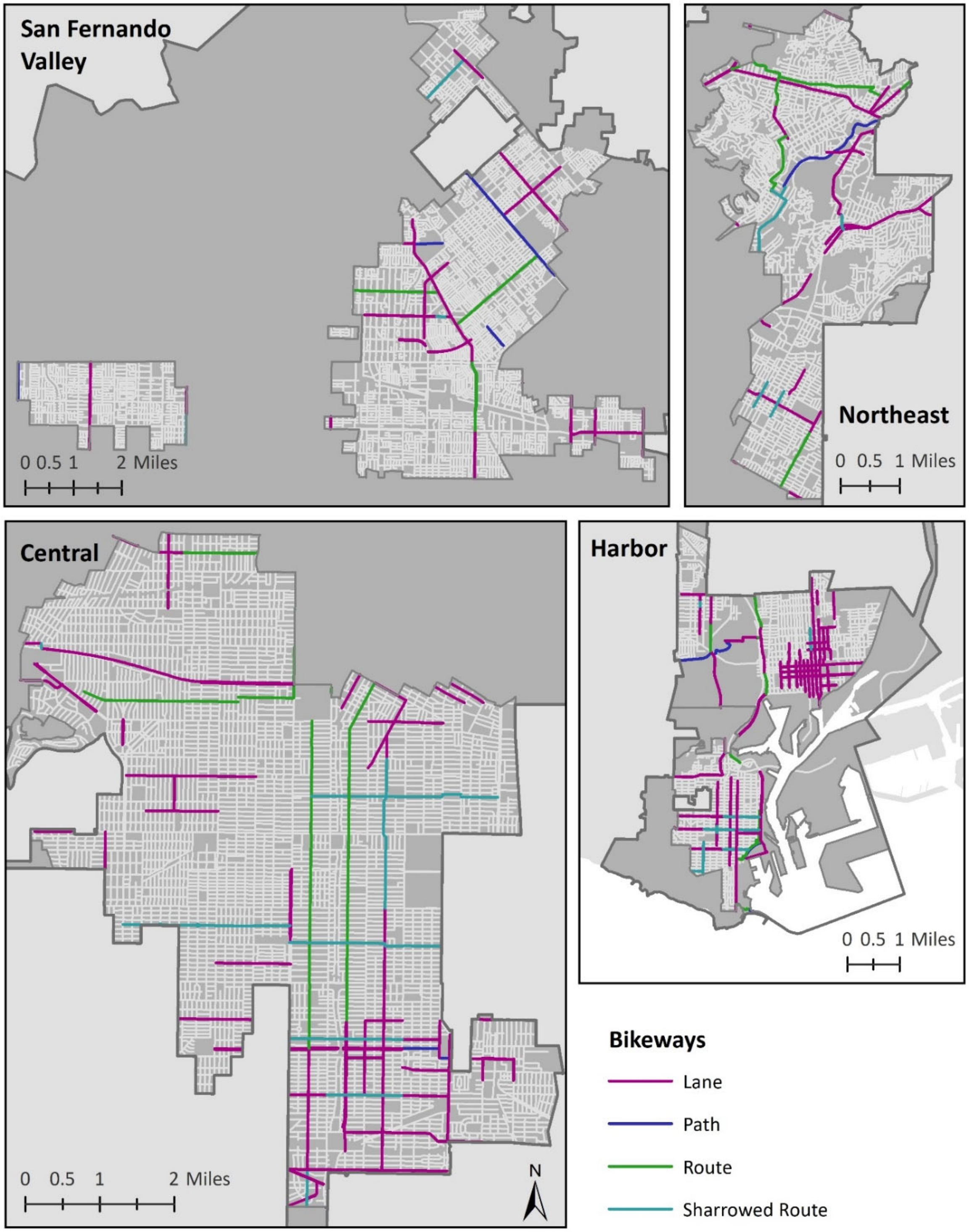
Pavement conditions in the Equity Map areas are also not dissimilar from the pavement conditions in the rest of the city. Approximately 29 percent of the streets in Los Angeles are within the Equity Map areas (City of Los Angeles 2019). Of these streets, about 28 percent, or 432 miles, are in poor condition. In the rest of the city, a quarter of the streets are in poor condition.

