

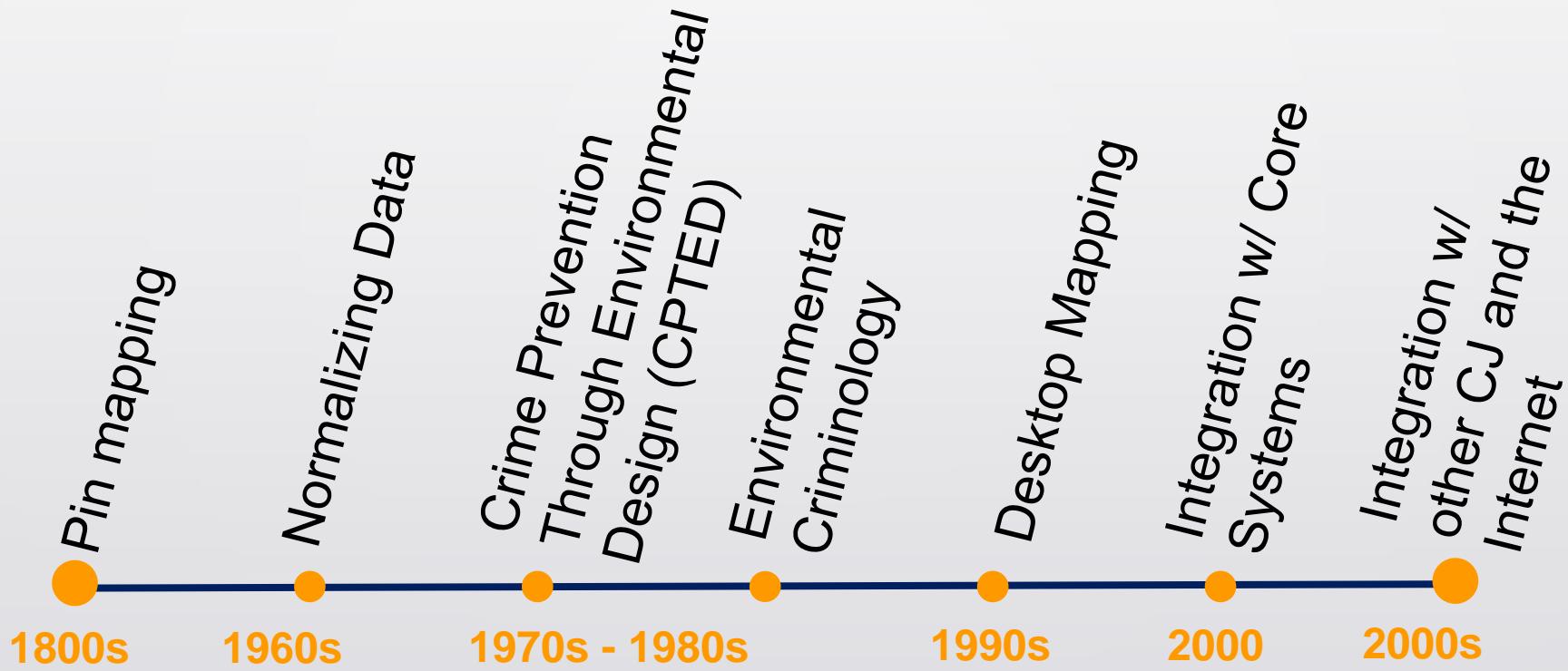


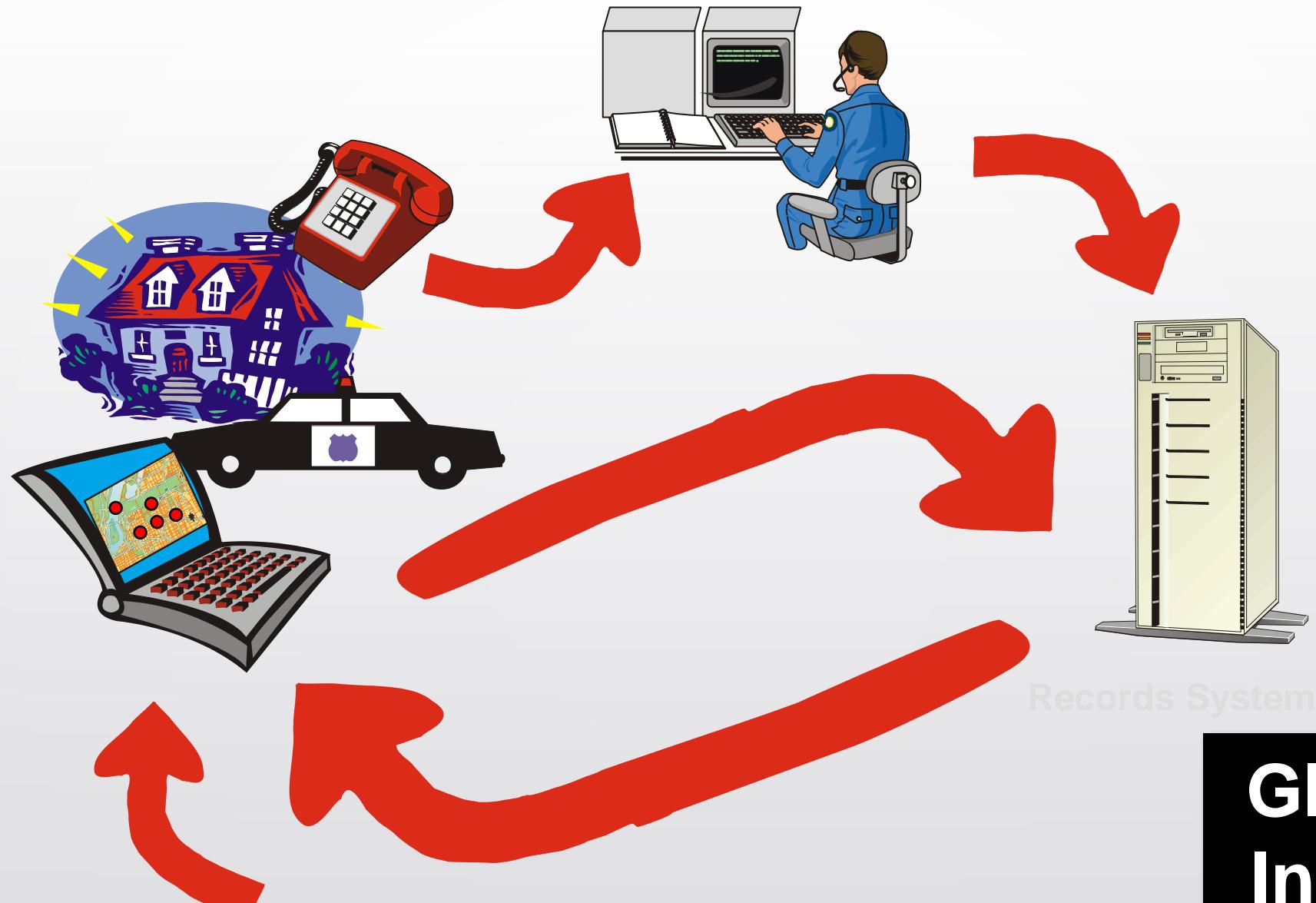
GIS and Crime: Research and Analysis





Historical Overview Spatial Analysis for Public Safety





Other Sources of
Geographic Information

**GIS as LE
Integrated
Technology**

911 Call
(CAD)



Offense/Arrest Report
(RMS)



Prosecution
(DA/Court System)



