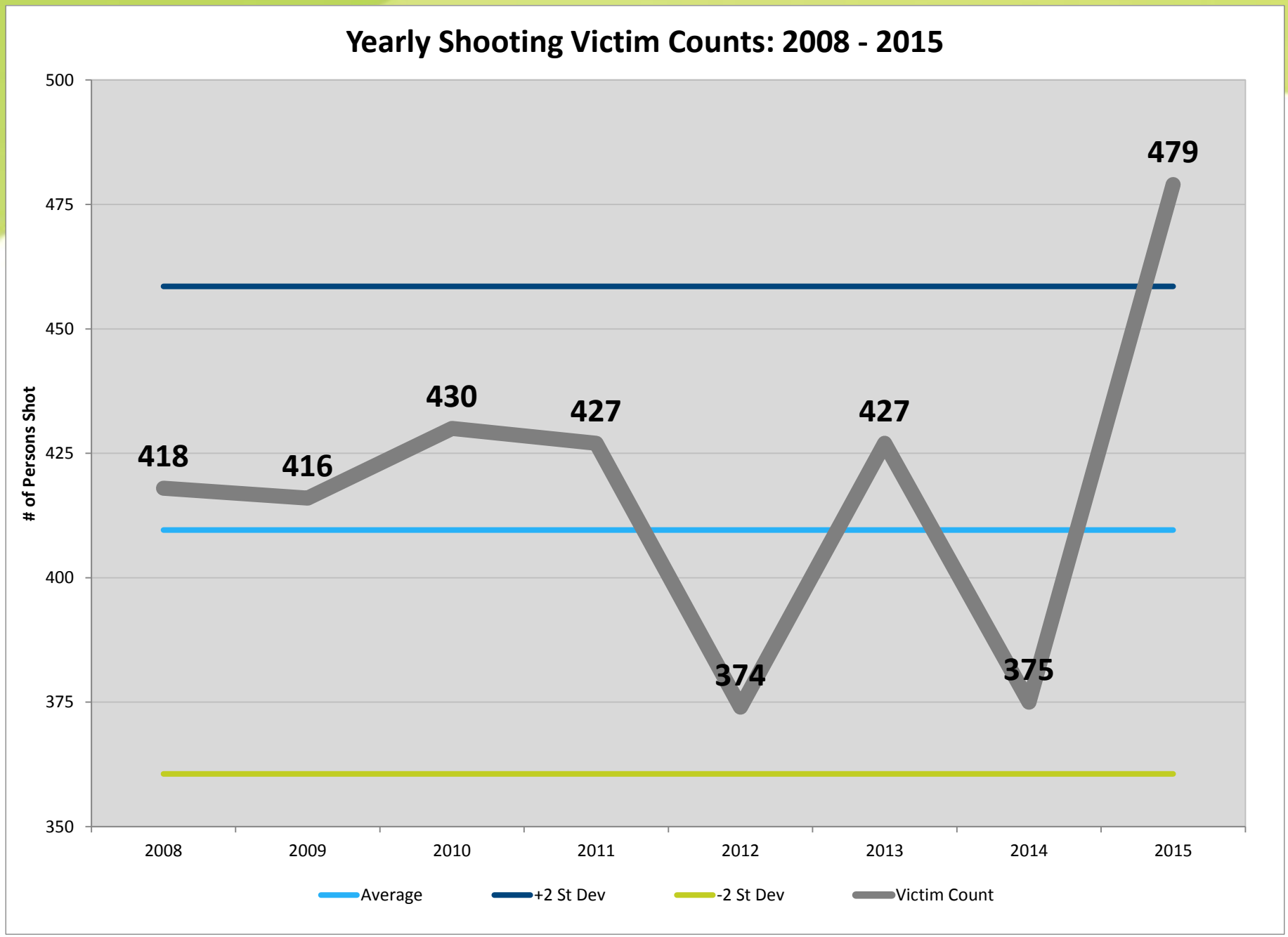
city of CINCINNATI POLICE

Describing Gun Violence Levels across Time and Space in Cincinnati, Ohio

12 July 2017

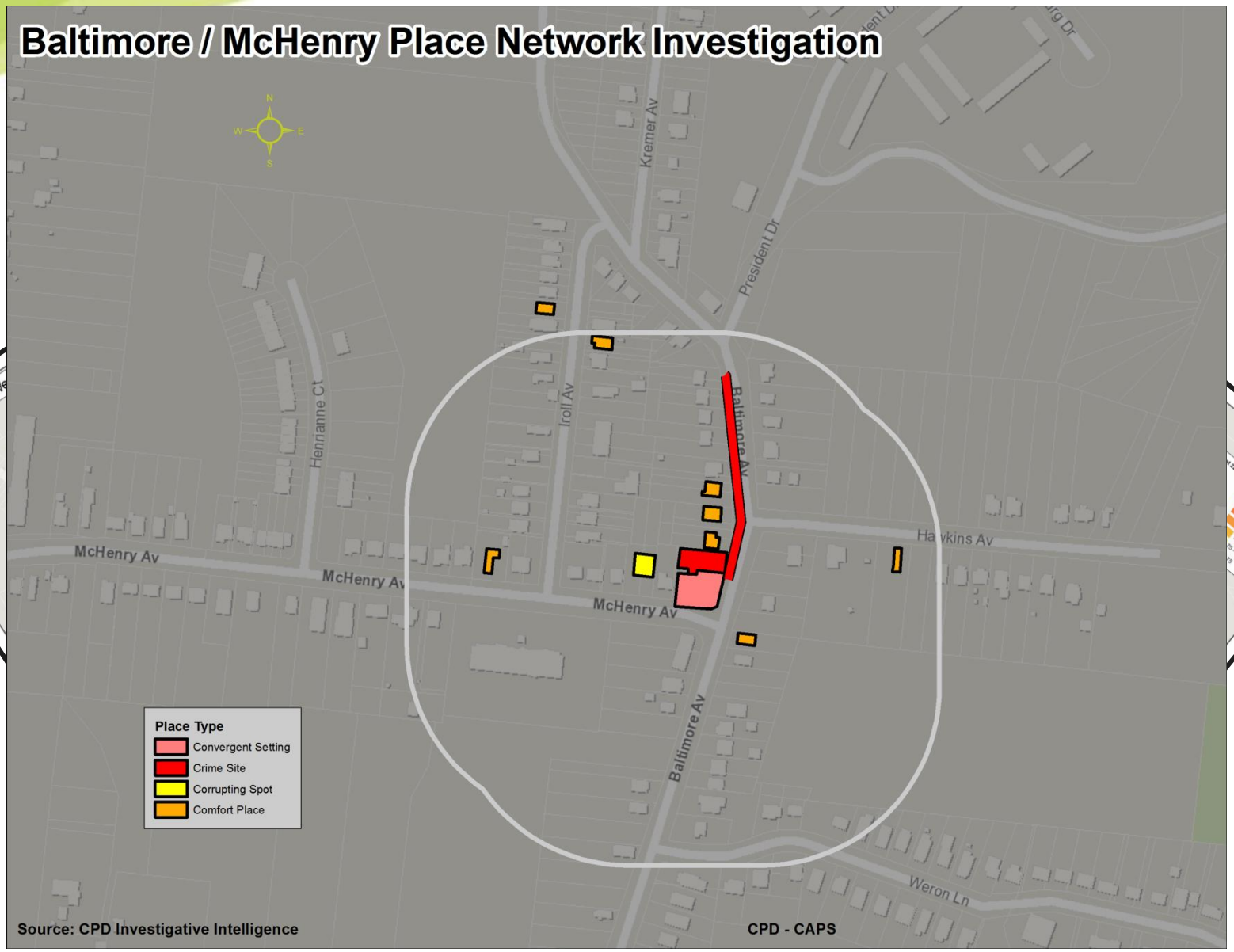
BACKGROUND

Place-based Investigations of Violent Offender Territories (PIVOT)


Yearly Shooting Victim Counts: 2008 - 2015
# of Persons Shot
500
475
450
425
400
375
350
418
416
430
427
374
427
375
479
2008
2009
2010
2011
2012
2013
2014
2015
Average
+2 St Dev
-2 St Dev
Victim Count

P.I.V.O.T.

Place-base Investigations of Violent Offender Territories



Citywide Violence Scores

Sparkle Dr
7600 block of Reading Rd
Vine/Seymour
Bahama Te
Hawaiian Te
DutchColony/Holland
Winneste/Craft
District5
District4
Baltimore/McHenry
Harrison/Fischer
Westwood Northern/Sutter
Moosewood/Bowling Green
