



## PARKS + EQUITY

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Using PyQGIS and Rgeoda for Evaluating Localized  
Equitable Park Access across the United States



SASAKI

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1. Project Introduction
2. Research Questions / Objective
3. Data & Methodology
4. Results
5. Next Steps



SASAKI

Sasaki is an urban planning, design, architecture and interior design firm based in Boston, MA.

Research at Sasaki is a critical endeavor that advances our collective knowledge and helps to fuel creative innovation. Every year, we have internal research grants to promote exploration of new ideas in our practice.



We know what percentage of cities  
are within a 10 minute walk of a park

BUT...

How big is the park?

What amenities does it have?

Is the park quality well maintained?

Which communities have access and  
which don't?





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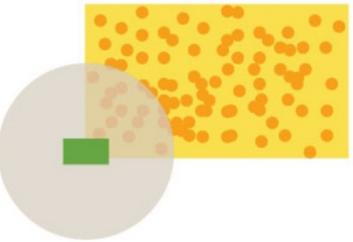


## Research Questions:

1. Across urbanized areas in the U.S., who are the communities being served by parks and who is left out?
2. How can we visualize inequities in park quality for different demographic groups, especially for communities of color and low-income communities?
3. How can we provide tools / data to help cities make targeted investments in parks with an equity lens?

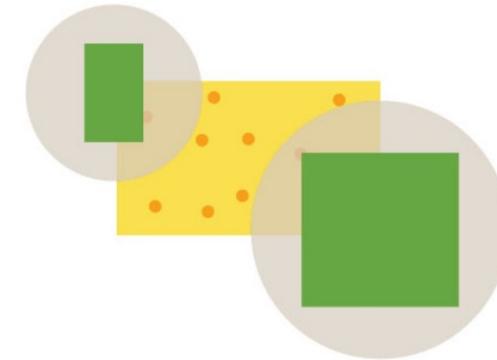


# Nuancing Park Access Metrics



Many people and  
a tiny park?

OR



Few people and  
big parks?

# Exploring Alternative Methodologies for Park Access



# Trust for Public Land: ParkScore & ParkServe

Imagine a great park within a 10-minute walk of every home, in every neighborhood, in every city across America.

The research is clear: parks boost well-being for the entire neighborhood. And great parks foster community, where everyone is welcome. We invite you to join us for a day of celebrating the parks we have - and advocating for the parks we need.