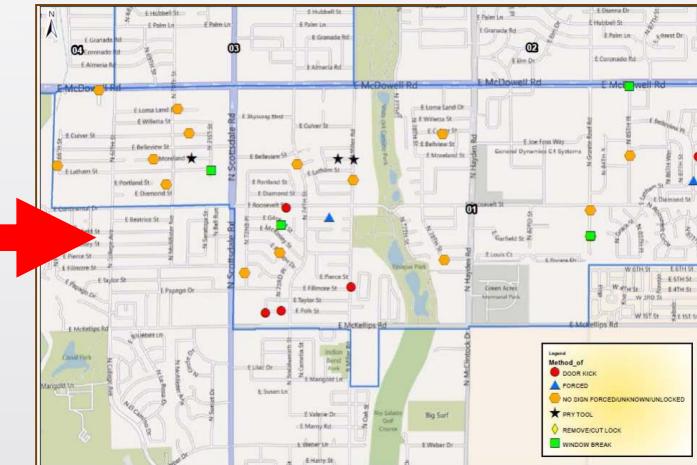
Parole/Probation



Community Context
Businesses
Schools
Parks
Alcohol Establishments
Bus Stops/Routes



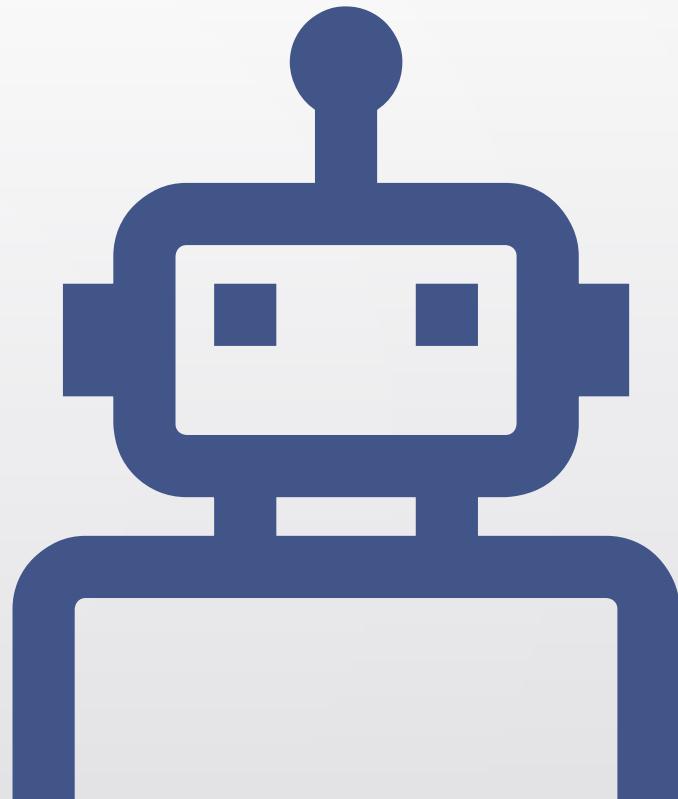
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An Integrator
for Effective
Public Safety

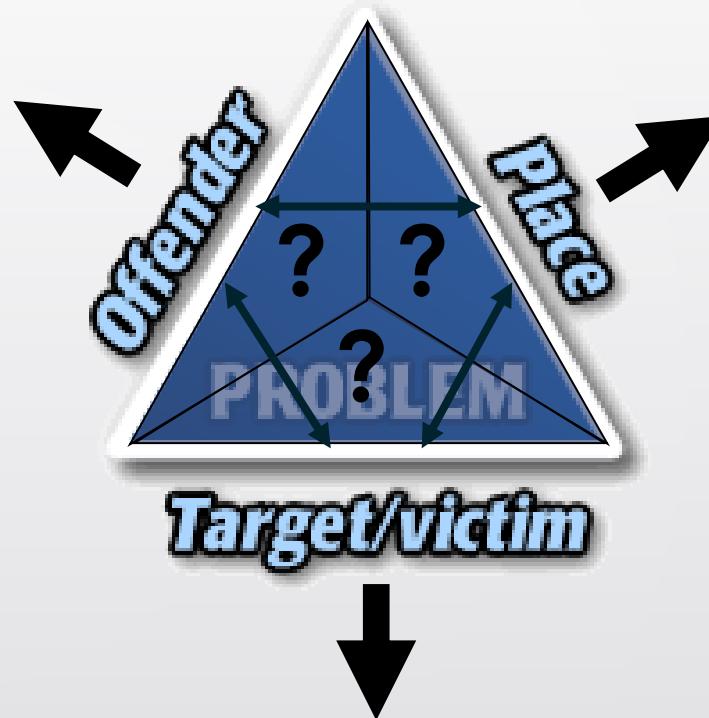


Analyzing Problem Areas (aka Hot Spots)