Harrison/McHenry
3500 block of Reading Rd
3300 block of Reading Rd
District3
District2
Victory/Wm H Taft
Gilbert/Rogers
1600 block of Linn St
Back/Hamer
Glenway/Warsaw/Ross
3400 block of Warsaw Av
District1
1300 block of Main St
Linn/Clark
Storrs/Neave
District1
DistrictCBD

Legend

Neighborhoods

CIRV Territory

Potential Problem Solving Locations

Violent Hot Spots by Violence Score

- Core Score = 12 (12 locations)
- Core Score >= 11 (2 locations)
- Core Score >= 10 (9 locations)
- Core Score >=9 (5 locations)

Combined Violence Score

- < 3
- 3-5
- 6-8
- 9-12

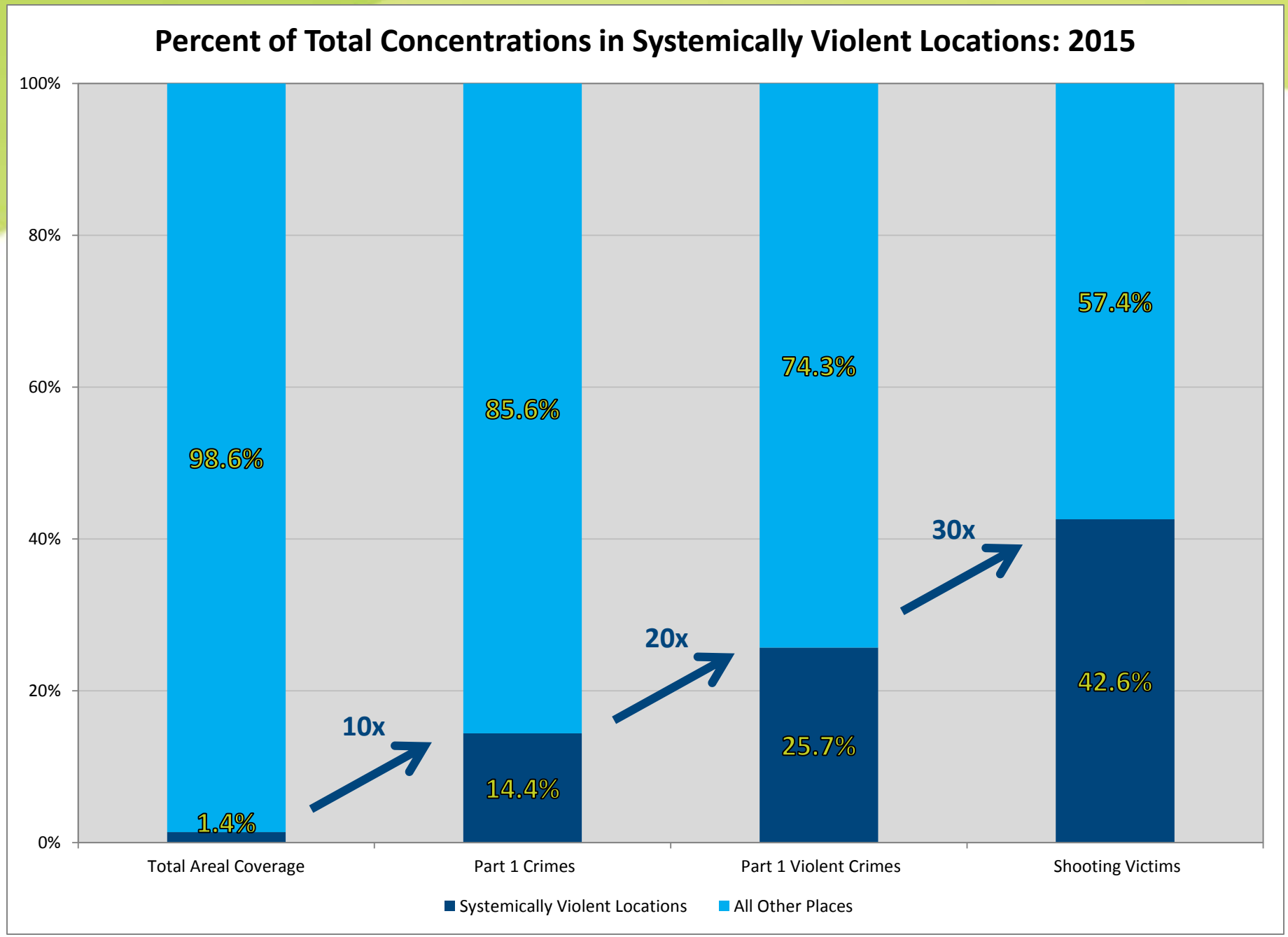
There are 23 clusters of 8 or more contiguous cells (100x100 ft) with violence scores of 10+. A 400 foot buffer (~1 block radius) is drawn around each of these clusters.

