The Trust for Public Land's ParkScore® and ParkServe™

Mapping the Nation's Urban Parks and 10-Minute Walk Park Accessibility

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The Trust for Public Land

The Trust for Public Land’s (TPL) ParkScore® Project uses Geographic Information Systems (GIS) technology to analyze how well parks and public open spaces in the 100 largest cities in the United States are meeting residents’ needs for outdoor recreation and interaction with nature. TPL’s evaluation of the largest U.S. cities takes into account 10-minute walk park accessibility, the average size of parks, amount of park space, number of amenities (playgrounds, basketball hoops, dog parks, senior/recreation centers), and park spending per resident—providing a broad-based comparison of these park systems. These results and analyses are publicly available, allowing easy, detailed comparisons of some of the largest park systems in the country. TPL’s ParkServe™ project builds on the success of ParkScore, taking it to the nationwide scale. Upon completion in the spring of 2018, ParkServe will map urban park locations and 10-minute walk park accessibility nationwide, covering 80% of the US population. This information will be publicly available through the ParkServe website, along with several interactive spatial tools to aid in prioritizing urban park development and improvement. By showing how many residents are able to reach a park in a 10-minute walk, ParkScore and ParkServe pinpoint underserved neighborhoods and guide local leaders in determining where to site parks and focus resources.
INTRODUCTION

The Trust for Public Land (TPL) creates parks and protects land for people, ensuring healthy, livable communities for generations to come. TPL helps raise funds for conservation, aids in the protection and restoration of natural spaces, and works closely with communities to plan, design and create parks, playgrounds and protected natural areas. At TPL, we believe that quality parks are a key ingredient to achieving healthy, livable communities. Through award-winning GIS technology, ParkScore® and ParkServe™ help cities, towns and communities visualize the current park distribution and accessibility. Each project is central to meeting The Trust for Public Land’s goal that everyone, from big cities to small towns, live within a 10-minute walk of a quality park, playground or protected natural area. By showing how many residents are able to reach a park in a 10-minute walk, ParkScore and ParkServe pinpoint underserved neighborhoods and guide local leaders in determining where to site new parks and focus restoration initiatives.

TPL’s ParkScore® project uses Geographic Information Systems (GIS) technology to analyze how well parks and public open spaces in the 100 largest cities in the United States are meeting residents’ needs for outdoor recreation and interaction with nature. ParkScore began in 2012, and included the 40 largest cities in the US in its analysis and final rankings; it has since grown to include the 100 largest cities in the US. Incorporating data from TPL’s Center for City Park Excellence (CCPE) City Park Facts survey, the evaluation of these cities takes into account 10-minute walk park accessibility, the average size of parks, amount of park space, number of amenities (playgrounds, basketball hoops, dog parks, senior/recreation centers), and park spending per resident. The analysis results and rankings provide city officials and the public with a broad-based comparison of some of the largest park systems in the country. TPL’s ParkServe™ project builds on the success of ParkScore, taking its measure of 10-minute walk park accessibility to the nationwide scale. Upon completion in the spring of 2018, the first-of-its-kind ParkServe database will include and map park locations and 10-minute walk park accessibility for nearly 14,000 cities, towns, and communities in the US.

TPL’s ParkScore and ParkServe projects address several key issues regarding equitable access to parks, playgrounds and protected natural areas. Results from both projects are, or will be, publicly accessible alongside some of TPL’s advanced spatial web tools to help city officials and the public answer questions, such as:

- Where are my city’s parks and who can access them?
- How does my city’s park system compare to our neighboring cities?
- Which cities are investing the most in the improvement of their park systems?
- Which city park systems are most equitably distributed?
- How does access to parks affect public health?
METHODOLOGY

Key Terminology

Geographies

*Place* – a United States Census Bureau defined geography that includes incorporated places and census designated places

- *Incorporated place*: an area with an established government serving a group of people within a defined boundary
- *Census designated place*: an area that is not legally incorporated, but delineated for statistical purposes, usually in cooperation with local officials

*Urban area* – a United States Census Bureau defined geography that includes both urbanized areas and urban clusters; the areas delineated must meet certain criteria, combining minimum measures of population density and total population while also adhering to urban land use requirements

Technical Terms

*GIS (Geographic Information System)* – a system designed to capture, store, manipulate, analyze, manage and present spatial or geographic data

*Attribute* – a descriptive element defining a property of a spatial polygon, such as park name, land owner, and public accessibility

*Modeling* – analysis process that manipulates data using GIS scripts and tools to produce a graphic, statistical, and/or geographic output