Figure 6-2 shows the high-collision networks in the Equity Map areas identified by LADOT's Vision Zero team. Although only 29 percent of LA's streets are within the Equity Map areas, 38 percent of the high-injury network miles are within these communities. While there is little discrepancy in existing infrastructure between the streets in the Equity Map areas and elsewhere in Los Angeles, road safety does appear to be a major challenge to safe dockless riding and adoption.

Although a straightforward response to this concern could be to introduce more bike lanes, Oxas from People for Mobility Justice questioned the equity in providing this infrastructure. In recent years, advocacy groups have pointed to bike lanes as a potential gentrifying amenity, one that must be coupled with anti-displacement policies. The relationship between bike lanes and displacement, though, is complex. Scholars argue that the lanes themselves are not the cause of gentrification (Geoghegan 2016). Displacement is often linked to a wider and more hidden process of overall rising costs. Across Los Angeles, rents and housing are getting more expensive largely due to a shortage of housing. Because new bike lanes are a visible, physical addition to a community, it is easy for community members to attribute rising costs to this new amenity.

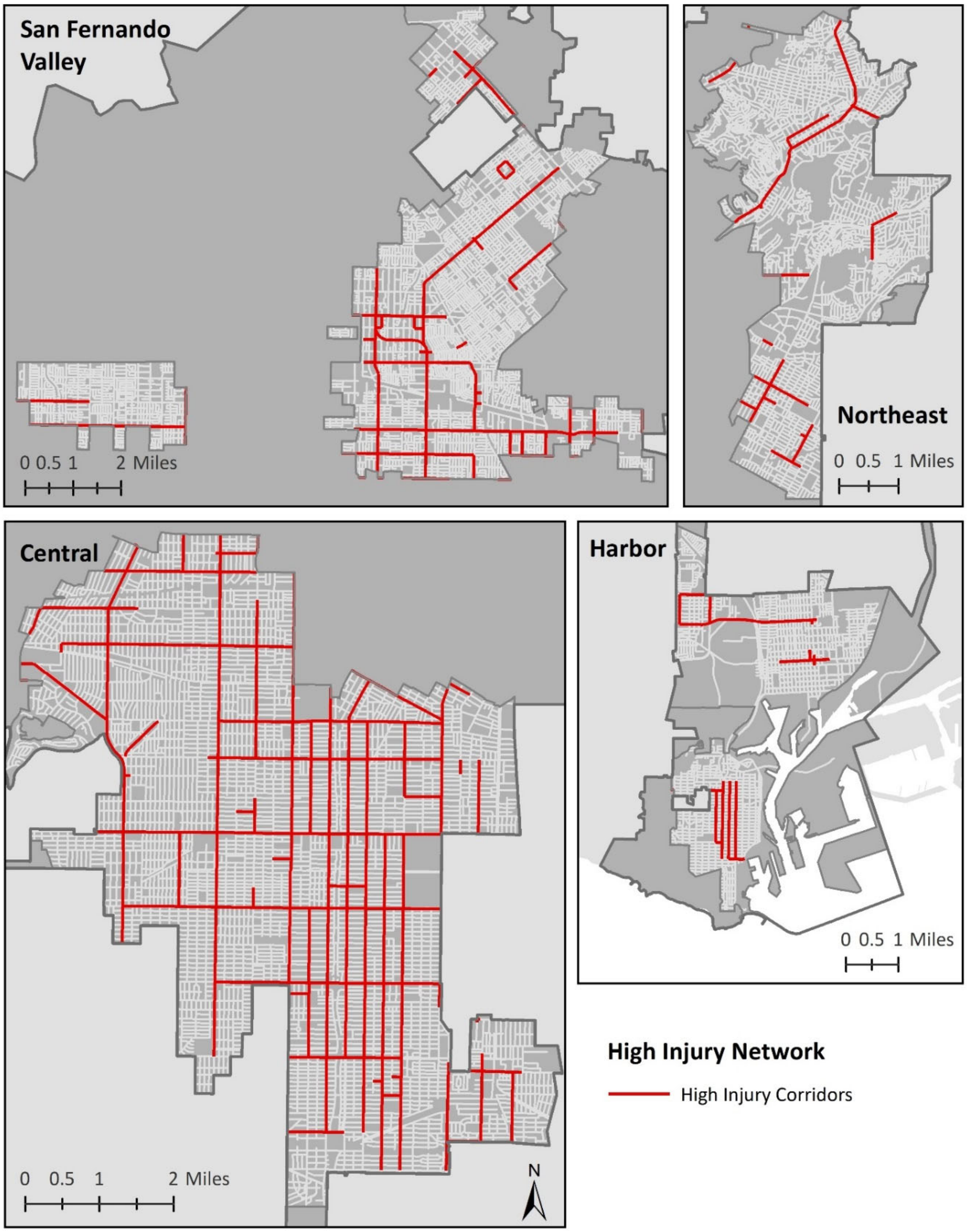
More studies must be done to determine if a clear correlation exists between bike lanes and displacement. In the meantime, I recommend LADOT staff prioritize safety improvements on the streets of Los Angeles, as well as facilitate the use of more sustainable modes of transportation. Encouraging bicyclists and dockless operators and riders to contact council members and advocate for safer streets and bike lanes could catalyze the implementation of improved infrastructure.

