How We Did It

Assessing Public Safety as a Function of Light in Fort Lauderdale, FL

Executive Summary

Public safety is a concern in every city across the country. In Fort Lauderdale (FTL), community concerns that darkness is contributing to public safety issues prompted a deeper look into lighting and crime patterns in the city. The goal was to understand where FTL could leverage additional lighting and/or smarter lighting repair schedules to reduce public safety issues and improve the perception of safety among residents.

As a result of the analysis, the Center for Government Excellence (GovEx) identified the following key findings:

Key Findings:

- ***The perception of public safety in Fort Lauderdale is positive:*** According to the neighbor survey conducted from 2012 through 2015, FTL is broadly viewed as a safe city by its own residents.

- ***Fort Lauderdale does <u>not</u> have a viable comprehensive inventory of its own lighting infrastructure:*** To properly understand the relationship between lighting levels and public safety, FTL would need a complete inventory of all lighting infrastructure. However, the project team was provided access to geospatial data about the lights owned by Florida Power & Light (FP&L). Data about city-owned lights was either not available or not tagged to geospatial coordinates, making them unusable.

- ***Based on old FP&L data, there is no demonstrable pattern of crime as it relates to lighting levels:*** Mapping decade-old data about lights owned by FP&L demonstrates that there are no major dark spots in the city; moreover, geographic distribution of violent crimes show no real hotspots that overlap the dark areas of the city that do exist.

Background & Context

Leaders in the City of Ft. Lauderdale (FTL), Florida are continuing efforts to build a politically and operationally sustainable intelligence/decision-support capacity while innovating the delivery of city services to benefit residents. To that end, the city continues its performance management practices with the ongoing implementation of FL^{2}STAT, cross-cutting cylinder meetings, and integrated performance management metrics across divisions and departments. The city has a very comprehensive strategic vision with its Fast Forward Fort Lauderdale Plan,

and a Structural Innovation (SI) team which is advancing performance analytics practices to inform decision making across the city, particularly at the City Manager level. Because their performance management practices were already robust, the city's scope of work with What Works Cities (WWC) focused on increasing the accessibility of city data to residents and on helping them build out a robust analytics capacity.

To that end, GovEx, its partners, and the City of Fort Lauderdale held discussions to determine the potential for an advanced analytics scope of work. On March 31, 2016, the leadership in Fort Lauderdale signed a Memorandum of Understanding committing themselves to an Analytics Kickstart engagement with GovEx.

Summary of Analytics Kickstarts

Using support from Bloomberg Philanthropies, the Johns Hopkins University Center for Government Excellence ("GovEx") launched the GovEx Analytics Kickstart Program which includes three primary areas of work:

- **Direct Project Support:** Providing project-specific assistance on 1-3 projects in up to five (5) What Work Cities.
- **Guidance:** Targeted guidance to those cities interested in creating a sustainable analytics capacity with their administration.
- **Replication Promotion:** Promoting the replication of underlying fundamentals which enable the success of risk identification projects like those featured here.

GovEx uses the Analytics Kickstart Program to demonstrate the value and feasibility of an analytics program. This program provides genuine improvements in government service delivery via data analytics, as well as building the foundation for a politically-resilient data and evidence driven decision support infrastructure. The selection of cities contemplates readiness based on the maturity of a city's current use of data and evidence. To ensure successful deployments, all Kickstart cities must demonstrate their readiness and commitment from a political, cultural, legal, & technological standpoint. However, it is normal that participating cities have not expressly addressed these requirements during the initial phase of the deployment. Thus, it is sufficient to determine that (1) leadership has committed to the program, and (2) data is available to be leveraged.