A violent score of 12 means that each violent indicator (shootings, agg robbery, firearm/gun offenses and weapon-related calls for service) is in the top 1% of the city across all 3-time periods of interest, 1 yr, 3 yr, 5 yr.

Prepared by: SCRMA Blake Christenson & CRMA Beth Christenson

Data Prepared On: 12/29/2015

1 0.5 0 1 2 3 Miles


Percent of Total Concentrations in Systemically Violent Locations: 2015
100%
80%
60%
40%
20%
0%
98.6%
1.4%
85.6%
14.4%
74.3%
25.7%
57.4%
42.6%
10x
20x
30x
Total Areal Coverage
Part 1 Crimes
Part 1 Violent Crimes
Shooting Victims
Systemically Violent Locations
All Other Places

PIVOT PARTNERS

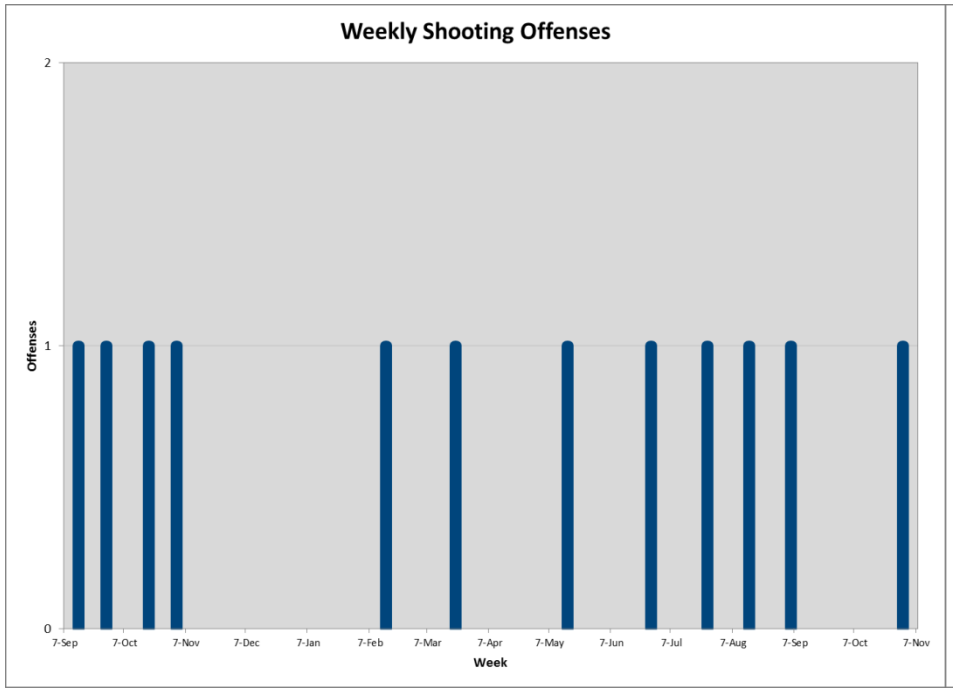
Bi-Weekly Working Group Meetings

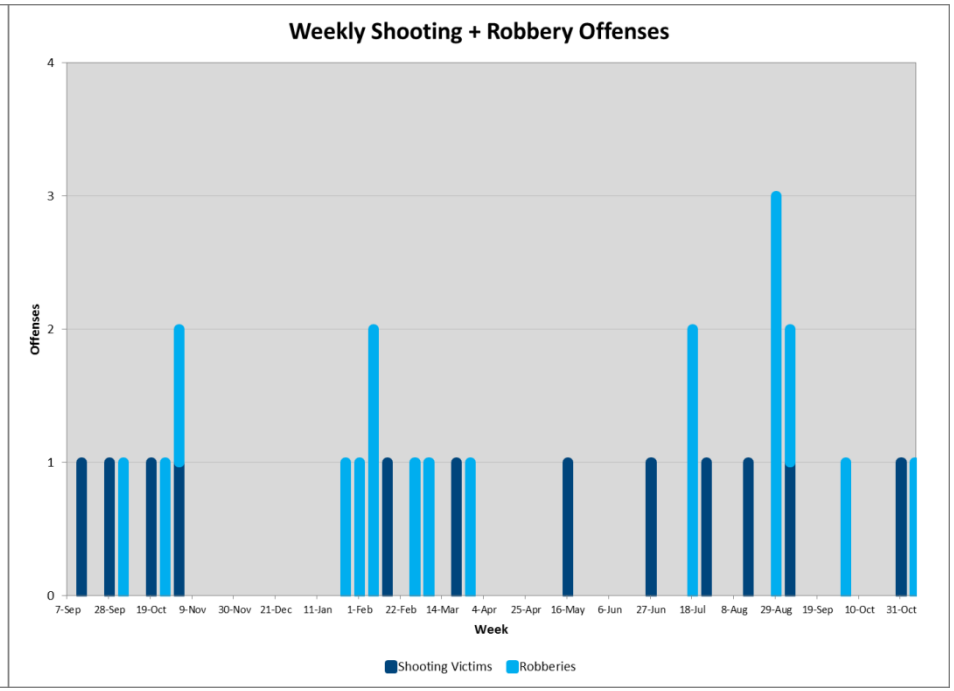
Local Community Councils	Community Partnering Center	City Planning	Buildings & Inspections
Community & Economic Development	Health Department	Fire Department	Law Department
Environment & Sustainability	Public Services	Transportation & Engineering	Keep Cincinnati Beautiful
Cincinnati Recreation Commission	Parks Department	Port Authority	Community Redevelopment Corporations

Measurement Problem….

"traditional" methods

- How do we measure, in (near) real time, progress toward reducing gun violence?