## How we calculated Boston's ParkScore rating:

### ACCESS ⓘ

100 out of 100



### INVESTMENT ⓘ

78 out of 100



### EQUITY ⓘ

78 out of 100



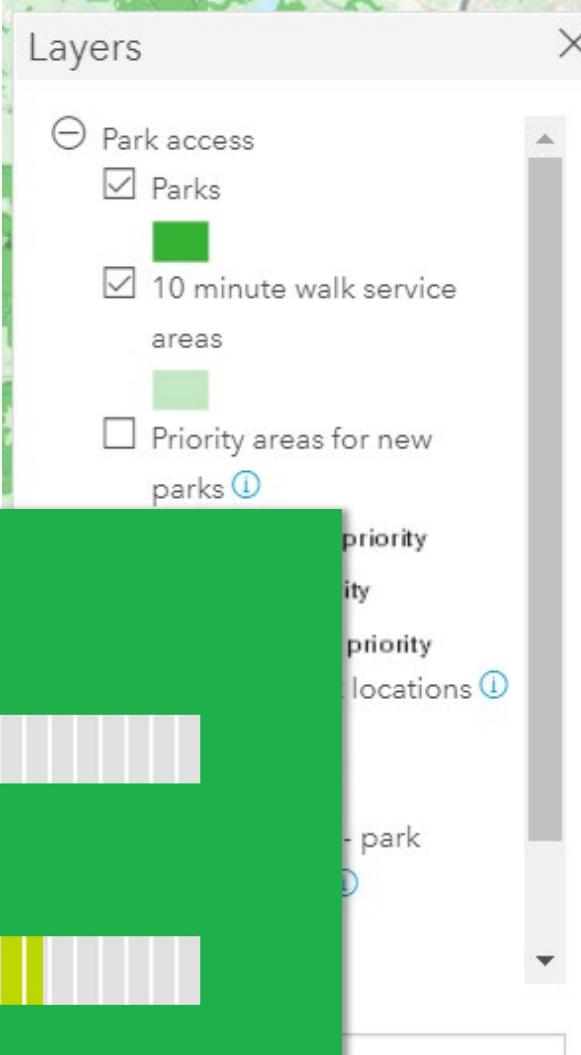
### ACREAGE ⓘ

47 out of 100



### AMENITIES ⓘ

65 out of 100



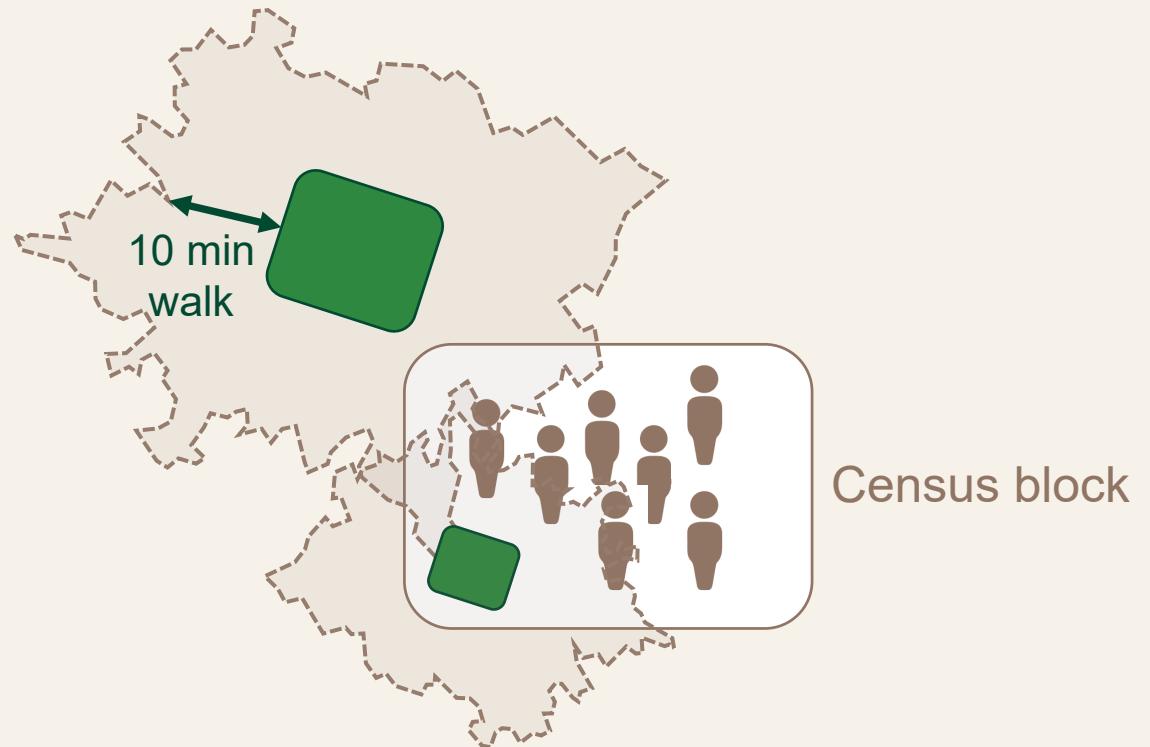
# Nuancing Park Access Methodologies

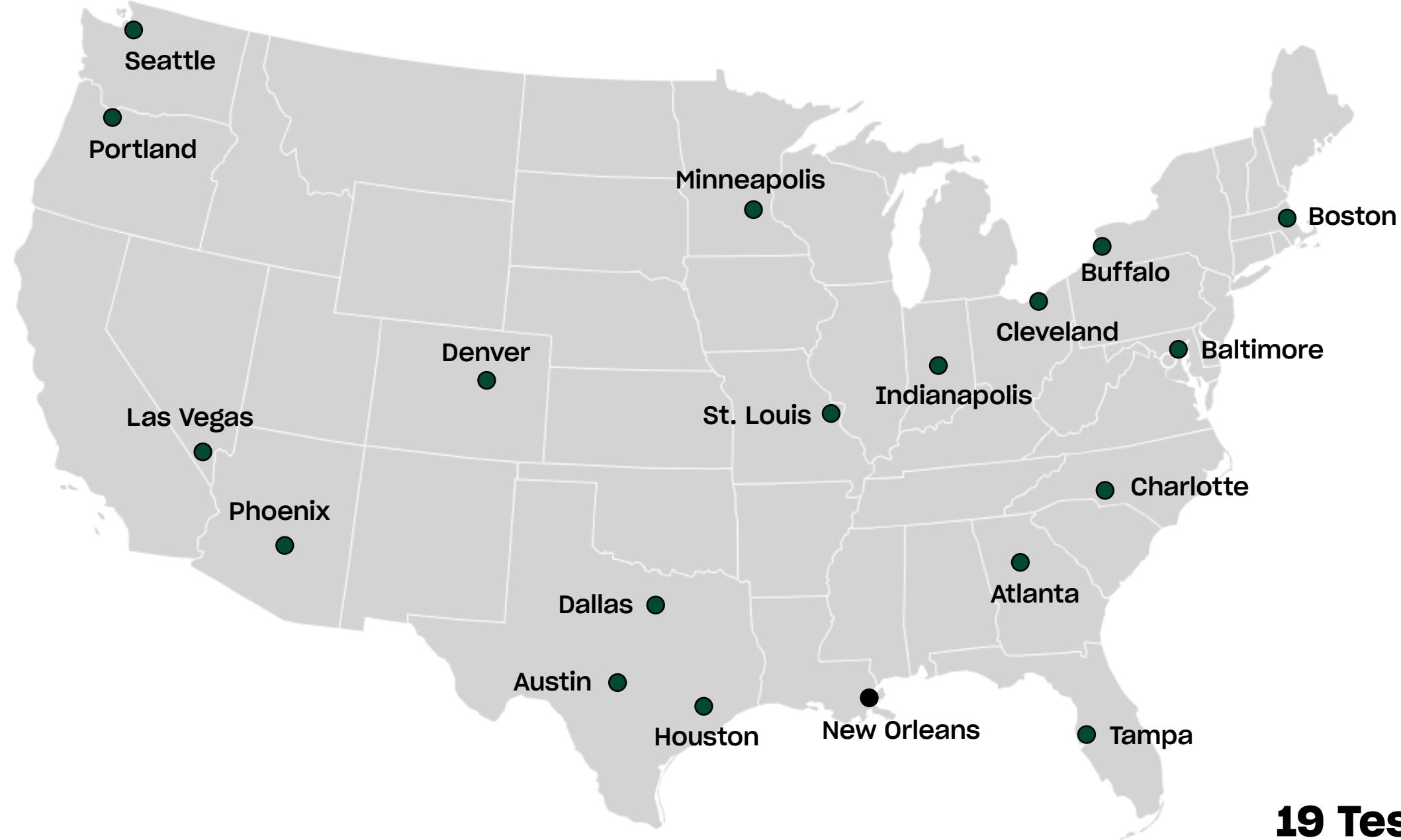
## Existing Standards



## Project Methodology

**Parkland per thousand residents**  
+ Consideration of demographic data





**19 Test Cities**

# Data Used

Trust for Public Land (TPL)

## Shapefiles:

Parks nationwide

10 min walk isochrones

<https://www.tpl.org/parkserve/downloads>

US Census Bureau

## CSVs:

Population

Race

Poverty Rate

<https://www.census.gov/data.html>

## Shapefiles:

Census Geography

<https://www.census.gov/programs-surveys/geography.html>



# ParkServe® Data Downloads

ParkServe® Data is provided for download in a variety of file formats and configurations. Please click on the links below to begin your download, and be sure to review the applicable Legal Disclosure and Terms of Use below.

## Complete U.S. ParkServe® Dataset

ParkServe® Data is provided for download in a variety of file formats and configurations. Please click on the links below to begin your download.