*10-Minute Walk* – a half-mile distance from the perimeter of a park, measured using the public walkable road network and uninterrupted by physical barriers such as highways, train tracks, and rivers

Tools

*ParkEvaluator®* – this is a standalone tool that is currently integrated into the ParkScore website and will be integrated into the ParkServe mapping application; the tool allows a user to sketch a project boundary and calculate a dynamic 10-minute (1/2 mile) walkable service area and calculates the number of people served within that area. After running the tool, the user can also create a report with detailed demographic stats and a map image of the project

*ParkReviewer™* – this is a standalone tool that will be integrated into the ParkServe mapping application and allow a user to correct errant park boundaries, amend park attributes (i.e. name, type, access status), and add parks missing from the ParkServe database
ParkOptimizer – this is a modeling output included in both the ParkScore website and ParkServe mapping application that shows suggested locations to add a park, ranked based on the highest number of new residents served within a 10-minute walk

ParkScore®

The ParkScore ranking system is based on three important characteristics of an effective park system: acreage, facilities and investment, and access. The Trust for Public Land’s CCPE survey, published annually as the City Park Facts Report, includes data on acreage, investment and basic facilities within each park system.¹ The ParkScore GIS team, using award-winning GIS technology, provides the 10-minute walk access component. Each year, the team reaches out to their partners at each of the 100 cities to collect new/updated GIS data and information about changes within a park system. These changes, if any, then undergo a detailed review to ensure quality control. Land owned by regional, state and federal agencies, including schoolyards and greenways, is considered and reviewed by the ParkScore team. Lastly, the qualifying data is integrated into the existing datasets for each city and the 10-minute walk is recalculated for each park.

Scoring²

Cities can earn a maximum ParkScore of 100. Each of the three characteristics mentioned above are weighted equally – allowing for a maximum of 40 points per category. The breakdown of the 40 points for each category is described below. The total score of 120 is then normalized to a score out of 100.

Acreage (40 points)

- Median park size (20 points)
  - This is calculated using park inventories acquired from park-owning agencies within each city.
- Parkland as a percentage of city area (20 points)
  - Unpopulated railyard and airport areas are removed from the baseline city land area.

Facilities and Investment (40 points)

- Spending per resident (20 points)
  - Spending measures include capital and operational spending by all agencies that own parkland within the city limits, including federal, state, and county agencies. These figures reflect agency spending on solely parks and recreation, however,

¹ 2017 City Park Fact Report can be downloaded here: https://www.tpl.org/2017-city-park-facts#sm.000005pfdqboe7cu9i8ktp7znt6
² Scoring descriptions adapted from ParkScore website: http://parkscore.tpl.org
and do not reflect the significant spending in other capacities that some park agencies are responsible for throughout their cities.

- Average per capita provision of 4 key amenities (20 points)
  - The four amenities included, chosen because of the breadth of users served as well as the ease of accurate counting of these measures, were basketball hoops, dog parks, playgrounds and recreation and senior centers.

Access (40 points)

- The 10-minute walk is defined as entirely within the public walkable road network and uninterrupted by physical barriers such as highways, train tracks, and rivers.\(^3\)
- Access is further broken down through several demographic lenses, such as age, income and race/ethnicity. The demographic access statistics are provided through the ParkScore website, but not factored into the scoring of each city.

Mapping\(^4\)

In addition to providing each city with a score and ranking, cities can view their parks and 10-minute walk service areas through a mapping application on the ParkScore website. Also displayed in this map are gaps in park accessibility, or park need. All populated areas in a city that fall outside of a 10-minute walk service area are assigned a severity of park need, based on a weighted calculation of three demographic profiles provided by Environmental Systems Research Institute (Esri), through their 2016 Forecast Census Block Groups demographic data:\(^5\)

- Population density - weighted at 50%
- Density of children age 19 and younger - weighted at 25%
- Density of individuals in households with income less than 75% of the city median household income - weighted at 25%

Results\(^6\)

The image on the next page shows the scoring breakdown and map results from Minneapolis, MN and Indianapolis, IN, the best and worst ranked cities from ParkScore® 2017, respectively.