Identifying the Right Challenges and Opportunities

Before arriving on the ground in Fort Lauderdale, the GovEx team conducted preparatory calls with city staff, getting a sense for project opportunities that would be supported, and driven, by city leadership. On May 26th and 27th, 2016, GovEx conducted a site visit with several members of the city's leadership team to discuss further opportunities to help build decision-support capacity. The discussions included: City Manager Lee Feldman; Assistant City Manager Stanley Hawthorne; Structural Innovation team members Paula Romo, Toy Beeninga,

and Kristin Tigner; and GovEx team members Sheila Dugan, Sophia Dengo, and Carter Hewgley; and WWC Fellow Mike Flowers. The meetings concluded with an in-depth conversation with about their priorities for open data and analytics. As a result of this legwork, GovEX and the City of Fort Lauderdale landed on a mutually agreeable scope and collaborative working agreement.

By speaking to city leadership, including members of the Parks and Recreation Department, we learned the City of Ft. Lauderdale desired to be a safe, pedestrian friendly city for all residents by improving its intelligence around street lights. According to the city, they regularly survey residents and claim street light inadequacy is a top complaint among respondents. The Department of Parks & Recreation manages street lighting for the city's residential neighborhoods and parks, but lacks an adequate parcel-based map of the city's street lighting infrastructure which would enable numerous lighting optimization projects.

Building the capacity of the FTL team to understand its street lighting issues included these two major steps:

- Building Trusted Relationships with Stakeholders
- Accessing the Data

Building Trusted Relationships with Stakeholders

Analysis, if done well, requires relationships. The person mining the data for insights must begin with a foundational understanding of the context in which the data was created - which includes the people, culture, norms and business rules associated with service delivery - all best understood through an ongoing dialogue with those closest to the work and at critical programmatic decision points. At GovEx, we prioritize building strong trusted relationships with government partners as we support their efforts to improve services for residents.

GovEx invested several months working with Ft. Lauderdale's team on multiple fronts. First, GovEx began supporting the city's efforts to open its data to the public and share data with external stakeholders. Second, thank to the generosity of Bloomberg Philanthropies, GovEx provided two members of the Structural Innovation team with fully-funded scholarships to enroll in our Performance Analytics Tools & Techniques certificate course. Third, the GovEx team spent three days on the ground in FTL, providing face-to-face training to employees in multiple departments. Through multiple touchpoints, GovEx attempted to build relationships with city staff to strengthen GovEx's ability to understand the city's needs, habits, and working style. Unfortunately, the city experienced a large turnover of key staff in the Structural Innovation division which impacted project execution.

Accessing the Data

GovEx was able to access certain data sets from publicly available repositories. Fort Lauderdale's city boundaries, state roads, and Broward County address points were accessible from Broward County's online GIS portal.

Locations of streetlights, Fort Lauderdale Neighbor Surveys (2012 - 2015), and public safety data were provided by the city, insofar as they were able. Public safety data in particular was sent as password-protected Excel files in an abundance of caution over personally identifiable information (PII). Analysis done using web-based CARTO was also protected using CARTO's built-in privacy tools.

In the end, this analysis was conducted using data from FTL's internal public safety/service call systems, Florida Power & Light's streetlight location data, and the city's neighbor survey. Though GovEx had public safety data spanning from 2010 to August 2016, we limited the analysis to data spanning 2012 - 2015, to coincide with the available Neighbor Survey datasets.

There are caveats to the quality of the data. For example, the streetlight data provided is from 2007. The city also provided data as to the lights they own and operate, but that data was in PDF format without coordinates, and therefore could not be mapped. Fort Lauderdale also mentioned the presence of pedestrian lights, which are not tracked or inventoried, but which affect the illumination of the city.

Role of Technology

During the planning and development of this project, the GovEx team used several forms of technology which contributed to the project's success, each listed below.

Tool Name	Tool Type	How it was Used
Excel	Spreadsheet/Database	Fort Lauderdale provided all requested data in password-protected Excel format. Excel was also used to sanitize, filter, and perform initial analysis of data.
Google Docs	Shared Documents	Project Documentation
QGIS	Open-source spatial analysis software	Used to create a shapefile for potential area of illumination, given streetlight locations.
CARTO	Web-based spatial analytics & mapping	Data was visualized over FTL maps in

	software (carto.com)	CARTO to reveal patterns and hotspots.