Figure 6-1: Existing Bikeways in the L.A. Dockless Equity Map



Sources:
U.S. Census, 2017
LADOT, 2019

Figure 6-2: High Injury Corridors in the L.A. Dockless Equity Map



Sources:
U.S. Census, 2017
LADOT Vision Zero, 2019

7. Limitations & Next Steps

The Dockless Equity Map is a new tool to help LADOT craft policies to insure dockless mobility equity in the City of Los Angeles. However, if LADOT staff aim to reduce mobility challenges for disadvantaged community members, they will need to do more than simply apply this tool to promote equitable dockless deployment. The additional recommendations I propose in the previous section will take time to bring about and the results of such effort may not manifest in the short-term. The pilot will be a year of learning for residents, LADOT staff, and dockless operators. New equity issues may arise, such as company non-compliance with regulations or inequitable distribution of injury rates, that the analytical tool and recommendations I present here will not address.

Furthermore, the analytical tool I have developed in this report is geared toward addressing geographic equity in terms of dockless deployment, but does not address dockless education and outreach. The purpose of this map is to identify mobility disadvantaged areas where dockless companies are unlikely to operate without regulatory or financial incentives. However, there are dense areas of the city where low-income communities of color are likely to start seeing dockless mobility in the months ahead, such as in Koreatown and Thai Town. Residents in these areas may need extra help from LADOT staff and dockless operators to understand how to use these devices and how to access programs like the low-income pricing plan. LADOT staff may want to consider developing a new plan geared toward outreach.

8. Conclusion

Dockless mobility is the newest in a wave of emerging transportation technology and mobility options. While dockless scooters and bicycles have the potential to increase access for people across cities, regulators must do their part to ensure that these devices serve communities equitably. Accordingly, this research project sought to determine the most mobility and access disadvantaged communities in Los Angeles where LADOT staff might incentivize dockless operators to serve and to offer recommendations on bolstering equitable dockless implementation in these communities.

The Dockless Mobility Equity Map developed here identifies areas within the San Fernando Valley, East Los Angeles, South Los Angeles, and the Harbor as socioeconomically disadvantaged communities with limited existing vehicle, transit, and walking access that may benefit substantially from dockless mobility services. In addition to using this map, I advise LADOT staff to conduct in-depth outreach and engagement with these communities to (1) learn about existing mobility challenges and how dockless mobility might address them, (2) listen to concerns about dockless service in the neighborhood, and (3) educate residents on how to use dockless devices and how to access the cash option, non-smartphone option, and low-income pricing plan.