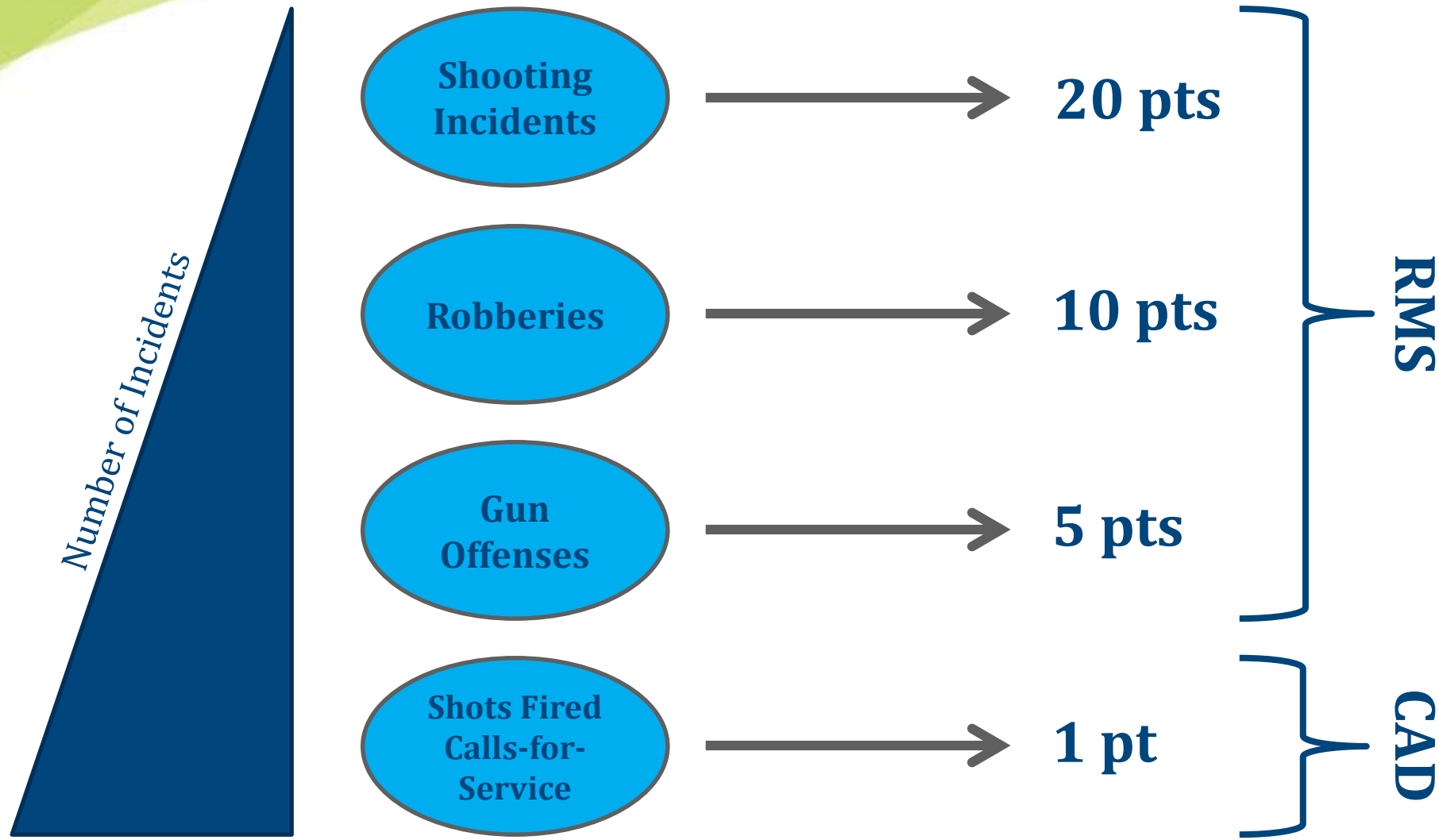


TOWARD A GUN VIOLENCE METRIC

1. Measures gun violence
2. Precise measurement
3. Measures current levels
4. Changes in short periods

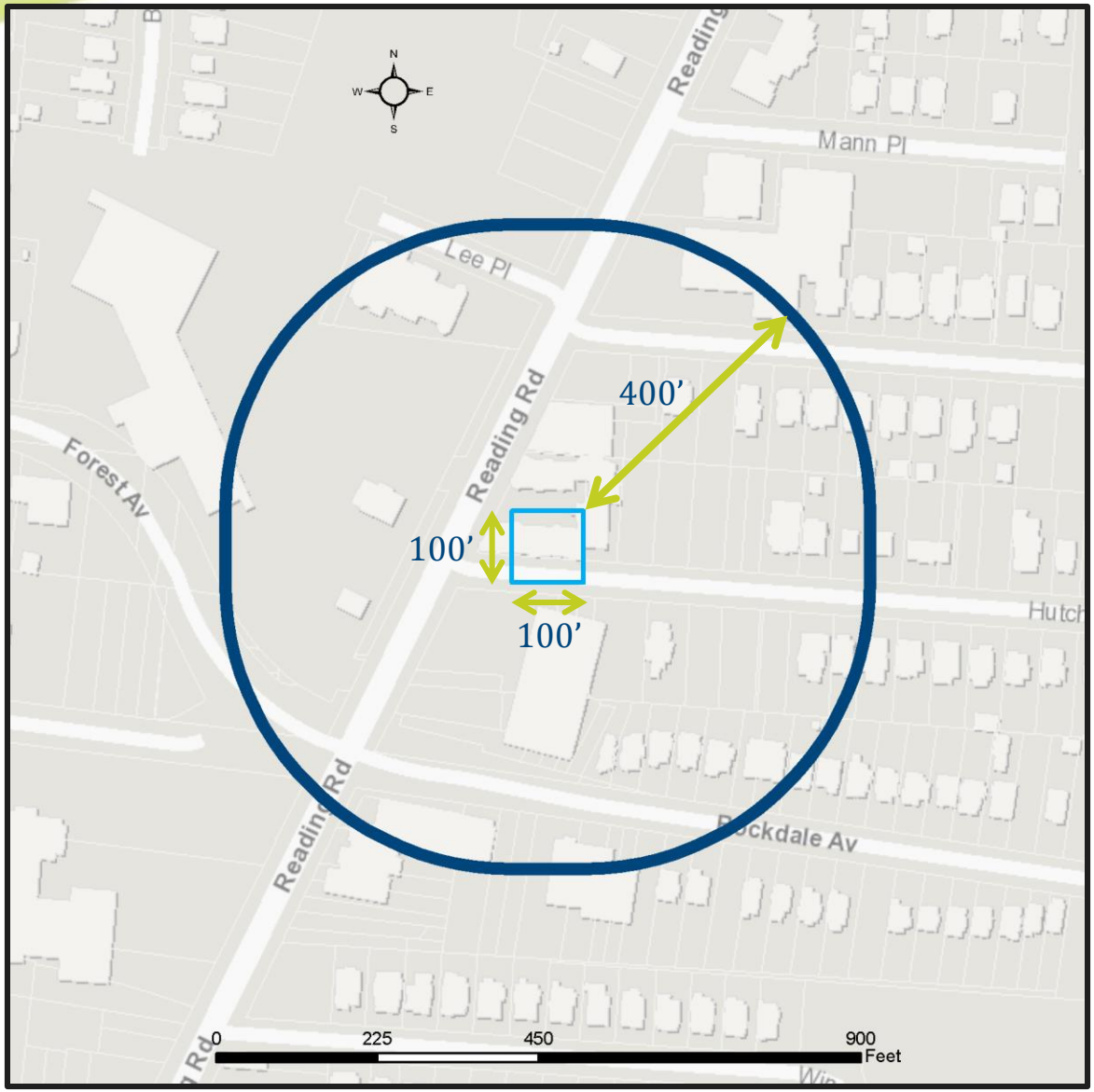
Measures gun violence

Datasets



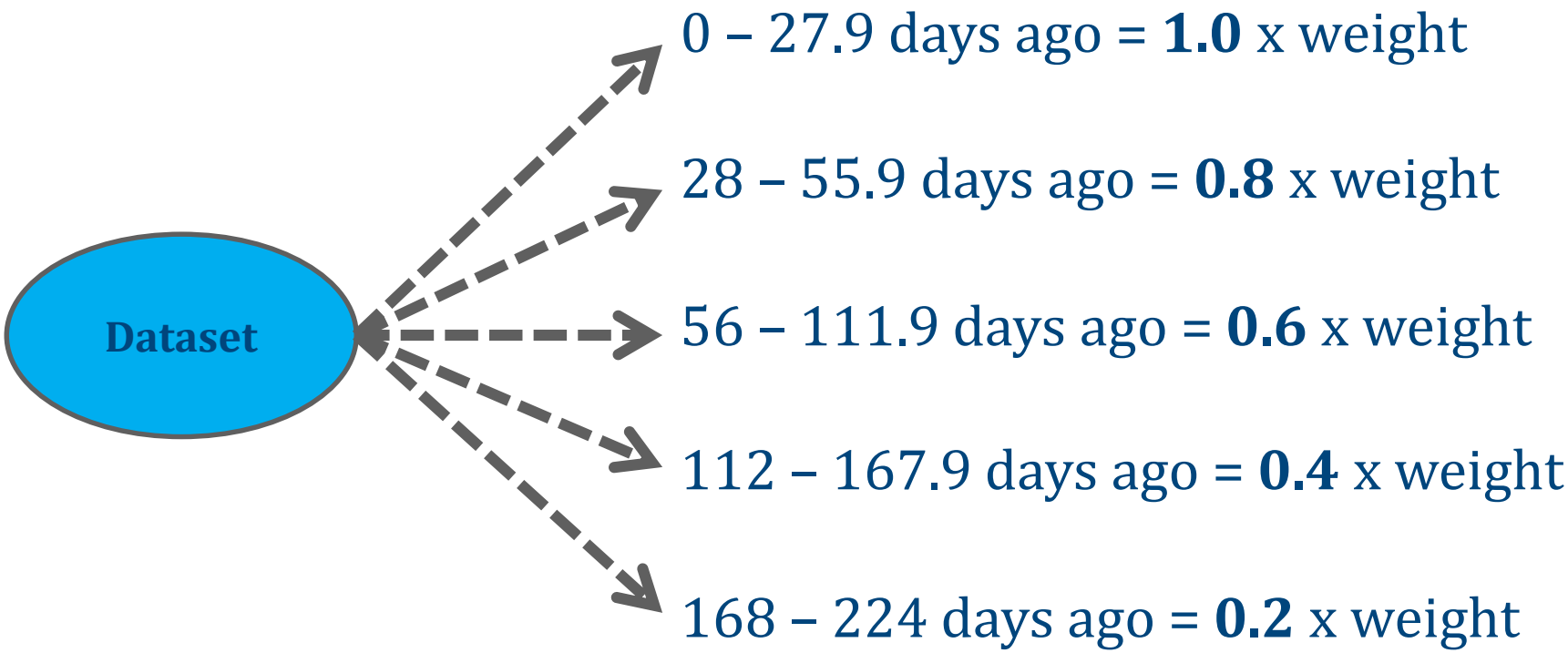
Precise Measurement

100’ x 100’



Measures current level + Changes in short time periods

224 days' worth of data time weighted



1 EXAMPLE OF A STEP-BY-STEP PROCESS

0. Source layers
1. Extract + manipulate data
2. Data processing
3. Post-processing

Step 0: Creating "places"

Data Management Tools → Sampling → Create Fishnet

- Extent = jurisdiction boundary
- Cell height = 100 feet
- Cell width = 100 feet
- Type = polygon

- Post-processing: select & export cells intersecting jurisdiction boundary
  - Cincinnati is made up of 225,618 100' x 100' cells