- Shapefile
- ESRI File Geodatabase
- ParkServe® Schema 2020 (Excel format)
- ParkServe® Schema 2020 (ESRI File Geodatabase)
- ParkServe® MapServer

[ParkServe® Legal Disclosure and Terms of Use](#)

# Methodology

## 1. Pre-Processing

Join demographic data to Census Blocks

Select + save Census Blocks within 1/2 mile buffer of City boundary

Select + save parks and 10 min walk isochrones within ½ mile buffer of City boundary

Batch project all files using ogr2ogr

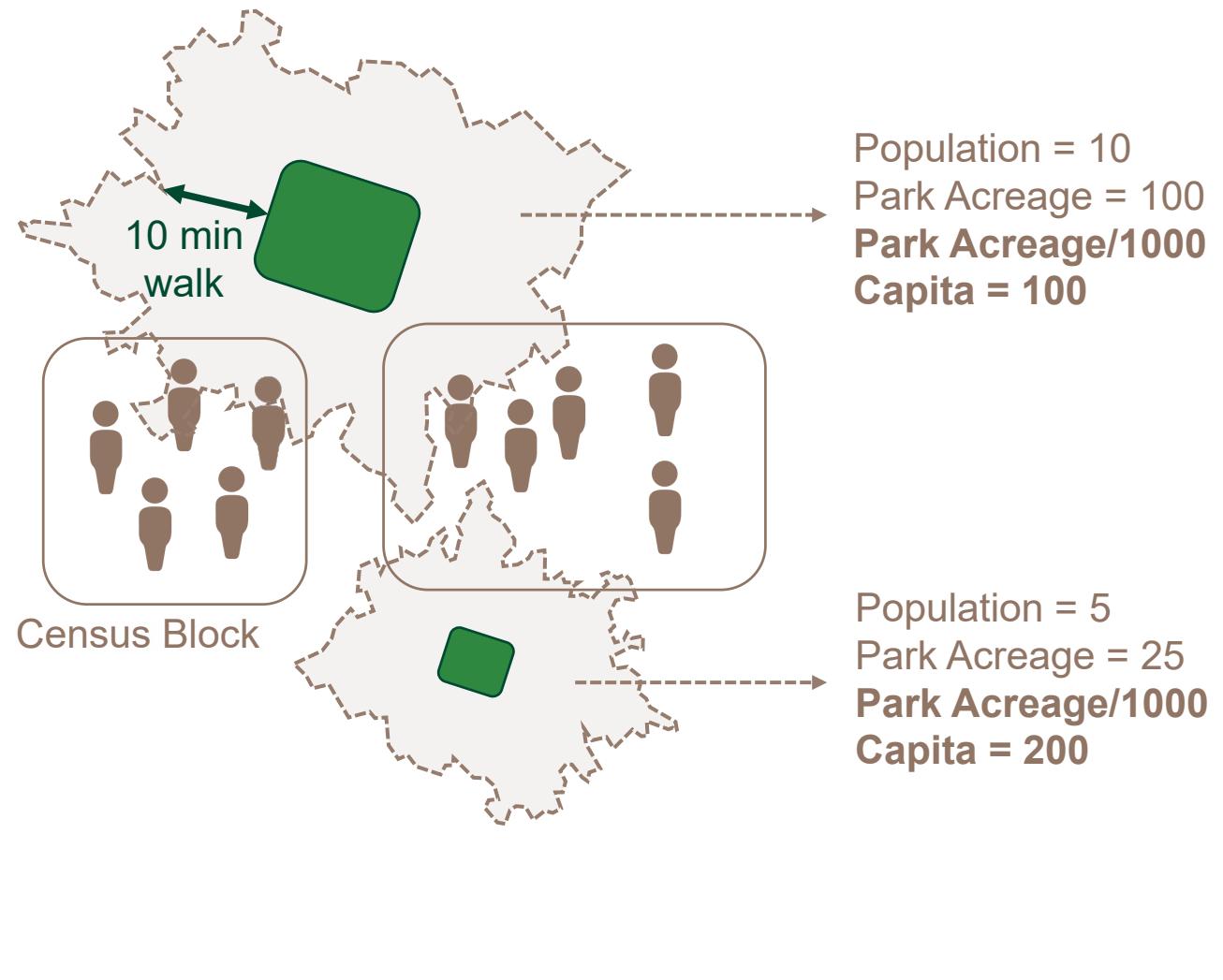
## 2. Calculate Parks Acreage / 1000 Capita for Each Census Block

Use PyQGIS to iterate through calculations for 19 cities

Summarize by Location: Summarize population within a Park's 10-min walk isochrone

For each Park's 10-min walk iso: Calculate park acreage/1000 capita

Summarize by Location: Summarize park acreage/1000 capita within each Census Block