Process

The following data was sourced from Fort Lauderdale:

- A list of streetlights owned and operated by Florida Power & Light, as of 2007, including coordinates
- Neighbor Survey results and instruments from 2012 - 2015
- Data from Fort Lauderdale's police response system, including the FBI's Uniform Crime Reporting (UCR) data, for 2010 - 2016 (hereafter referred to as the "crime data")

The location of street lights was mapped in CARTO and a 50-foot buffer was created around each point, to demonstrate the likely coverage of each light.

The crime data was filtered to match the same time frame as the Neighbor Survey data, and then filtered further to exclude traffic tickets and unpaid fines. From there, the data was filtered for crimes that fit the FBI's Uniform Crime Reporting (UCR) Program, and also for crimes that occurred outside the home on the assumption that street lighting doesn't affect domestic crime rates.

After that first round of filtering, the data was entered into CARTO and visualized as a Torque map (data points over time). The visualization was so noisy as to be unusable, so the data was further filtered to combine certain categories. For example, all data points labeled "in-progress," "just occurred," and "delayed" were combined for assaults, disturbance, fights, sexual assaults, shootings, stabbings, and stolen vehicles. The data was then again visualized as a Torque map. We tried to answer the following question:

- Is there any pattern to the distribution of violent crimes occurring outside the home, with relation to the locations of street lights?

The Neighbor Survey responses were filtered to focus on the questions asked concerning feelings around public safety and adequacy of street lighting, as well as to ensure consistency year over year. From there, we tried to answer the following questions:

- What percentage of the overall population responded to this survey?
- Of those who responded:
    - Are most people satisfied or dissatisfied with their perceptions of public safety in Fort Lauderdale?
    - Do most people think that the level of street lighting in the city is adequate?
- What was the geographical distribution of respondents?

- Is there any pattern to those who are dissatisfied with feelings of public safety and adequacy of street lights?
    - Is there any pattern with relation to distribution of existing street lights?

Key Findings

Over the course of this project, the GovEx team learned a tremendous amount about Fort Lauderdale, its streetlight systems, the perception of public safety in the city and the reality of public safety in the city. The goal was to answer the questions:

- What is the perception of public safety in Fort Lauderdale among residents?
- Where can street lighting be increased or changed to reduce crime and enhance the public perception of safety?

The notes below are highlights of the key findings from the questions posed in the collaborative agreement which we were (and were not) able to answer.

1. **The neighbor survey reveals no substantial perceived concerns around the adequacy of Fort Lauderdale's street lighting. (Appendix A)**

    a. The Neighbor Survey has an average of 627 responses per year. This represents 0.36% of the 2013 population of Fort Lauderdale (172,389, per the US Census Bureau) -- an extremely small sample size.
    b. Over the four years the city surveyed its residents, no notable concerns with public safety were noted. Broadly, people also feel satisfied that the city is sufficiently well-lit.
        i. 83% of respondents reported that the feeling of safety in the city was at least "good" in 2012 and 2013, with that number rising to 85% in 2014 and 2015.
        ii. Over the four years surveyed, more than 80% of respondents felt "satisfied" or "very satisfied" with the adequacy of street lighting.
    c. Those who said they were unsatisfied, when mapped, showed no apparent distribution pattern. (Appendix A)

2. ***Fort Lauderdale does <u>not</u> have a viable comprehensive inventory of its own lighting infrastructure***

    a. To properly understand the relationship between lighting levels and public safety, FTL would need a complete inventory of all lighting infrastructure.
    b. The project team was provided access to geospatial data from 2007 about the lights owned by Florida Power & Light (FP&L)

c. Conversations with the city revealed that FTL installs and maintains pedestrian lights, but, given the lack of a clear departmental owner of these lights, they are not inventoried or monitored in a systematic fashion.
d. Data about city-owned lights was provided to GovEx in PDF format and not tagged to geospatial coordinates, making the data unusable for this project