I also urge LADOT staff to harness data gathered during the pilot to set equity goals for future regulations. Keeping track of outreach events, low-income pricing plan sign-ups, and trips taken in the Dockless Equity Map areas may be useful in determining future fleet and outreach requirements, as well as realistic equity goals for the city. Finally, LADOT staff should work with city partners and other teams in the Department to push for the prioritization of improved infrastructure in the Dockless Equity Map areas. While the pressure is on to bring more mobility options to communities, LADOT must maintain safe and equitable access across the city.

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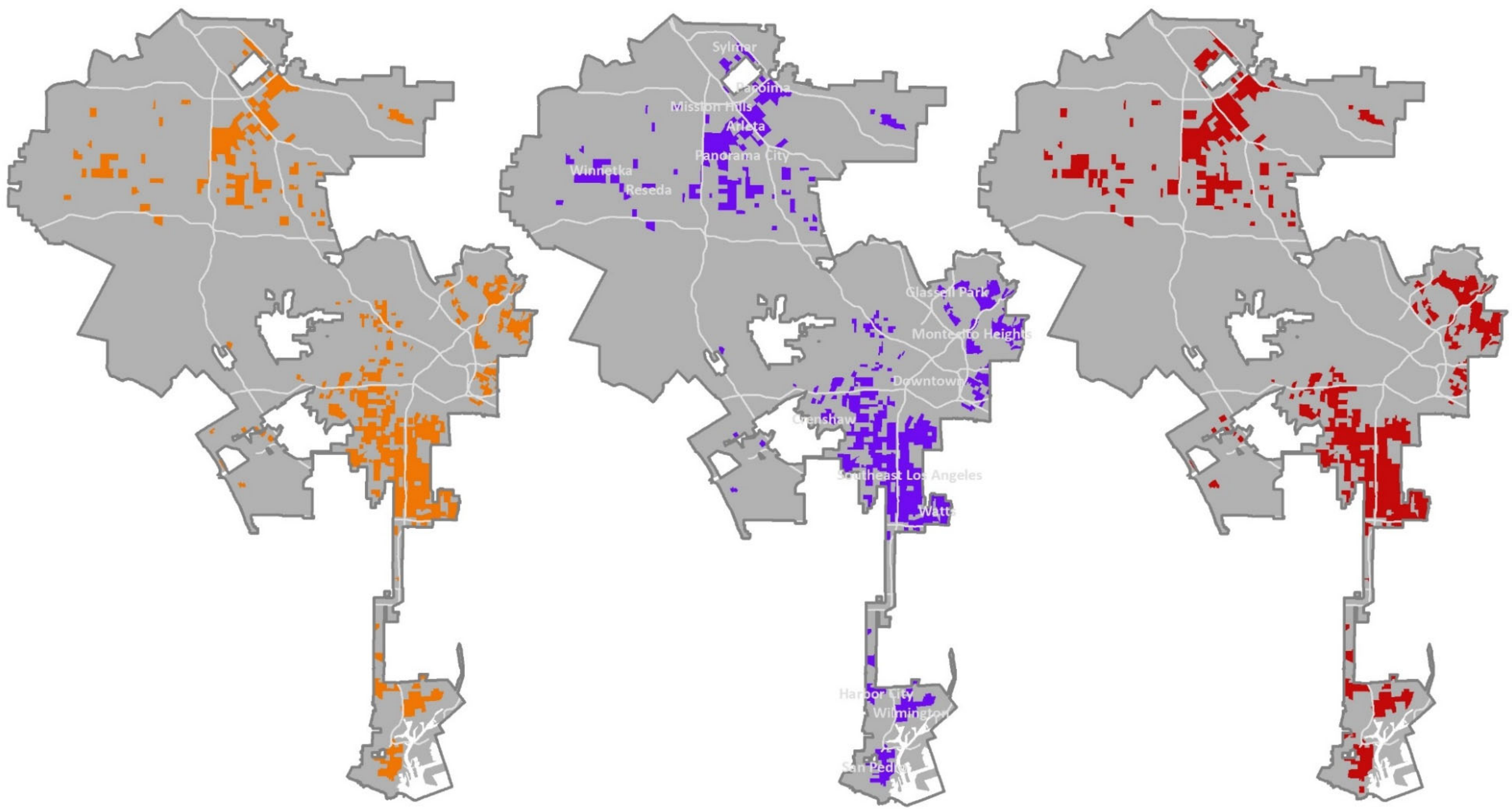
10. Appendices