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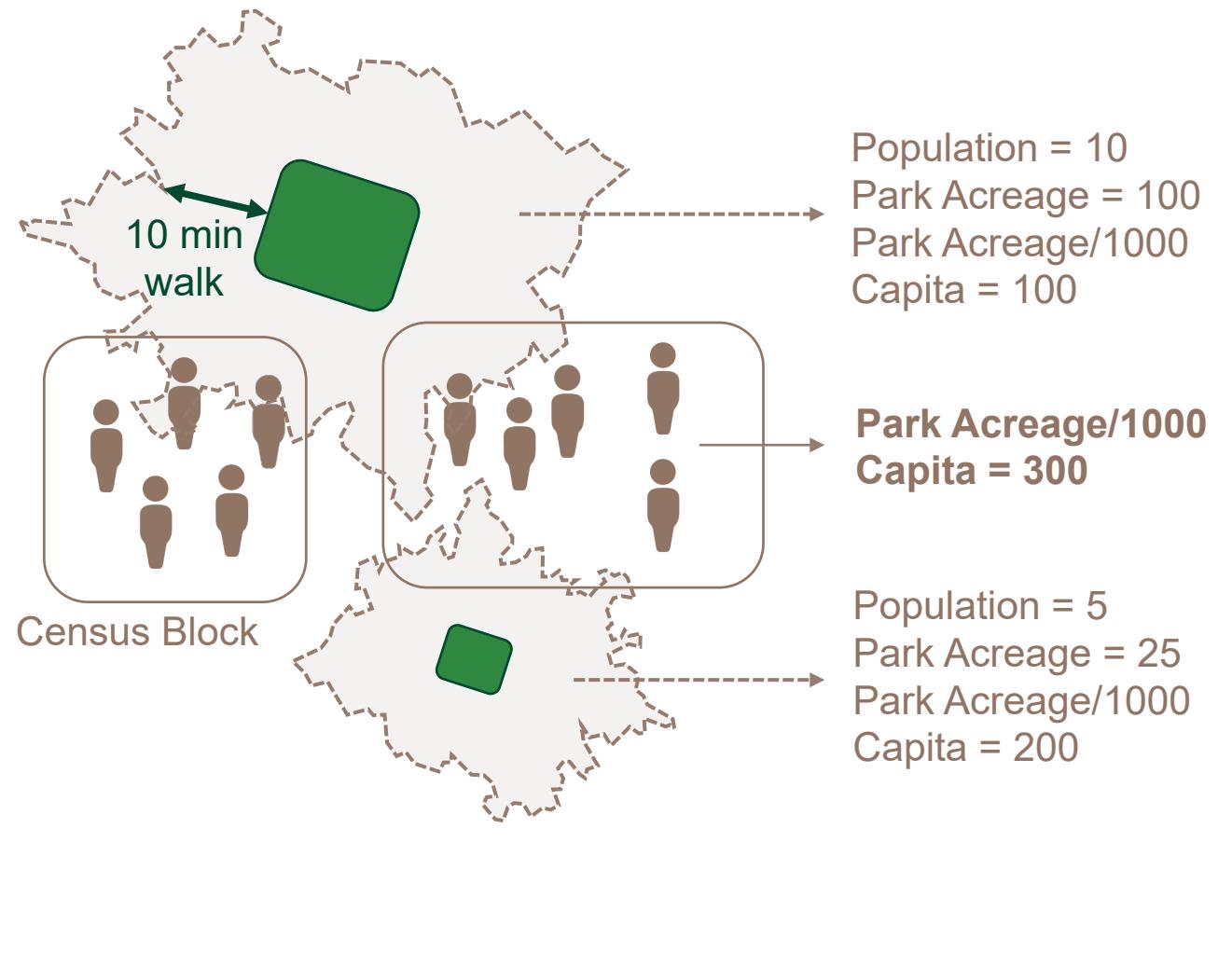
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Summarize by Location: Summarize park acreage/1000 capita within each Census Block



# Methodology

## 3. Deriving Low/High Park Access Clusters for Census Blocks

Use Rgeoda to iterate through local moran's I spatial autocorrelation for 19 cities

Export out new shapefiles with cluster results

Generate summary statistics by low/high park access cluster for race/ethnicity variables

## 4. Exploring Demographics in Low/High Park Access Clusters

What is the race/ethnicity breakdown within low/high access clusters?

How does this compare to the city-wide race/ethnicity breakdown?

## Quantifying Racial Disparities in Access Local Spatial Autocorrelation

### All Census Block Groups

Parkland Acres per thousand residents

**Low Parkland Areas**  
35% of city population lives here

(Somewhere in between)

**High Parkland Areas**  
12% of city population lives here

35% of city population lives here

12% of city population lives here

## Caveats

Underlying data still based on 10 min walk

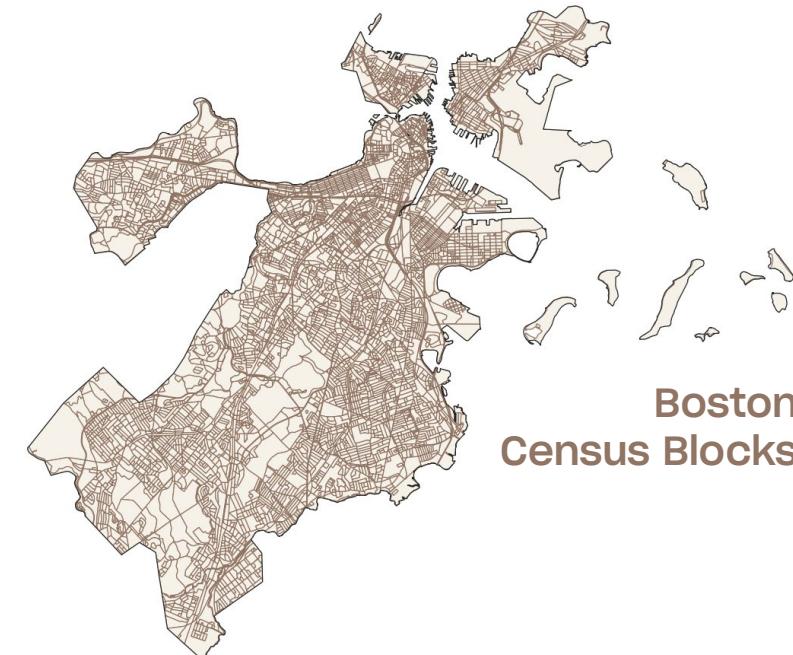
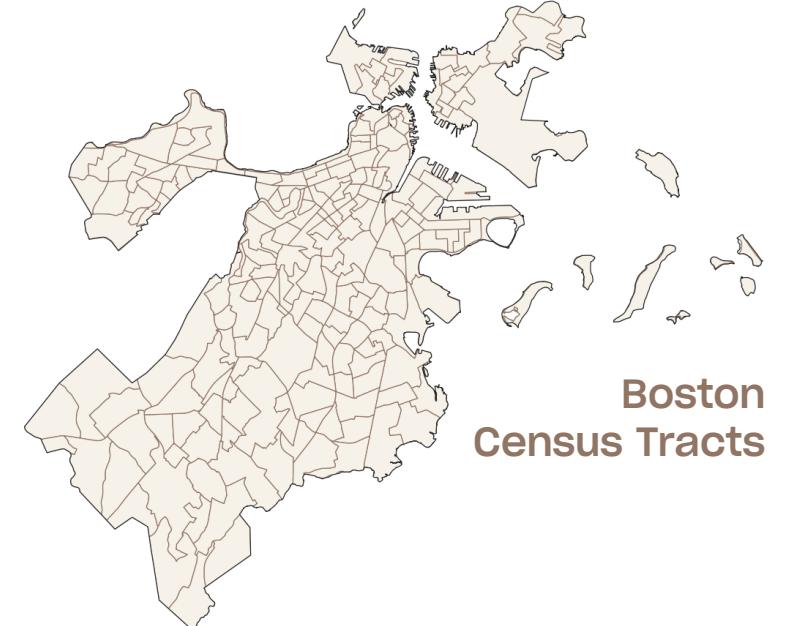
- Doesn't account for different walk/access sheds based on other factors: eg. Park size, park use
- Doesn't take into account people's ability to access to park beyond walking
- Missing other factors like park quality, which might be reflected through investment and amenities.