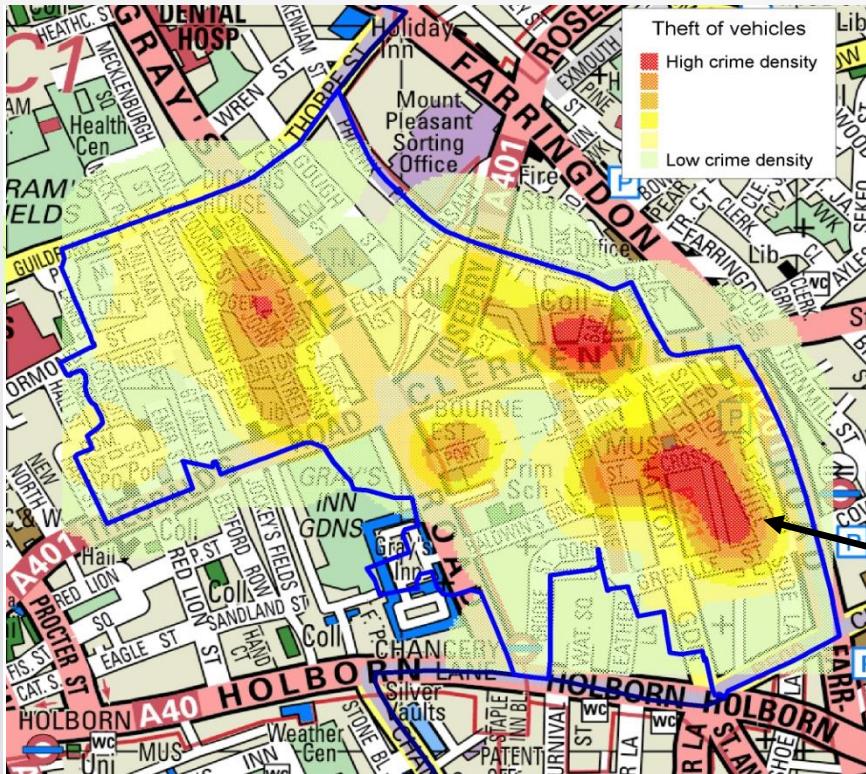
IMPORTANCE OF GEOGRAPHY

- The 4 dimensions of crime
 - 1. Legal (a law must be broken)
 - 2. Victim (someone or something has to be targeted)
 - 3. Offender (someone has to do the crime)
 - 4. Spatial (it has to happen at a place - somewhere, in space and time)
- Crime Analysis Triangle



Future crime is “six times more predictable by the address of the occurrence than by the identity of the offender. Why aren’t we thinking more about wheredunit, rather than just whodunit?” (Larry Sherman, 1995)