Step 1: Establishing time weight

Using MS Access

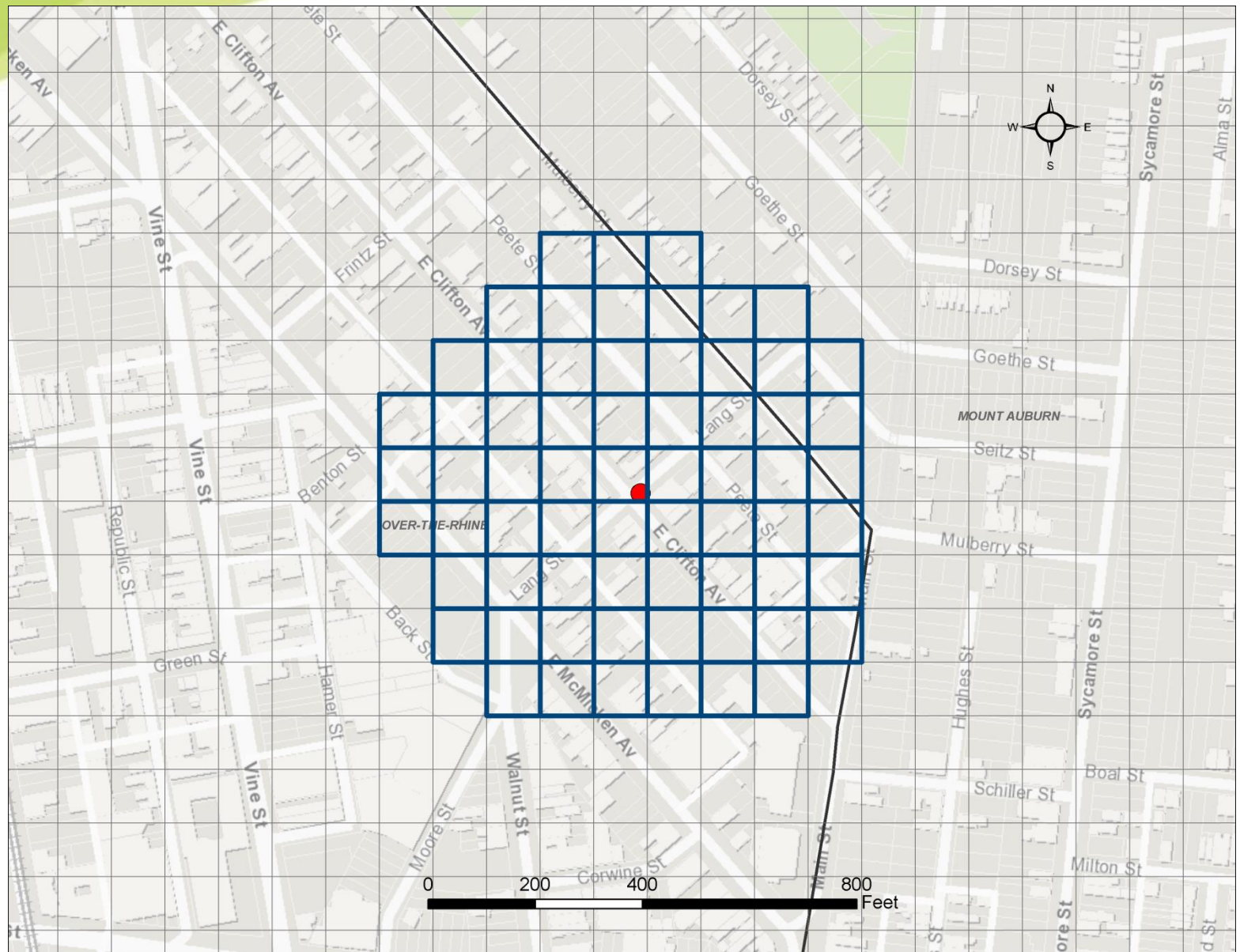
- "DateDiff" expression

- Assign a "Factor Score" to each data point where:
  - x < 28 days difference = 1.0
  - 28 <= x < 56 days difference = 0.8
  - 56 <= x < 112 days difference = 0.6
  - 112 <= x < 168 days difference = 0.4
  - 168 <= x < 224 days difference = 0.2
  - x > 224 days difference = 0.0

Step 2a: Creating spatial relationships

Analysis Tools→ Overlay → Spatial Join (Join One To Many) x4

-
-
-



Step 2b: Re-aggregating duplicate "places"

Analysis Tools→ Statistics → Summary Statistics x4

- Sum the factor score calculated in Step 1
  - Case field = "TARGET_FID"

Step 3a: Constructing the "Gun Violence Score

Layer Properties → Joins & Relates → Join

- Join the summary statistic tables back to the original fishnet layer

Step 3b: Constructing the "Gun Violence Score

Attribute Table→ **Field Calculator**

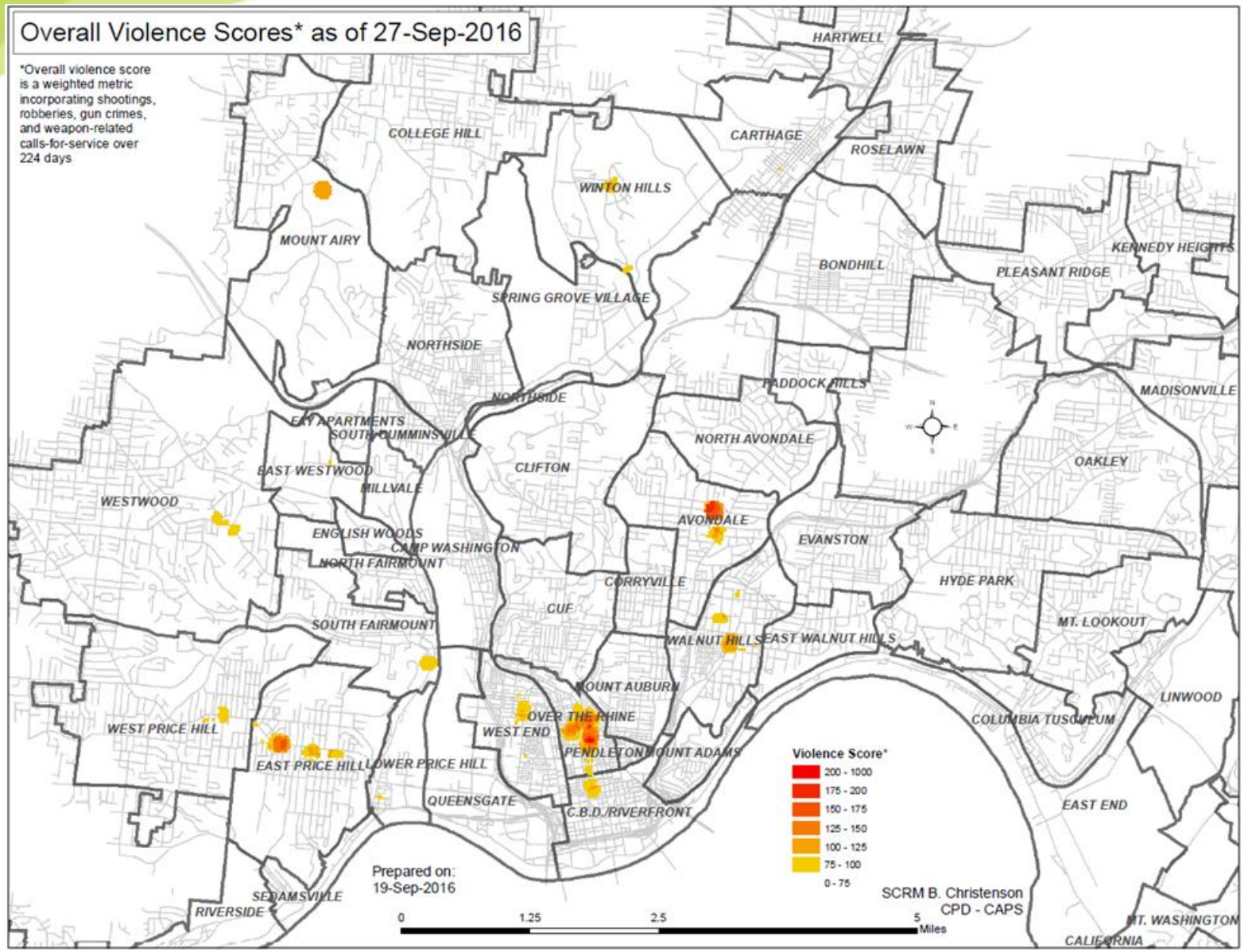
- Calculate the violence score by multiplying:
  - 20 x sum of factor scores for shootings
  - 10 x sum of factor scores for robberies
  - 5 x sum of factor scores for gun offenses
  - 1 x sum of factor scores for weapons-related calls-for-service