3. ***Based on old FP&L data, there is no demonstrable pattern of crime as it relates to lighting levels:***

    a. The distribution of violent crime shows no overlap between unlit parts of the city and crime hotspots (Appendix C).
    b. There are a few neighborhoods that do not appear to be lit, based on the available data (Appendix B). However, given the age of the available streetlights data, it's entirely possible that these neighborhoods are in fact serviced by Florida Power & Light:
        i. Lauderdale Isles
        ii. Riverland Village
        iii. Chula Vista
        iv. Riverland Woods
        v. River Run
        vi. Melrose Park
        vii. Bay Colony
    c. Conversations with the city revealed that the maintenance schedule for city-owned lights is ad hoc -- largely in response to neighbor complaints and outages observed by the maintenance crews when they're on the job, although there is a monthly maintenance schedule on the books.

Unanswered Questions

Where are the city's street lights located?

Fort Lauderdale's city street lights are largely owned and operated by Florida Power & Light. We have a nine-year-old dataset from FPL that shows the locations of most of the lights within the city boundaries. The city also provided the locations of city-maintained light poles in PDF form. These lights are not included in the analysis because there were no GPS coordinates included in the PDFs.

The data-discovery process revealed that Fort Lauderdale installs and maintains pedestrian lights, which supplement street lighting to illuminate the city. However, there is no central repository of the locations of pedestrian lights, nor is there a comprehensive understanding of

which department is responsible for installing and repairing these lights. Any conclusions drawn from this analysis should be checked against this lack of knowledge.

How can the city optimize its triaging process for the repair and replacement of existing street lights, regardless of light owner?

The city must first compile a comprehensive data set of all its street and pedestrian lighting that takes into account lights owned by the city, lights owned by Florida Power & Light, and all pedestrian lights.

Based on a conversation with the members of Parks and Recreation responsible for maintaining city-owned streetlights, Fort Lauderdale may benefit from collecting data about which lights go out when, in order to see if there are any patterns in the rate at which lights go out, or their locations. At this stage, it's difficult to make recommendations for optimizing a process that is not fully understood.

Conclusion

GovEx collaborated with Fort Lauderdale to assess whether city lighting (or lack thereof) has any relationship to a) perceptions of public safety in the city and b) patterns of violent crime in the city.