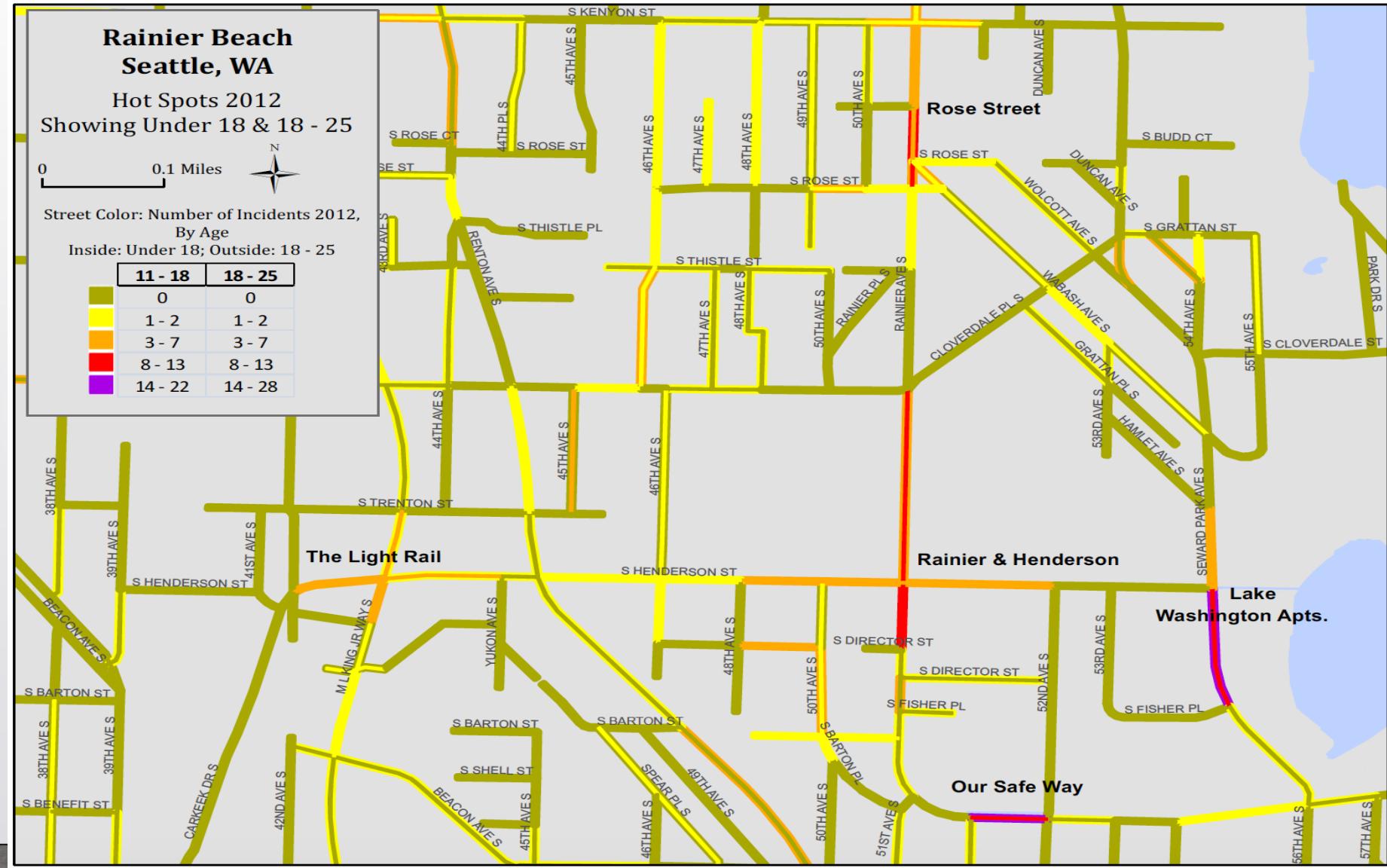
Clerkenwell Hotspot



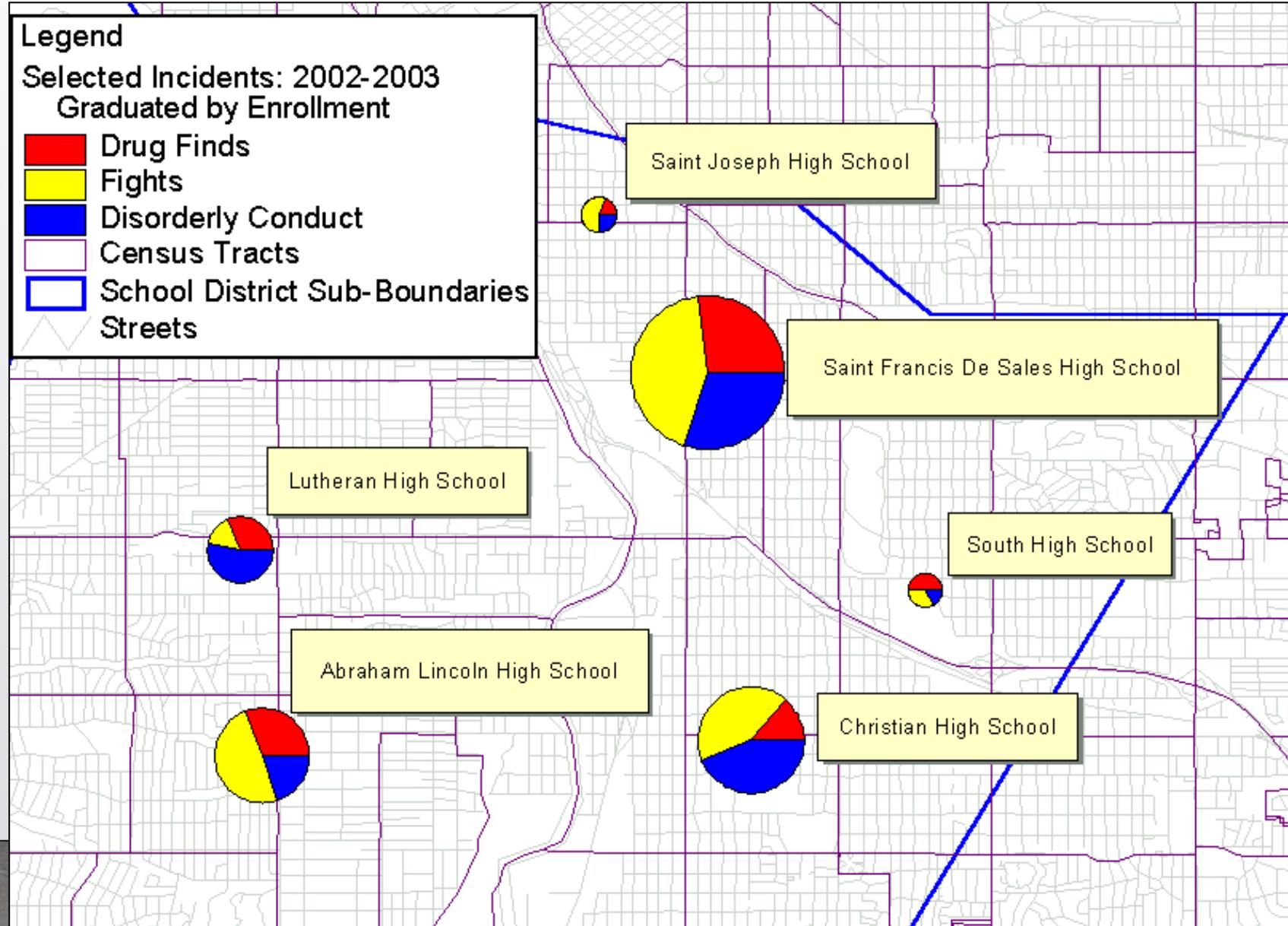
Vehicle Type	Camden	Clerkenwell (n)	Clerkenwell (%)
Car	51%	41	18%
Sports/Convertible	3%	5	2%
Scooter/Moped	26%	95	42%
Motorcycle	13%	70	31%
Van	5%	3	1%
Other	2%	10	4%
Unknown	0.5%	0	0%