CURRENT USES

1. Traditional "Hot Spotting"
2. Arming the Problem Solvers Toolbox
3. Other?...

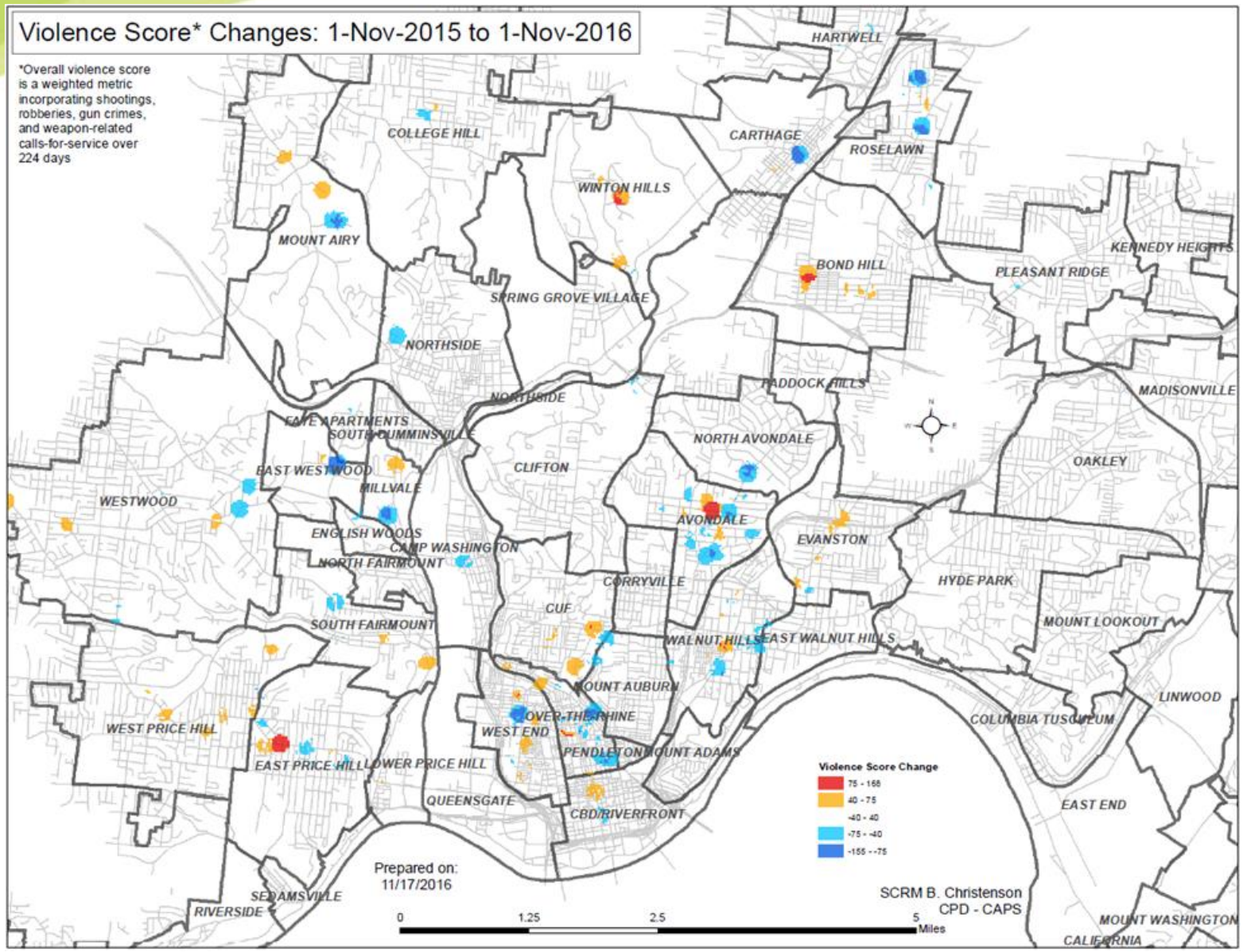
TRADITIONAL "HOT SPOTTING"

3-Dimensional Kernel Density Estimates



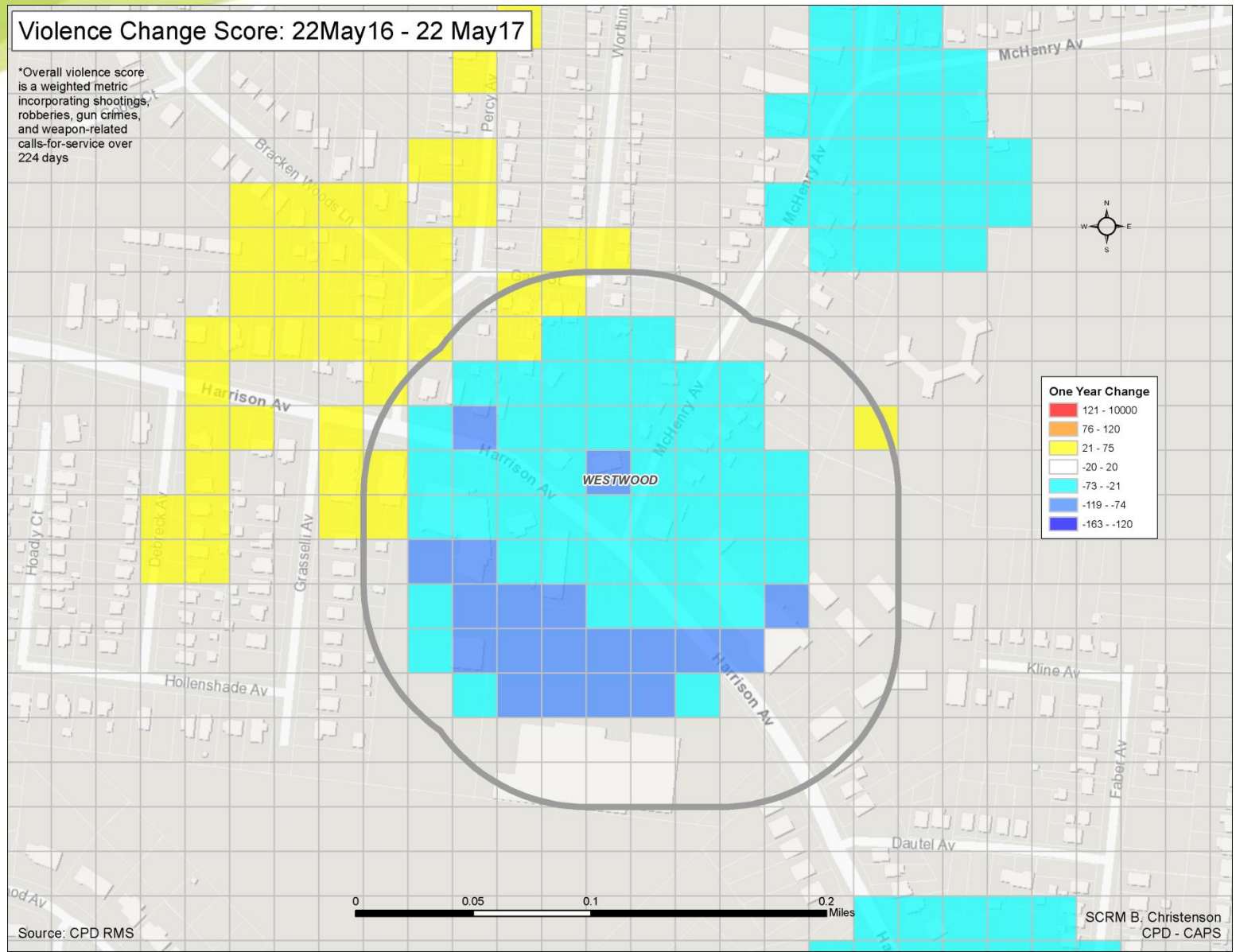
TRADITIONAL "HOT SPOTTING"