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\(^3\) Learn more about the 10-Minute Walk methodology here: [http://parkscore.tpl.org/Methodology/TPL_10MinWalk.pdf](http://parkscore.tpl.org/Methodology/TPL_10MinWalk.pdf)

\(^4\) Mapping descriptions adapted from ParkScore website: [http://parkscore.tpl.org](http://parkscore.tpl.org)


\(^6\) Results from ParkScore® 2017
## Minneapolis, MN

**ParkScore: 87.5**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Population</th>
<th>Average</th>
<th>Spending</th>
<th>Facilities</th>
<th>Access</th>
<th>New Score</th>
<th>ParkScore</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>403,882</td>
<td>28</td>
<td>20</td>
<td>18</td>
<td>39</td>
<td>105</td>
<td>87.5</td>
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</tbody>
</table>

- Median Park Size: 13
- Parks and Recs: 15

## Indianapolis, IN

**ParkScore: 28.5**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Population</th>
<th>Average</th>
<th>Spending</th>
<th>Facilities</th>
<th>Access</th>
<th>New Score</th>
<th>ParkScore</th>
</tr>
</thead>
<tbody>
<tr>
<td>98</td>
<td>857,203</td>
<td>24</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>34</td>
<td>28.5</td>
</tr>
</tbody>
</table>

- Median Park Size: 19
- Parks and Recs: 5

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*Legend: Basketball Hoops, Dog Parks, Parks and Recs, Playgrounds, Recreation/Cultural Centers.*
The ParkServe project will create the first nationwide urban park and park accessibility database, which will include data for nearly 14,000 cities, town, and communities, hereafter referred to as places. There are four main components to the ParkServe project:

1. Data Collection and Data Creation
2. Data Translation
3. Draft 10-Minute Walk Modeling and Data Verification
4. Final 10-Minute Walk Modeling

Due to the magnitude of the project, it was necessary that each of these four components be carefully designed, tested and implemented to ensure accurate progress tracking and quality control. The following sections will break down the ParkServe methodology, and describe how each of the four components was designed.

Data Collection

For each of the places, the ParkServe Team collects a GIS contact (example departments: GIS, Information Technology, Planning) and parks contact, usually from the parks department. Each contact is sent an email informing him or her of the project and requesting GIS data, maps, and address lists of publicly accessible parks, open spaces, greenways, trails, and any other park related information. Place contacts are followed-up with as deemed appropriate, based on the population of the place and/or the number of parks listed on their website. If we receive GIS data, the place is moved forward to the Data Translation process; otherwise, it moves to Data Creation.

The ParkServe Team also reached out to nearly 2,500 counties and over 400 metropolitan planning organizations (MPOs), following the same progression as described above, in hopes that they may have data at the municipal scale. The ParkServe contacts database currently has more than 15,000 unique entries.

Data Creation

The ParkServe team manually created GIS data for all places that either did not respond to the collection email(s), or did not have data to provide. In fact, more than 85% of all places required manual data creation. Many places that did not have GIS data, however, were able to provide us with maps or lists of their parks with addresses, which sped up the data creation process significantly.
To create the park data for each place, we used a process called “heads-up digitizing”\(^7\) where geospatial data is created by drawing digital polygons using reference imagery\(^8\) that represent the park areas. The adjacent image demonstrates a park polygons being digitized.

After each park polygon has been created for a place, that data is moved forward to Data Translation.

**Data Inclusion/Exclusion**

**Collected Data**

For data received for a place, we will include all properties that provide active or passive recreational opportunities in the ParkServe database except for golf courses, cemeteries, and schools. Properties with private landowners such as HOAs, tribal lands, churches, universities, and military bases, are marked as not open to the public, unless otherwise noted. All publicly owned properties, such as city, county, state, and national parks are marked as open to the public unless otherwise noted.

**Created Data**

Publicly owned properties are prioritized by the ParkServe Team in the creation process. However, if a privately owned property is listed as open to the public or deemed publicly accessible through research, it is manually digitized. This research includes the use of city and county websites as well as reference imagery and parcel data.

**Exceptions for ParkScore Cities**

For data collected through ParkScore, golf courses and cemeteries are removed. However, school parks are uploaded into the ParkServe database because to include school parks in their data and ranking, ParkScore cities must send a joint-use agreement stating that the school properties are open to the public after school hours. ParkScore cities are the only exception to excluding schools in the ParkServe database.


\(^8\) ESRI World Imagery, OpenStreetMap, GoogleMaps, CoreLogic ParcelPoint
Other Cases of Note

Parks/open space/recreation properties that are open to the public but require a fee are labeled open to the public, but the fee is noted in the database. Parks/open space/recreation properties that are open to the public with known limited operating hours are labeled public access, but the limited operating hours are noted in the database.