Analyzing “hot” blocks



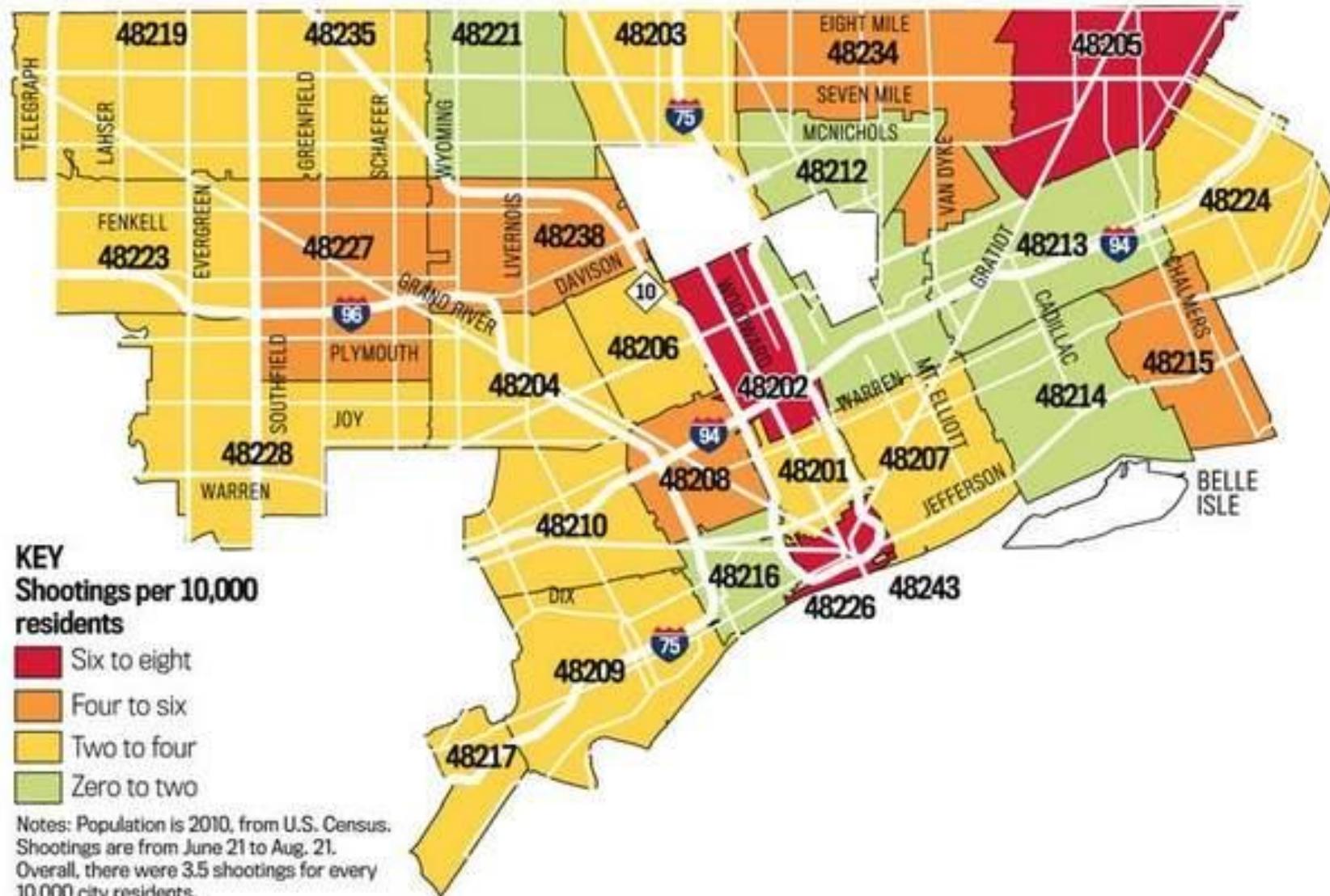
Analyzing Multiple Variables by Location



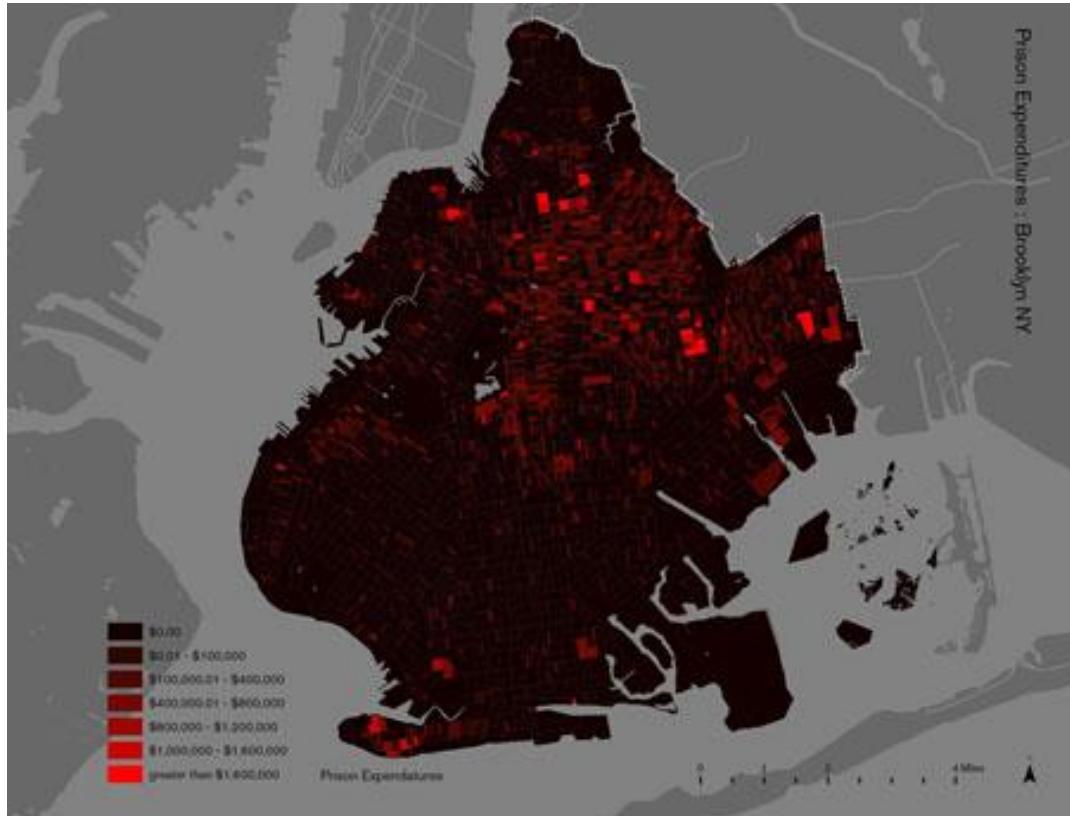
Analyzing by Areas (choropleth)

Detroit's hardest hit

Shootings over a two-month period this summer in Detroit varied dramatically by neighborhood & zip code.