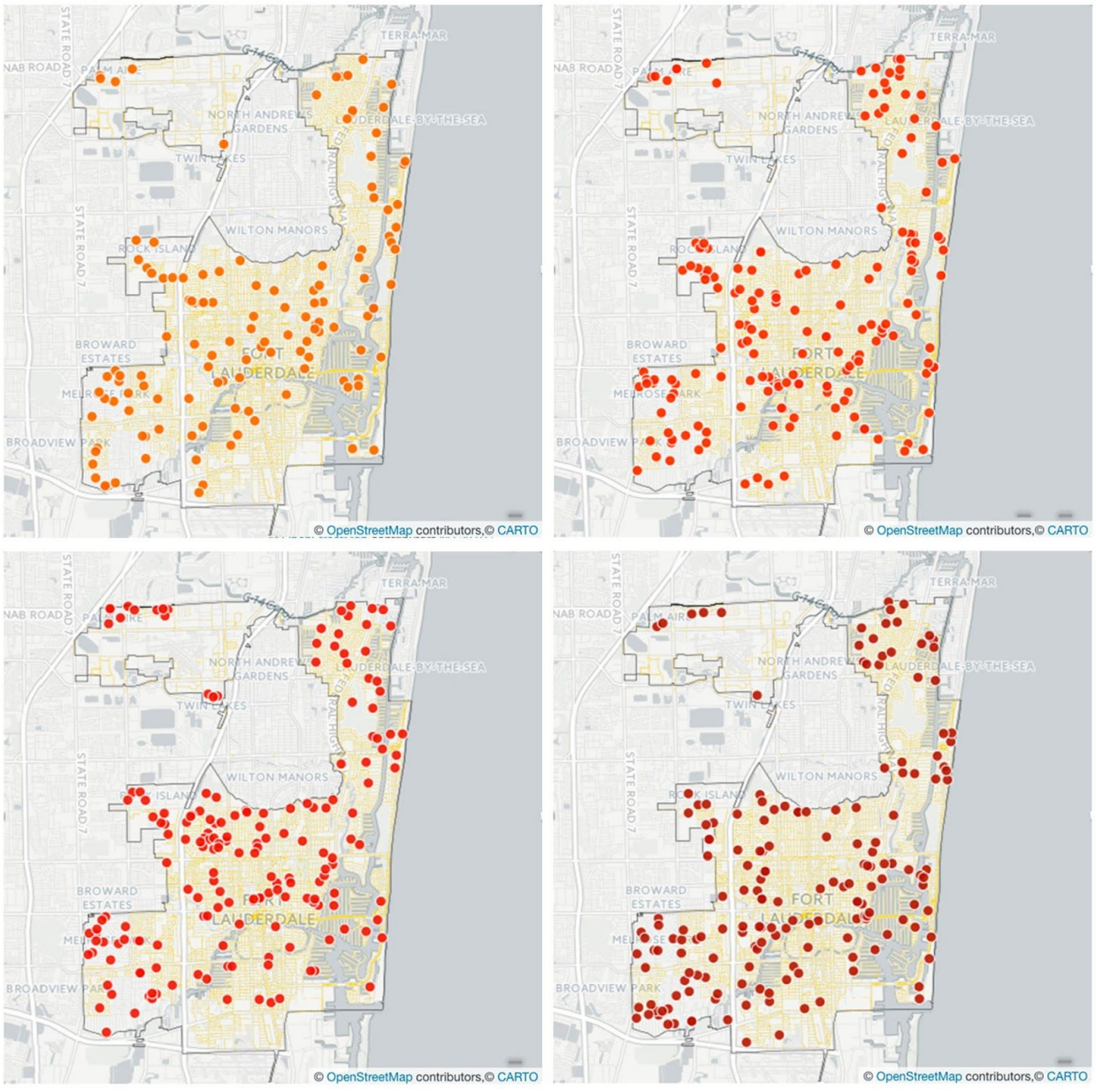
After assessing the available data, we concluded that there is not adequate information from the city to make draw major conclusions or make confident recommendations. Based on the analysis GovEx was able to conduct on the data available, there is no discernible relationship between the pattern of city lighting and crime in Fort Lauderdale. Moreover, the data from the neighbor surveys shows that the majority of the population (over 80%) is actually satisfied with the level of public safety in the city, and the adequacy of street lights. This is consistent over the four years of available data.

There are important caveats to the conclusions stated above:

- The data for street lights is nearly a decade old, and as such should be updated before relying on the results of this analysis.
- The city also maintains its own street lights, which are not included in this analysis. The inventory of city-maintained street lights should be kept in a format that better facilitates mapping and analysis.
- The city also maintains pedestrian lights, which affect the level of illumination in the city. These lights are also not included in this analysis, since they are not tracked in a comprehensive way.