Data Translation

Data translation is the process of transforming and uploading created and collected parks data to fit into the standardized database schema created for the ParkServe project. This method is done using GIS software, Microsoft Excel, and several custom-built tools. The translation process includes detailed quality control of each polygon and standardization of all park attributes, so data can be seamlessly combined in later steps.

Data Modeling and Verification

Draft Modeling

After all data is reviewed and standardized, draft 10-minute walk service areas are created for each park in the urban area. These service areas are unique in that they are created by calculating half mile distances along a walkable street network, rather than drawing a circle with a half mile radius around each park. This is the same methodology as described above in the ParkScore “Access” section.

Data Verification

The verification process provides an opportunity for each place to review the ParkServe data prior to publication, and make any necessary edits. For each place, a park and GIS contact are emailed requesting review of the parks using the ParkServe ParkReviewer™ application. The same contact collected during the data collection process are used in this process. Once contacted, each place is given three weeks to review the data before it is removed from the online tool. Following the three week verification period, each edit made through the ParkReviewer™ is reviewed by the ParkServe team. All accepted edits are then saved to the ParkServe database.

Final Modeling

Using the 10-minute walk methodology described above, the ParkServe team re-models the 10-minute walk service areas for the verified park dataset. The gaps illustrated by these service areas are then analyzed to measure park need using the same methodology as described above in the ParkScore® “Mapping” section. The below images demonstrates ParkServe analysis results for the Seattle urban area, which includes around 140 individual cities, towns and communities. The City of Tacoma, WA and the City of Kirkland, WA are highlighted to demonstrate what the
analysis will look like for each place on the ParkServe website. In addition to the sample image shown, displaying parks, service areas, and park need, each place will be provided with the percentage of its residents within a 10-minute walk of a park.
IMPROVING LIVABILITY

Each year, ParkScore® provides a broad-based comparison of some of the largest park systems in the country. This ranking systems provides city officials with a unique evaluation of their city’s park system and provides park planners, park advocates, and local residents with the tools they need to advocate for more parks, playgrounds and protected natural areas in their city. When ParkServe™ is fully released in the spring of 2018, the 10-minute walk access analysis will expand to include nearly 14,000 cities, towns and communities, providing the same evaluation of how well a park system is meeting the needs of its neighborhoods. Each of the nearly 14,000 places will be provided with the percentage of residents currently within a 10-minute walk of a park and an age, income and race/ethnicity breakdown of that percentage. This analysis from TPL has traditionally cost cities nearly $5,000 to complete. Users will also be able to compare these statistics to those of their encompassing urban area as well as neighboring cities, towns and communities.

The Trust for Public Land believes that everyone, whether they live in a low-income neighborhood, are of a minority population, or are seniors, should have access to a park, playground, or protected natural area within a 10-minute walk. Research shows that people living near parks exercise more often and more vigorously.9 Parks can act as restorative and peaceful places to relieve stress and encourage positive mental health.10 Access to active landscapes like bike/running paths, recreation fields, and fitness zones can widely improve physical health and prevent diseases associated with poor lifestyle habits. Additionally, parks and green spaces can help to promote a sense of community and social interaction through involvement in community events or connection through shared activities.11 Using the data and results from ParkScore and ParkServe, neighborhoods and communities with poor park access are easily identified. Improving park access in areas of need will contribute to the quality of service provided by a city’s park system, but also greatly benefit the physical and mental health of its neighborhoods and communities. These findings can be coupled with geographic health data, such as unhealthy behaviors and preventative service use, to help cities and partner organizations target health initiatives towards the neighborhoods most in need.

The 10-minute walk gap analysis provides cities, towns, and communities with a look into how their park systems is serving residents – but it does not measure the quality of those parks, or how well each is suited towards the needs of its surrounding neighborhoods. More data is needed to accurately reflect what is inside the boundaries of a park. What condition is it in? What amenities does it offer? ParkScore provides a glimpse into basic amenities per capita by city; future phases of the ParkServe database will include amenity data by individual park to help evaluate what types of activities are available at each park and how amenities are distributed throughout each city, town or community. Furthermore, future phases of the ParkServe database

11 Abraham, et al. (Landscape and well-being, 2010).
will include park quality metrics. How well is the park designed? How safe is the park? Research shows that parks with more amenities that have been recently renovated are more likely to be used. Both park amenities and park quality metrics will be partially collected through crowdsourcing – so city, town and community residents can advocate for new or updated parks and protected lands, to ensure healthy, livable communities for generations to come.

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12 Parks and Health Brochure. The Trust for Public Land. 
REFERENCES