Census data was outdated at the time of the project

- 5-year American Community Surveys are only good to evaluate at the Tract level due to large margin of errors at smaller spatial units. But summary by locations at the Tract level did not generate meaningful clusters.
- Analysis used Census 2010 (Block level) and ACS 2012-2017 (Tract level) data to estimate Block level data for 2012-2017.
- This year, Census 2020 Redistricting Data Summary files have been released. Includes: Voting age, race, Hispanic or Latino origin, housing occupancy status, group quarters population by major group quarters type. Lowest level of geography is at the Census Block level.

Run time

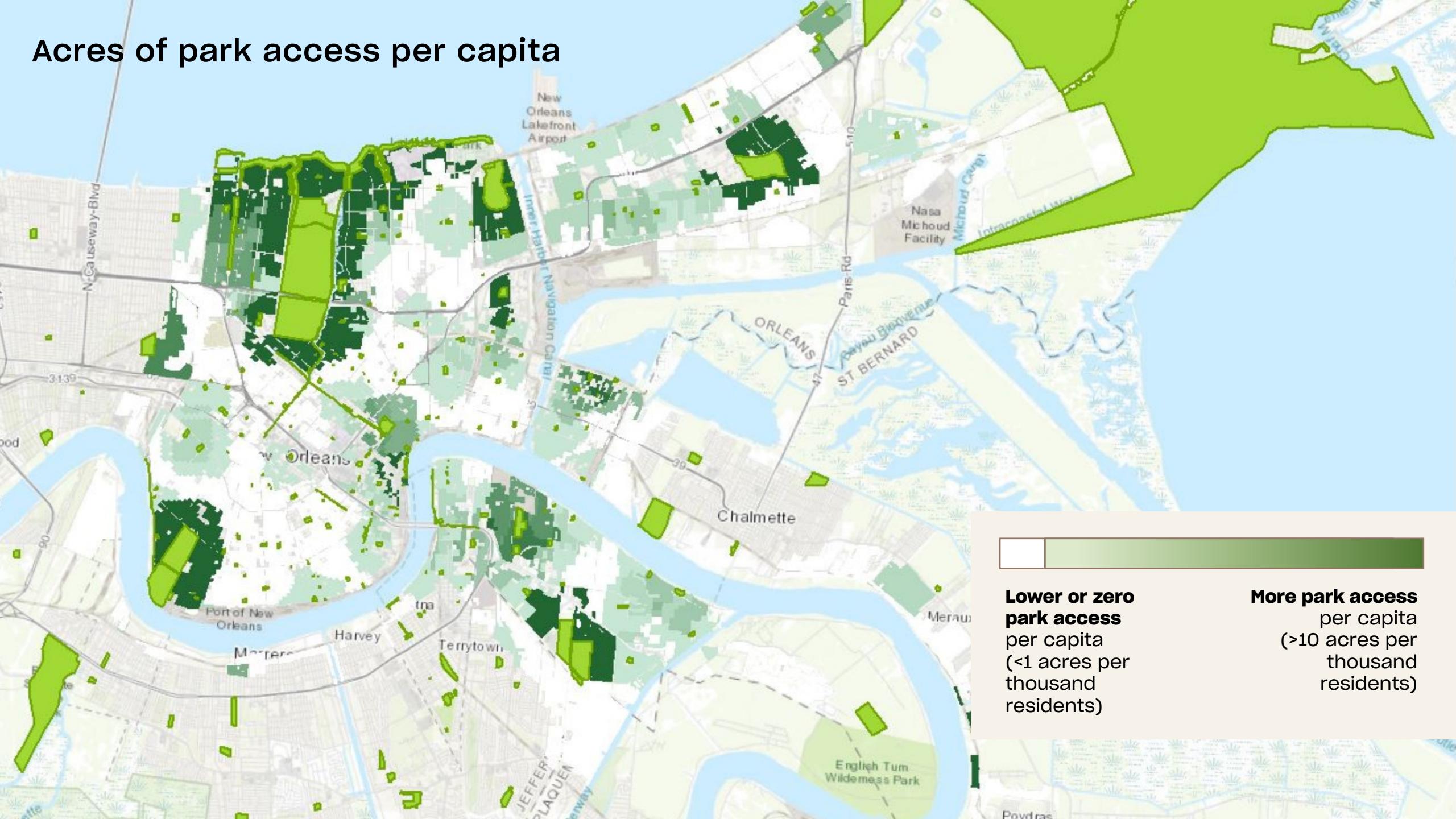
- The processing time in PyQGIS was slow. Would using PostGIS help reduce this processing time?