Change maps



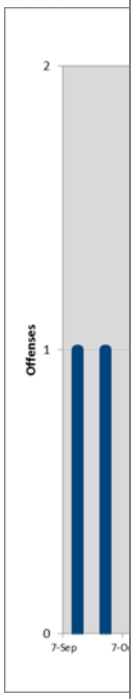
Haptic Feedback for Problem Solving

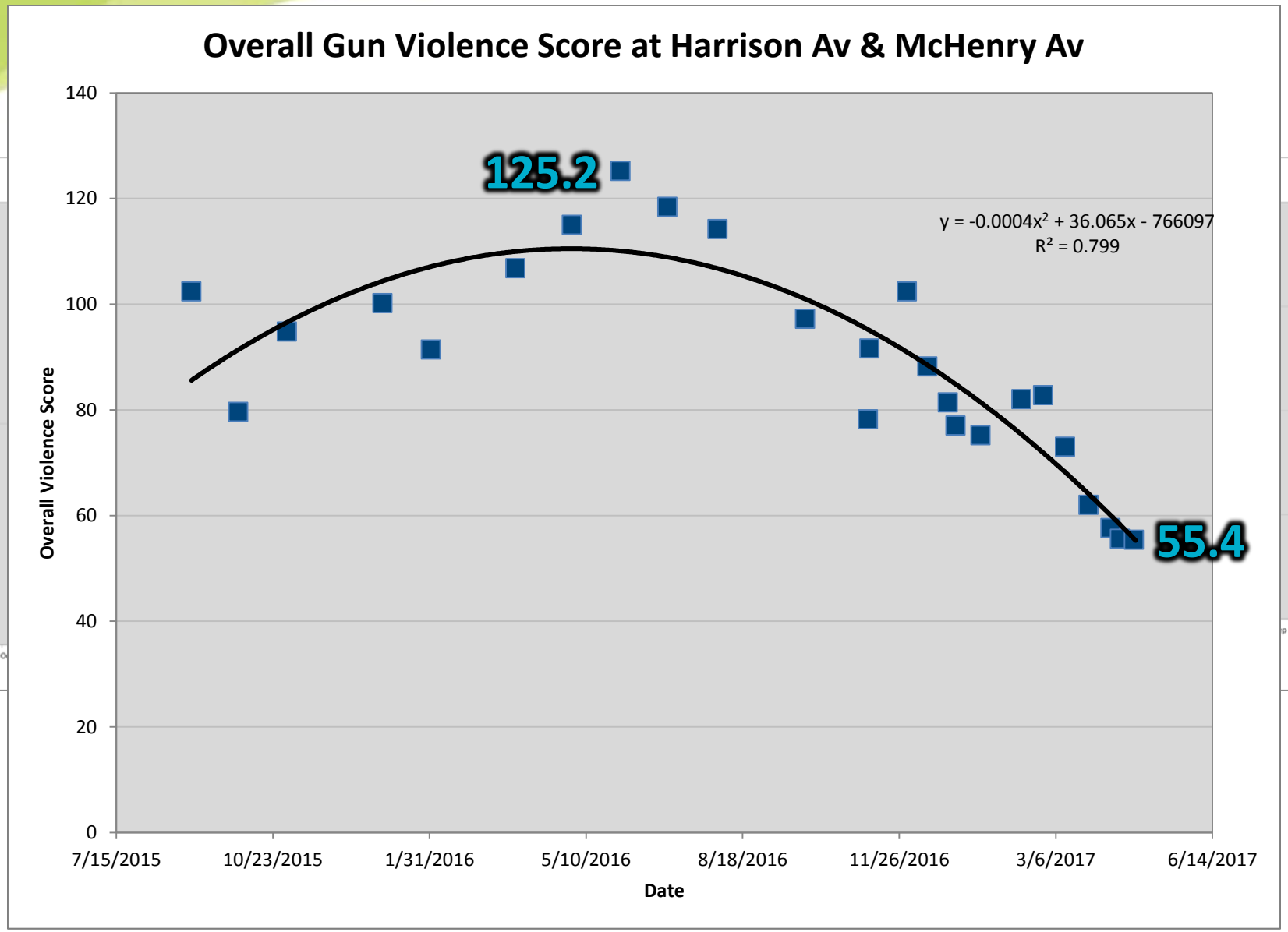
Site-specific project maps

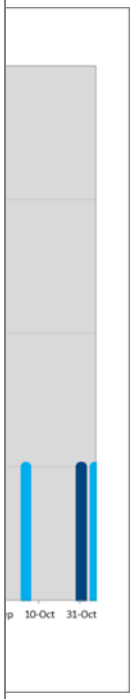


Haptic Feedback for Problem Solving

Score tracking







THANK YOU!

See more:

- Research in Brief: Place-Based Investigations to Disrupt Crime Place Networks
  - (April 2017 issue of *Police Chief*)
- CPDPIVOT.com
  - 3 white papers (and counting)

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