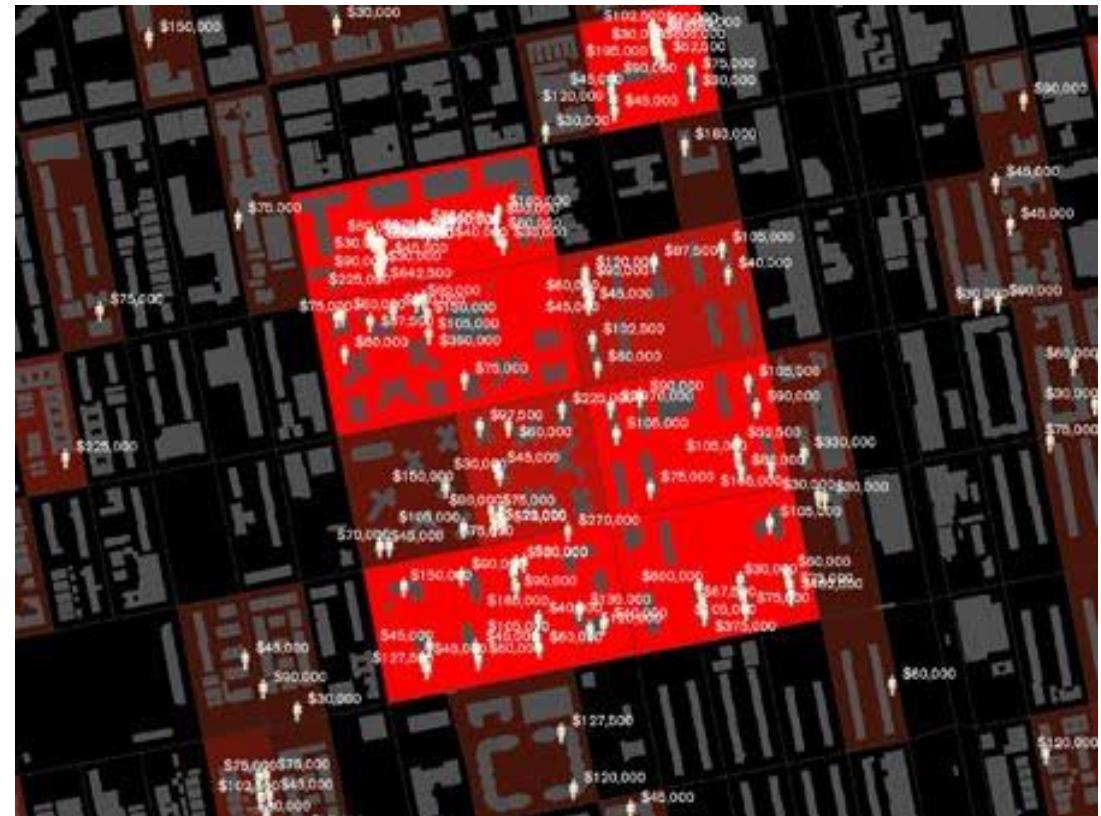
Analyzing Criminal Justice and Communities



There are over 2 million people incarcerated in the US, and a disproportionate number come from a very small number of neighborhoods in the biggest cities.

In many places states are spending over \$1 million/year on the residents of single city blocks.

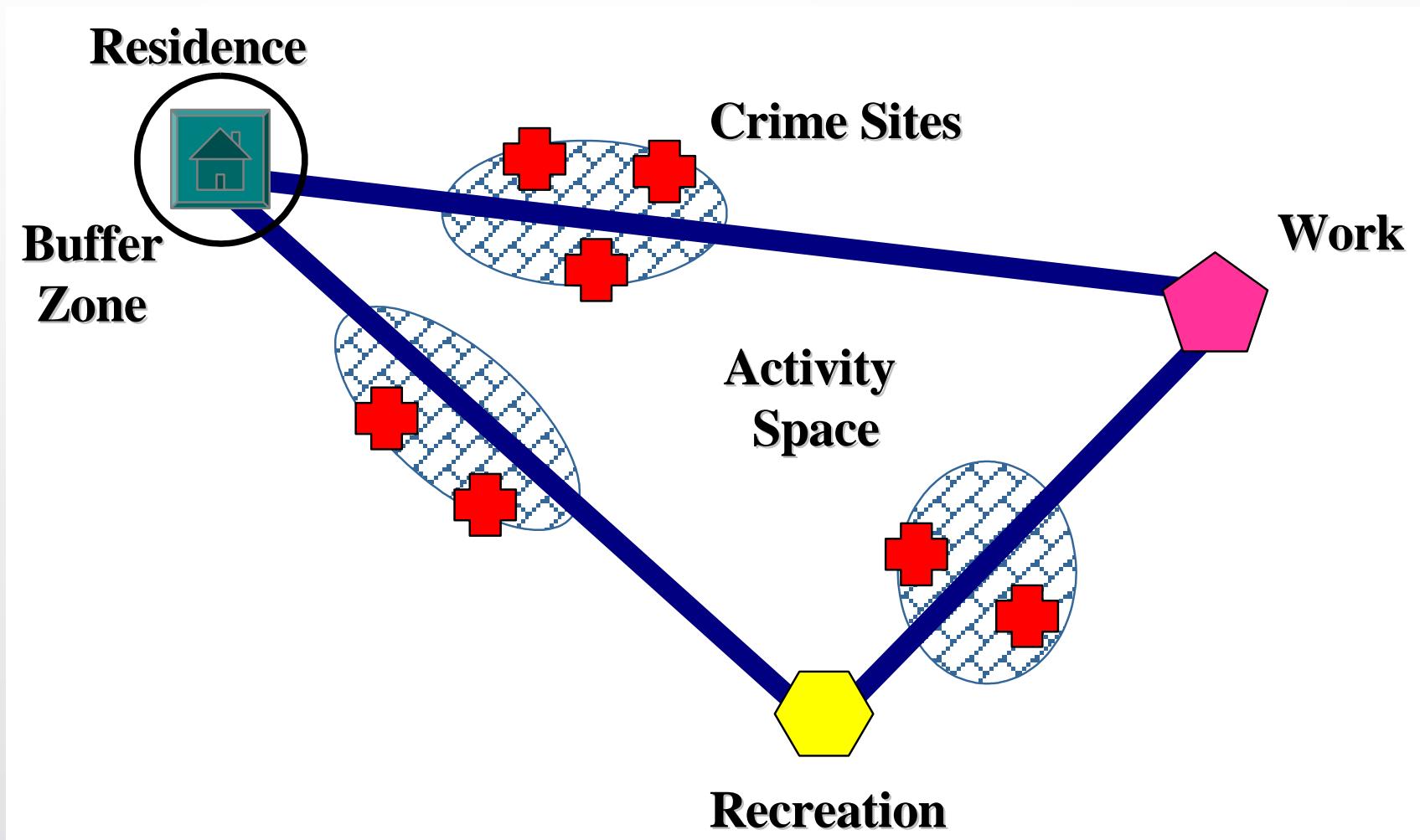
The Spatial Information Design Lab & Justice Mapping Center created maps of these “million-dollar blocks” and of the city-prison-city-prison migration flow for 5 cities.