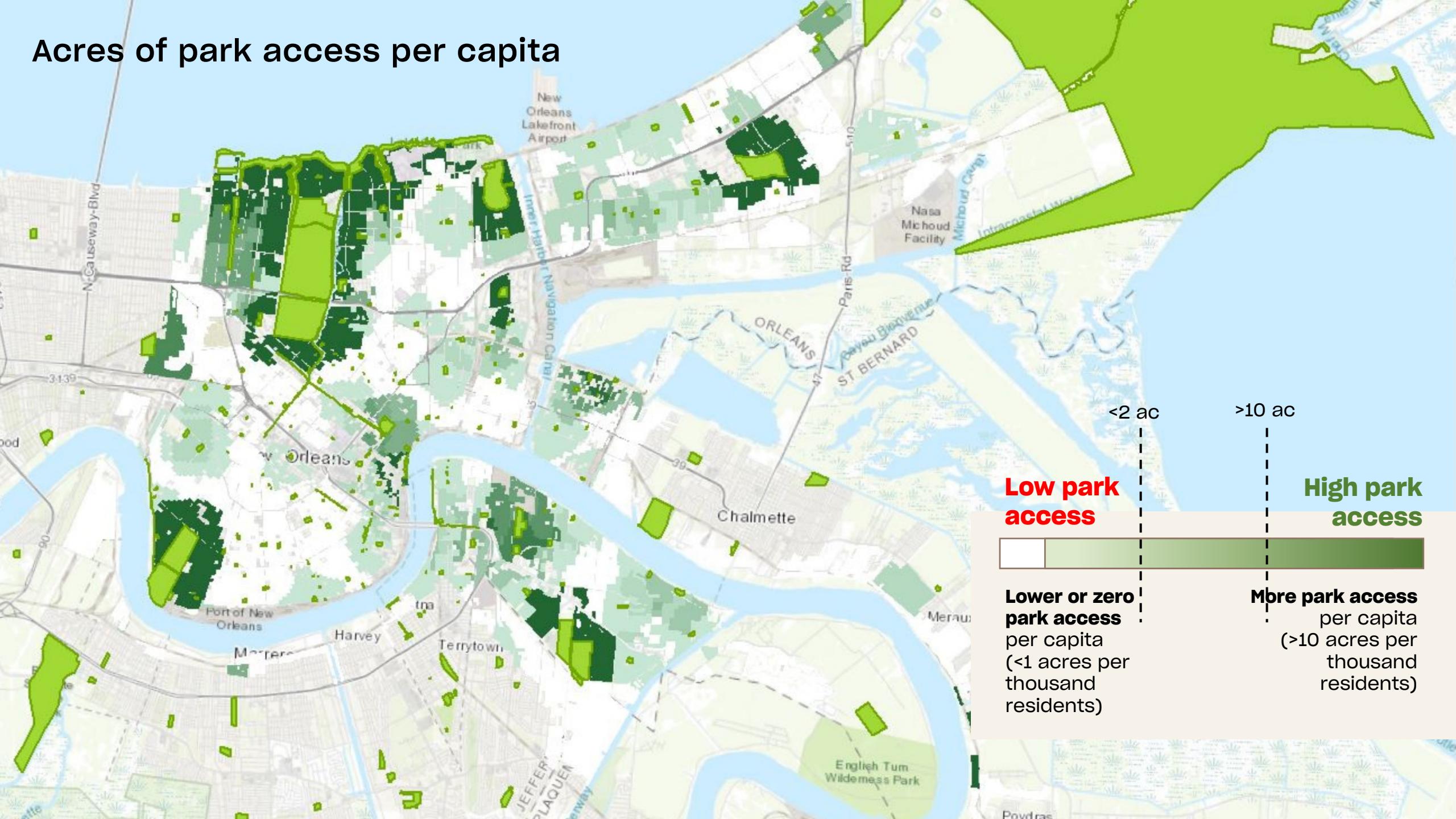
# Results



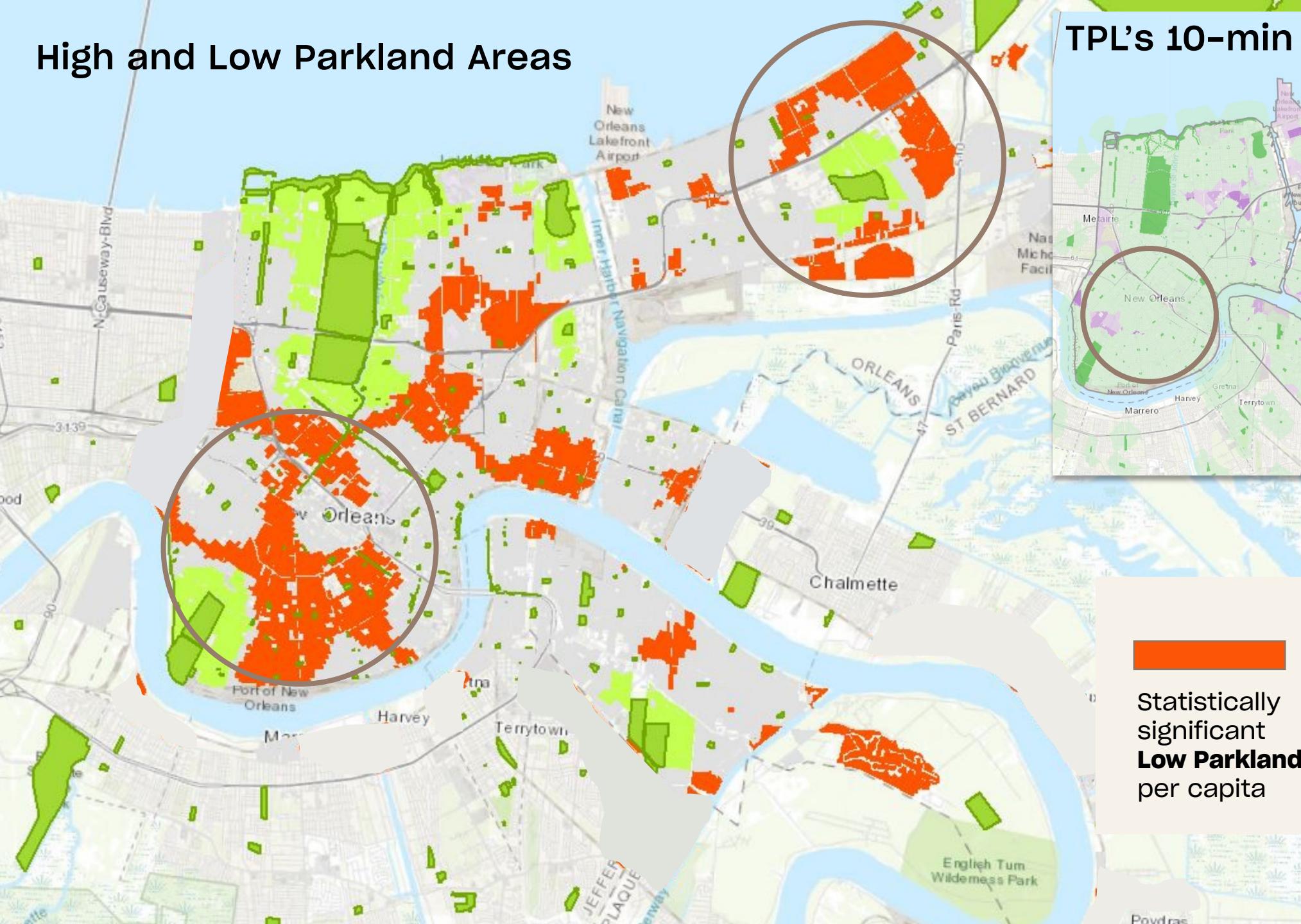
# Acres of park access per capita



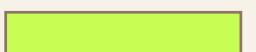