Appendix A: Job Accessibility Weighting Comparison

The following maps compare the highest ranking block groups in the raw dockless equity index for each spatial access score calculation scenario: 1) unweighted, 2) job accessibility factors given twice the weight of car ownership variables, and 3) job accessibility factors given four times the weight of car ownership variables. Job accessibility factors include the number of jobs within a 30-minute transit trip and jobs within walking distance, while car ownership variables include zero car household densities and the ratio of cars to adults. For the final index, I chose the third scenario of giving job accessibility factors four times the weight of car ownership variables so that dense areas where dockless companies are likely to operate are excluded.

Figure A-1: Job Accessibility Weighting Comparison



Unweighted

Job Accessibility Indicators x2

Job Accessibility Indicators x4

These maps compare the block groups ranking in the 75th percentile of the raw index based on each job accessibility weighting scenario.

Appendix B: Interview Questions

1. What kind of work have you been doing at your organization?

2. What communities are you familiar with or have done the most work in?

3. What mobility challenges are you aware of in these communities?

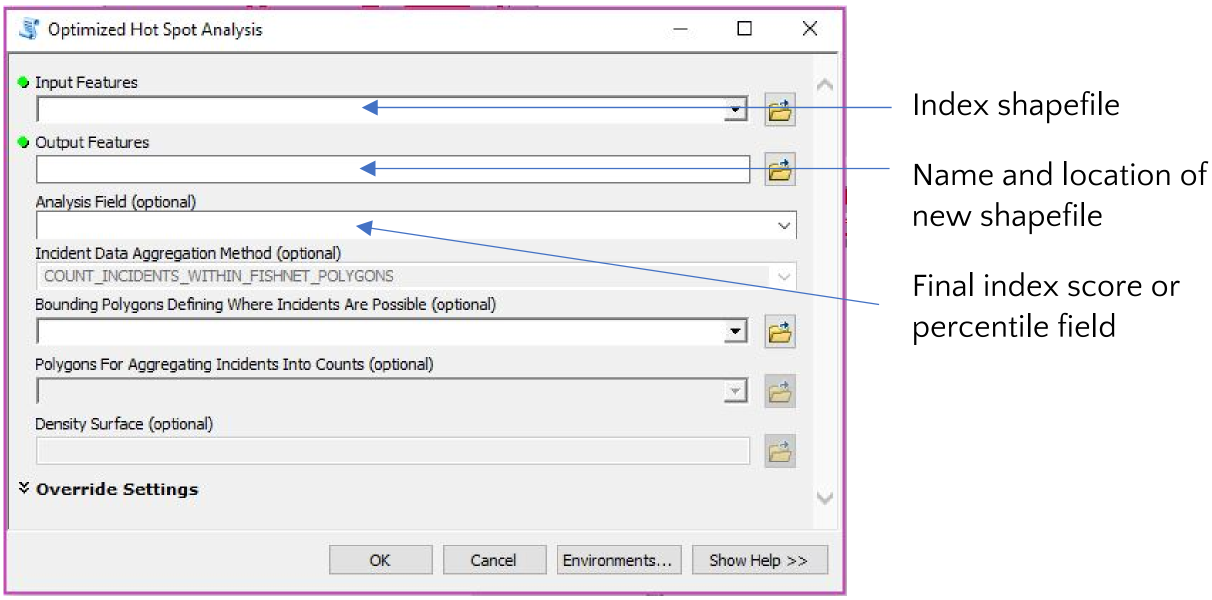
4. Show zoomed in maps of raw dockless equity index.
   a. Should some areas be taken out of the index?
   b. Are there areas that you think are missing from this map?