GIS and Investigative Analysis

Crime Pattern Theory



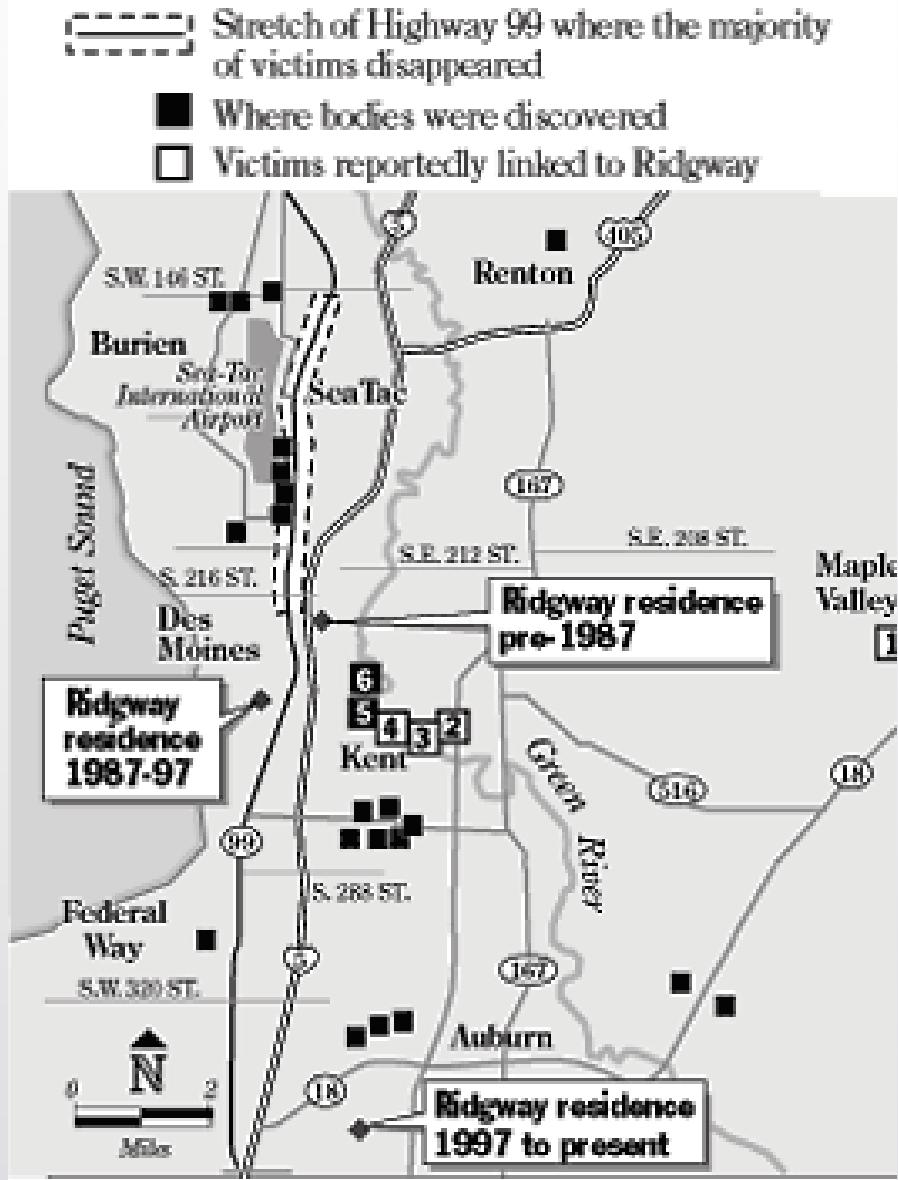
Brantingham, P. & P. (1993). "Environment, Routine, and Situation: Toward a Pattern Theory of Crime." *Routine Activity and Rational Choice*, Advances in Criminological Theory, volume 5, edited by Ronald Clarke and Marcus Felson. New Brunswick, NJ: Transaction Publishers.

Geographic Correlation

■ What's near the incidents in my crime pattern?

- Highways/major routes
- Methadone clinics
- Public transportation
- Budget motels
- Public housing
- Schools
- Gang territories