# Acres of park access per capita



## High and Low Parkland Areas



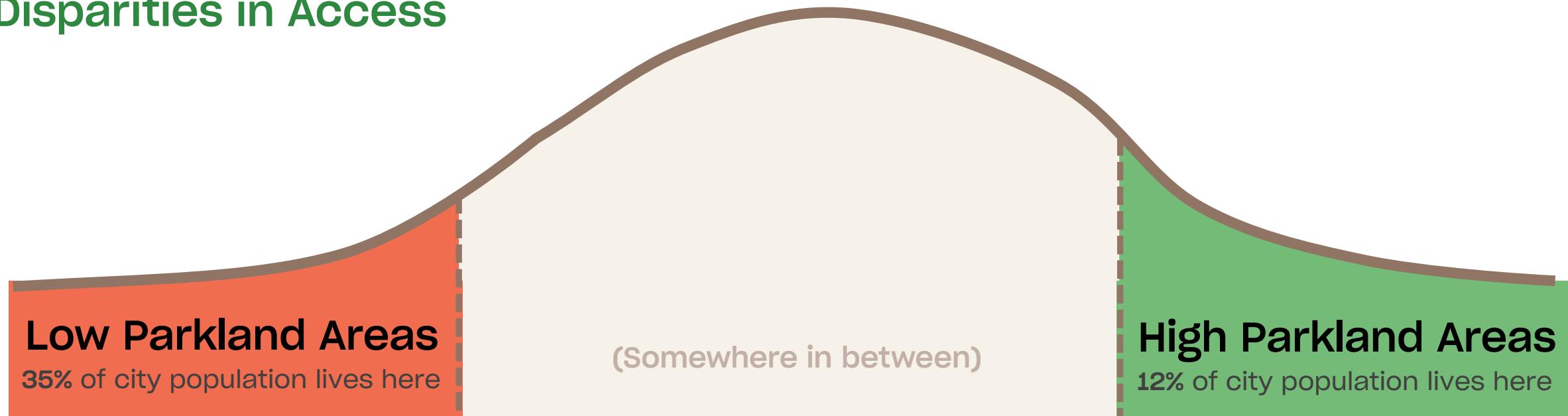
Statistically  
significant  
**Low Parkland**  
per capita