5. What are your equity concerns about dockless mobility in these areas?

Appendix C: Optimized Hot Spot Analysis Tool Instructions

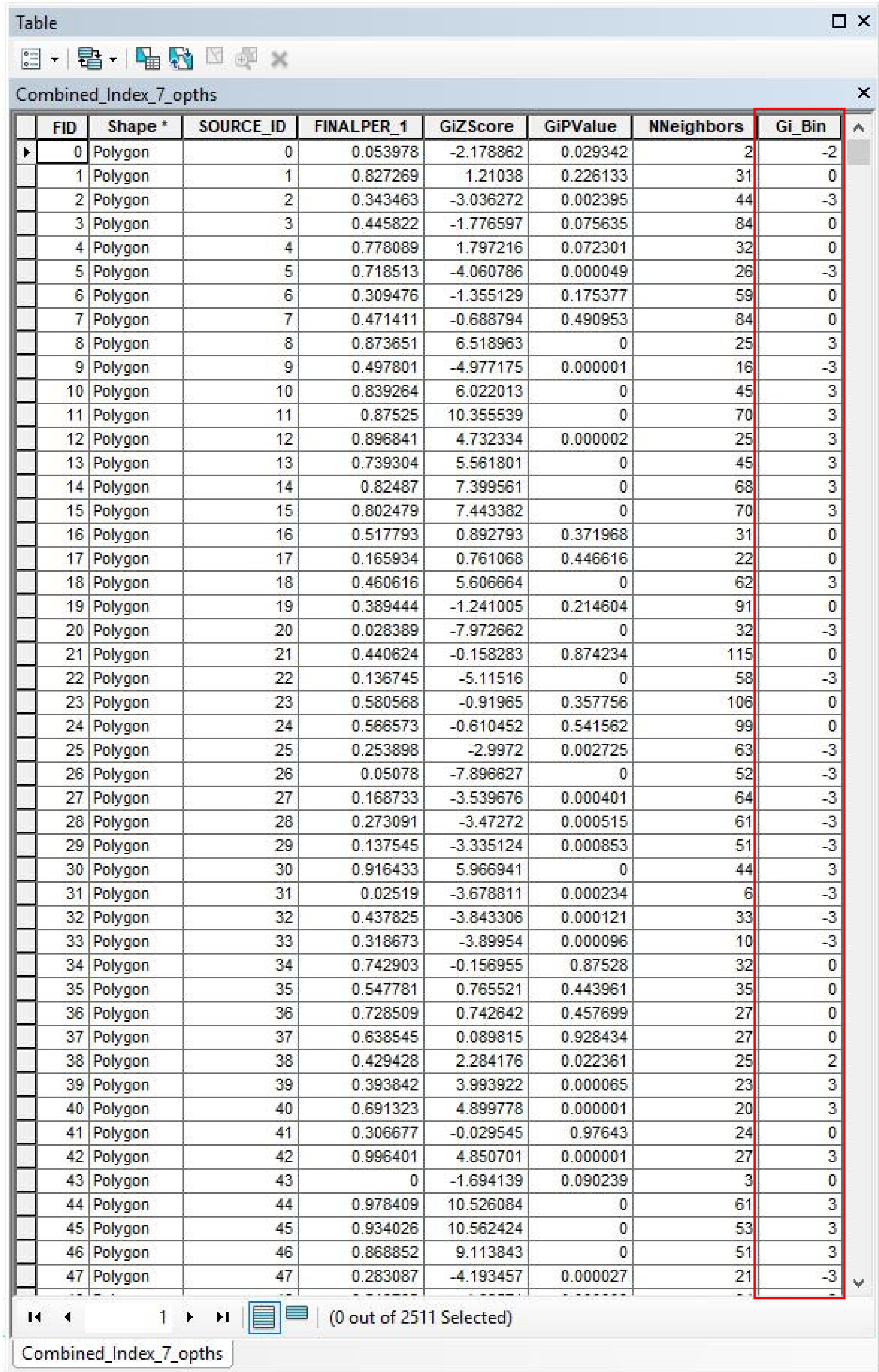
The following are the steps I took to utilize the Optimized Hot Spot Analysis tool in the mapping software ArcGIS. I used this tool to group the highest-ranking block groups in the index and make a more functional map for policy decisions.