Appendix A

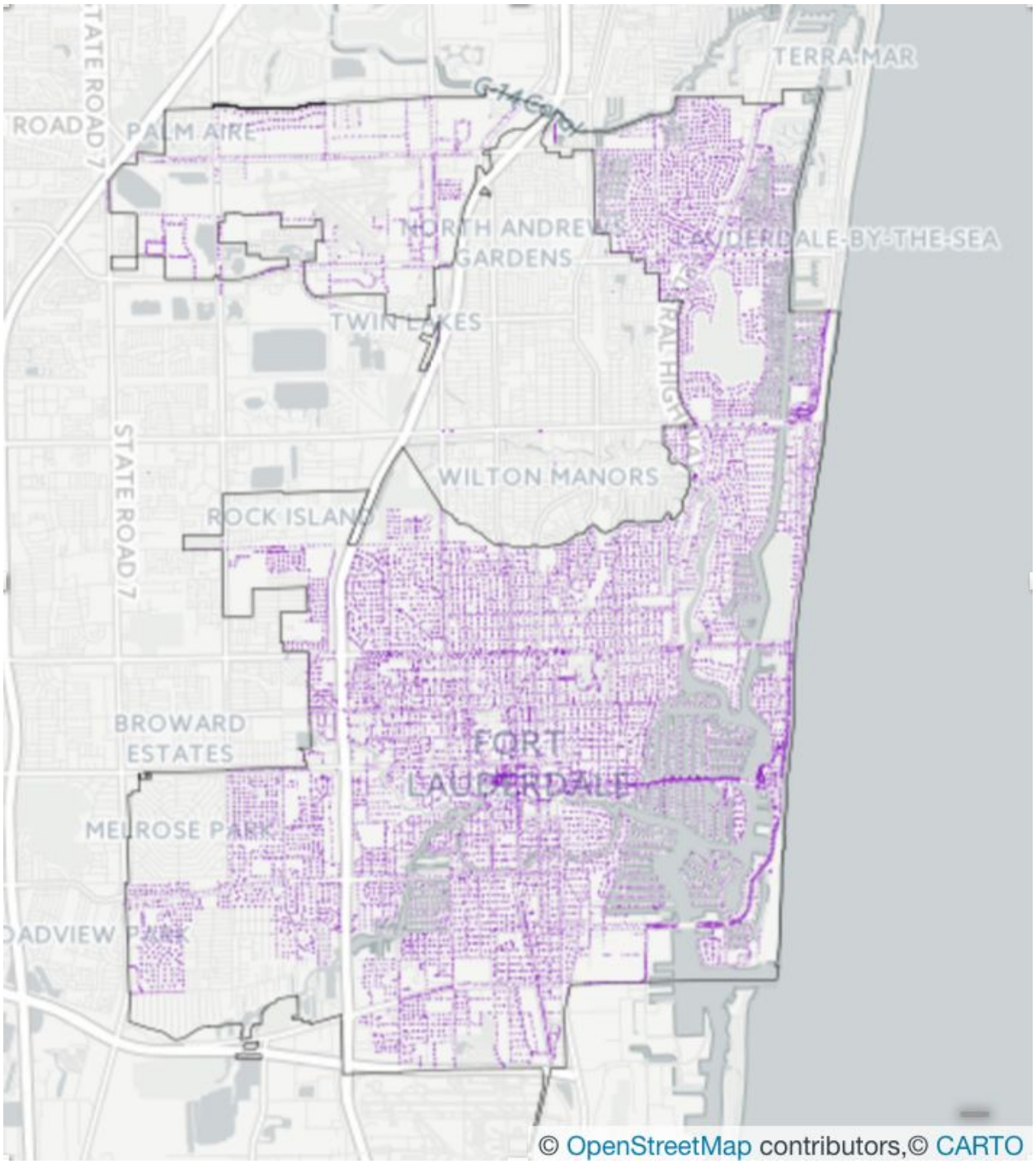
Geographical distribution of those dissatisfied with the adequacy of streetlights (shown in yellow), 2012 - 2015 (L to R).



The distribution of respondents who were dissatisfied with street lighting in Fort Lauderdale show no consistent pattern, nor do they overlap unlit areas of the city.

Appendix B

Locations of streetlights in Fort Lauderdale, per Florida Power & Light, as of 2007.



Appendix C

Violent crime incidents between 2012 and 2015, overlaid on lighting patterns.