Statistically  
significant  
**High Parkland**  
per capita

# Quantifying Racial Disparities in Access

All Census Block Groups  
Parkland Acres per thousand residents

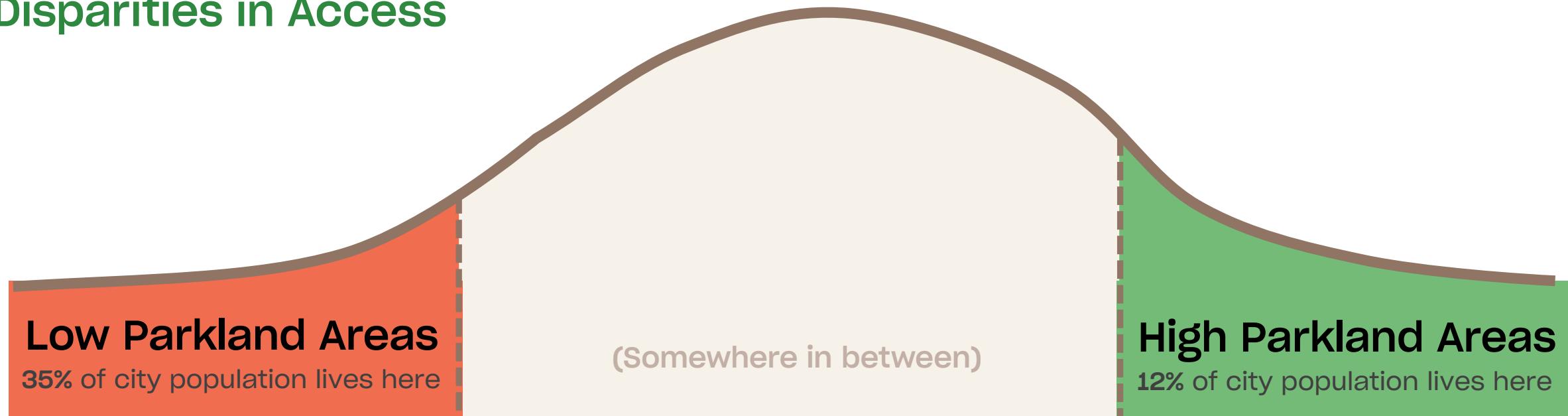


White	Black	Hispanic/ Latinx	Asian	Other/ Multi-racial
31%	59%	6%	2%	2%

White	Black	Hispanic/ Latinx	Asian	Other/ Multi-racial
55%	34%	5%	3%	2%

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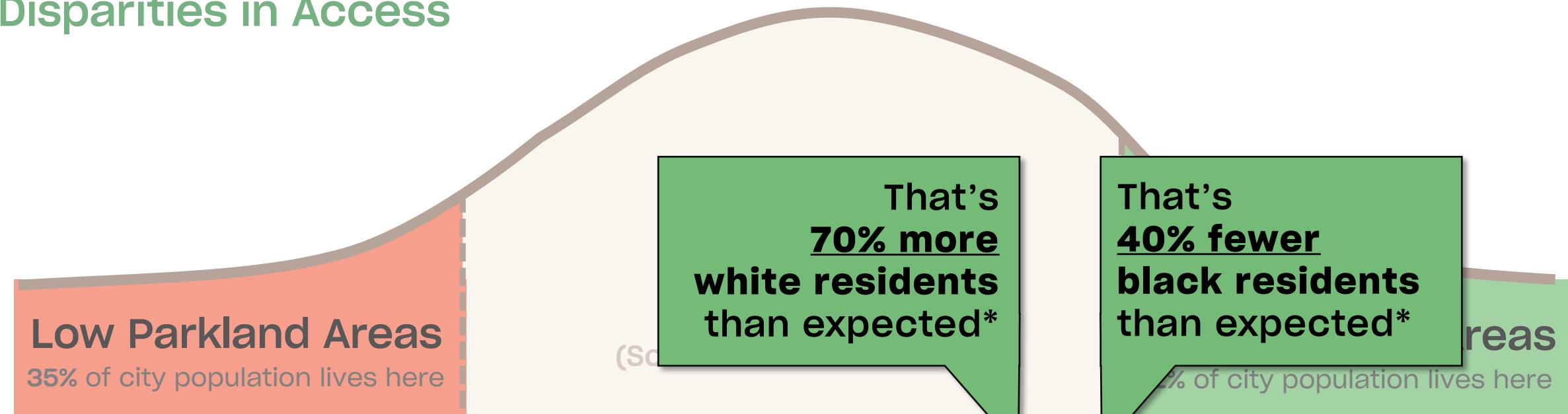
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Citywide Population Distribution

White	Black	Hispanic/ Latinx	Asian	Other/ Multi-racial
32%	56%	6%	3%	2%

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## Citywide Population Distribution

White	Black	Hispanic/ Latinx	Asian	Other/ Multi-racial
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\* "Expected" = percent of residents expected if the high parkland areas matched the citywide population distribution for that race (ex. 3% Asian residents in high parkland areas is expected because 3% of the citywide population in New Orleans is Asian.)

# Race / Ethnicity Dot Density Map

## Brighter Areas = Low Parkland Access



Where do we go from here?





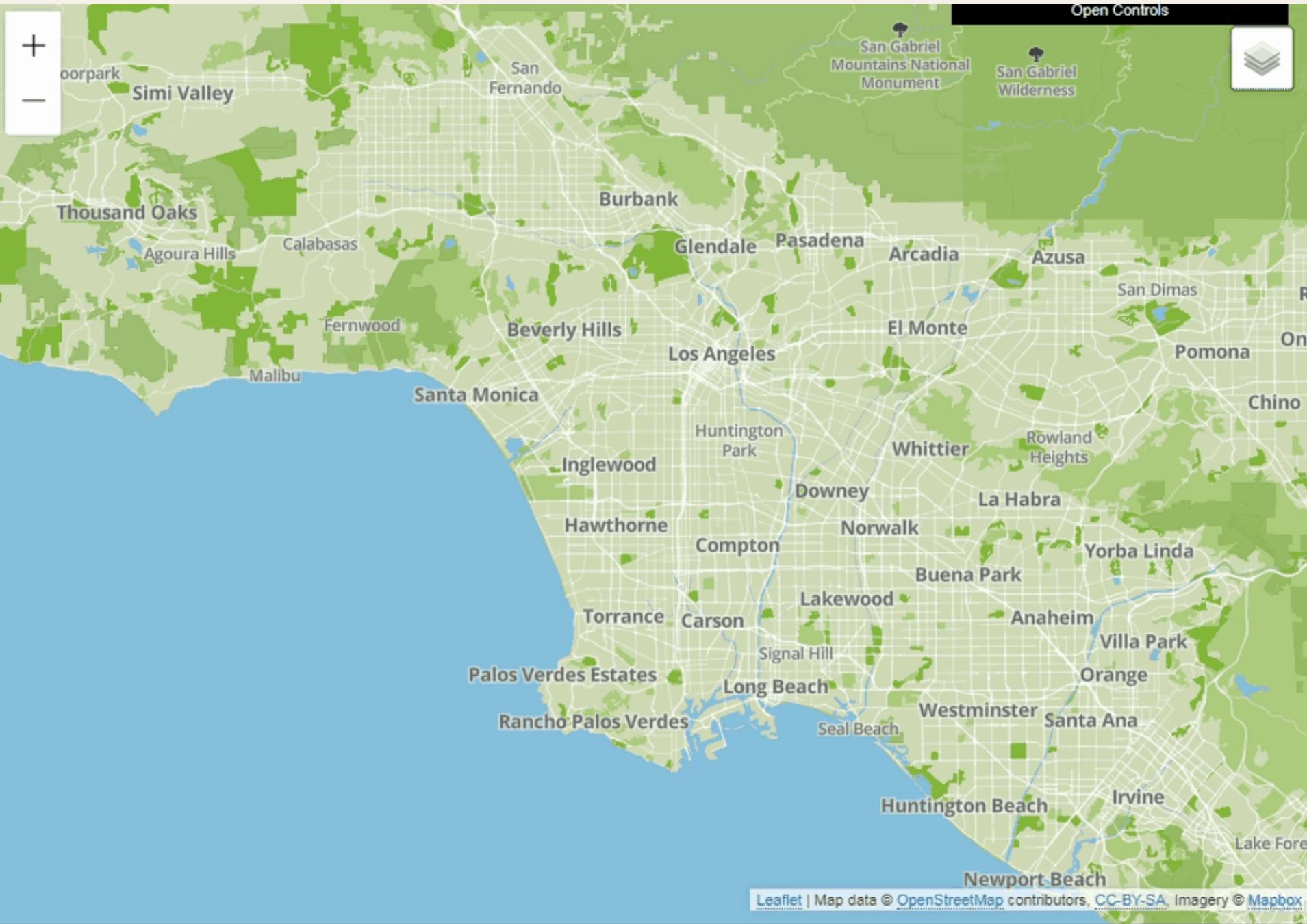
How could this be useful for city and park planners?

What did we learn during the process?

What are some next steps/future considerations?

- This methodology is simple, and a starting point for diving deeper into learning more about park access equity. Data is already available to run this analysis.
- Park quality data is lacking. How do we measure park quality?
- Other datasets to consider overlaying: redlining data from Mapping Inequality, historical events and policies that might have impacted how a city grows over time





# Thank You!

## Our Team

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<https://github.com/sasakiassociates/park-equity-analysis>



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Advisor

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