1. First, I searched for the Optimized Hot Spot Analysis tool in the Search panel on the right of ArcMap.
2. The following window opens when I select the tool. I then filled in the fields as shown below



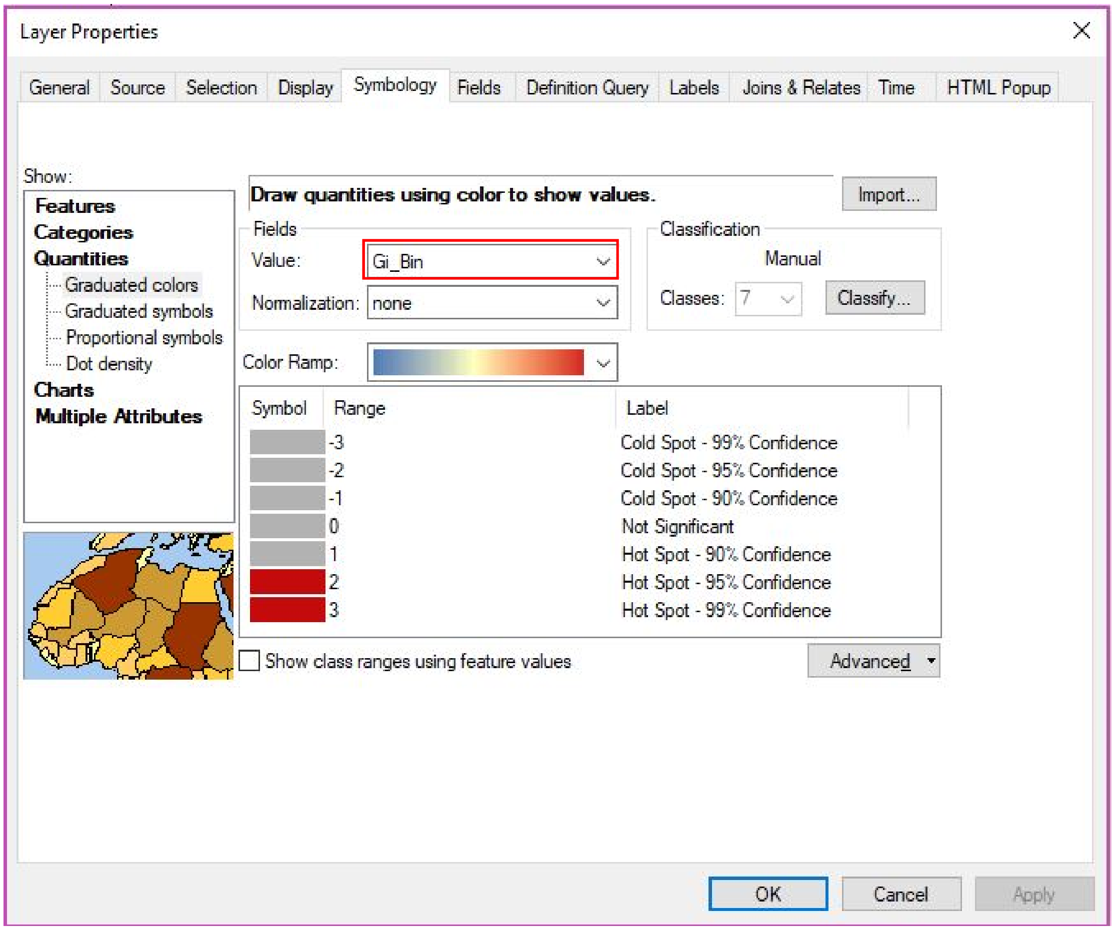
3. Clicking OK generates a new layer in the table of contents.

4. The new layers attribute table looks like the one shown below with a Gi_Bin field at the end:



FID	Shape *	SOURCE_ID	FINALPER_1	GiZScore	GiPValue	NNeighbors	Gi_Bin
0	Polygon	0	0.053978	-2.178862	0.029342	2	-2
1	Polygon	1	0.827269	1.21038	0.226133	31	0
2	Polygon	2	0.343463	-3.036272	0.002395	44	-3
3	Polygon	3	0.445822	-1.776597	0.075635	84	0
4	Polygon	4	0.778089	1.797216	0.072301	32	0
5	Polygon	5	0.718513	-4.060786	0.000049	26	-3
6	Polygon	6	0.309476	-1.355129	0.175377	59	0
7	Polygon	7	0.471411	-0.688794	0.490953	84	0
8	Polygon	8	0.873651	6.518963	0	25	3
9	Polygon	9	0.497801	-4.977175	0.000001	16	-3
10	Polygon	10	0.839264	6.022013	0	45	3
11	Polygon	11	0.87525	10.355539	0	70	3
12	Polygon	12	0.896841	4.732334	0.000002	25	3
13	Polygon	13	0.739304	5.561801	0	45	3
14	Polygon	14	0.82487	7.399561	0	68	3
15	Polygon	15	0.802479	7.443382	0	70	3
16	Polygon	16	0.517793	0.892793	0.371968	31	0
17	Polygon	17	0.165934	0.761068	0.446616	22	0
18	Polygon	18	0.460616	5.606664	0	62	3
19	Polygon	19	0.389444	-1.241005	0.214604	91	0
20	Polygon	20	0.028389	-7.972662	0	32	-3
21	Polygon	21	0.440624	-0.158283	0.874234	115	0
22	Polygon	22	0.136745	-5.11516	0	58	-3
23	Polygon	23	0.580568	-0.91965	0.357756	106	0
24	Polygon	24	0.566573	-0.610452	0.541562	99	0
25	Polygon	25	0.253898	-2.9972	0.002725	63	-3
26	Polygon	26	0.05078	-7.896627	0	52	-3
27	Polygon	27	0.168733	-3.539676	0.000401	64	-3
28	Polygon	28	0.273091	-3.47272	0.000515	61	-3
29	Polygon	29	0.137545	-3.335124	0.000853	51	-3
30	Polygon	30	0.916433	5.966941	0	44	3
31	Polygon	31	0.02519	-3.678811	0.000234	6	-3
32	Polygon	32	0.437825	-3.843306	0.000121	33	-3
33	Polygon	33	0.318673	-3.89954	0.000096	10	-3
34	Polygon	34	0.742903	-0.156955	0.87528	32	0
35	Polygon	35	0.547781	0.765521	0.443961	35	0
36	Polygon	36	0.728509	0.742642	0.457699	27	0
37	Polygon	37	0.638545	0.089815	0.928434	27	0
38	Polygon	38	0.429428	2.284176	0.022361	25	2
39	Polygon	39	0.393842	3.993922	0.000065	23	3
40	Polygon	40	0.691323	4.899778	0.000001	20	3
41	Polygon	41	0.306677	-0.029545	0.97643	24	0
42	Polygon	42	0.996401	4.850701	0.000001	27	3
43	Polygon	43	0	-1.694139	0.090239	3	0
44	Polygon	44	0.978409	10.526084	0	61	3
45	Polygon	45	0.934026	10.562424	0	53	3
46	Polygon	46	0.868852	9.113843	0	51	3
47	Polygon	47	0.283087	-4.193457	0.000027	21	-3

5. In the Layer's Properties→ Symbology tab, I classified by the Gi_Bin value. The Bi_Bin numbers correspond to Cold Spots, Not Significant, and Hot Spots within 90 to 99 percent confidence intervals.



6. As the final map focuses on the Hot Spots, I selected block groups within the 95 percent confidence interval and above for the final map.