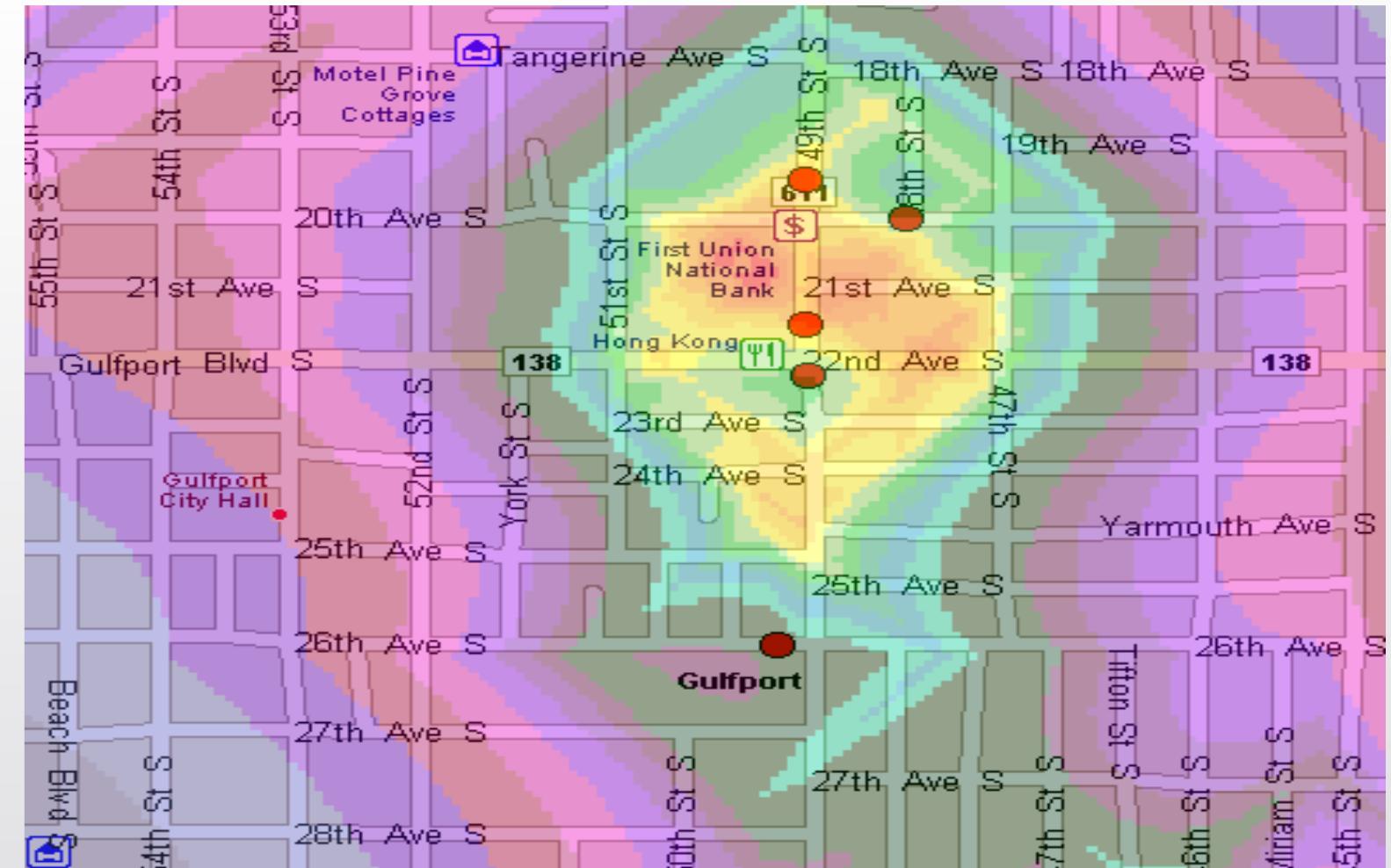
Route/Recovery Area

Consider:

- “Acquisition” Site
- Crime Site
- Dump/Recovery Site

Crime is actually three-dimensional

Integrating theory into investigations: Geographic Profiling



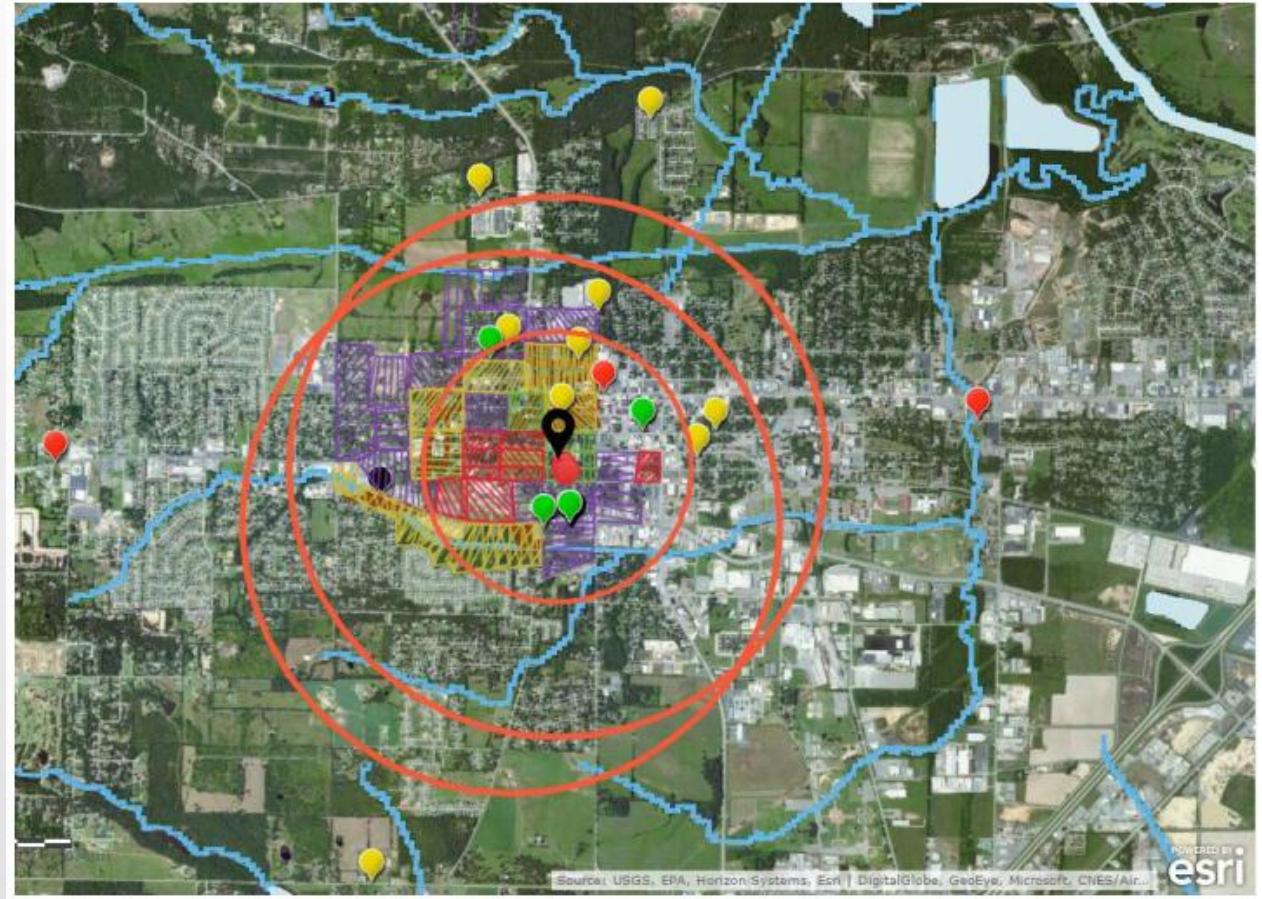
<https://www.txst.edu/gii/geographic-profiling.html>



National Center for Missing & Exploited Children

“Team Adam” Map

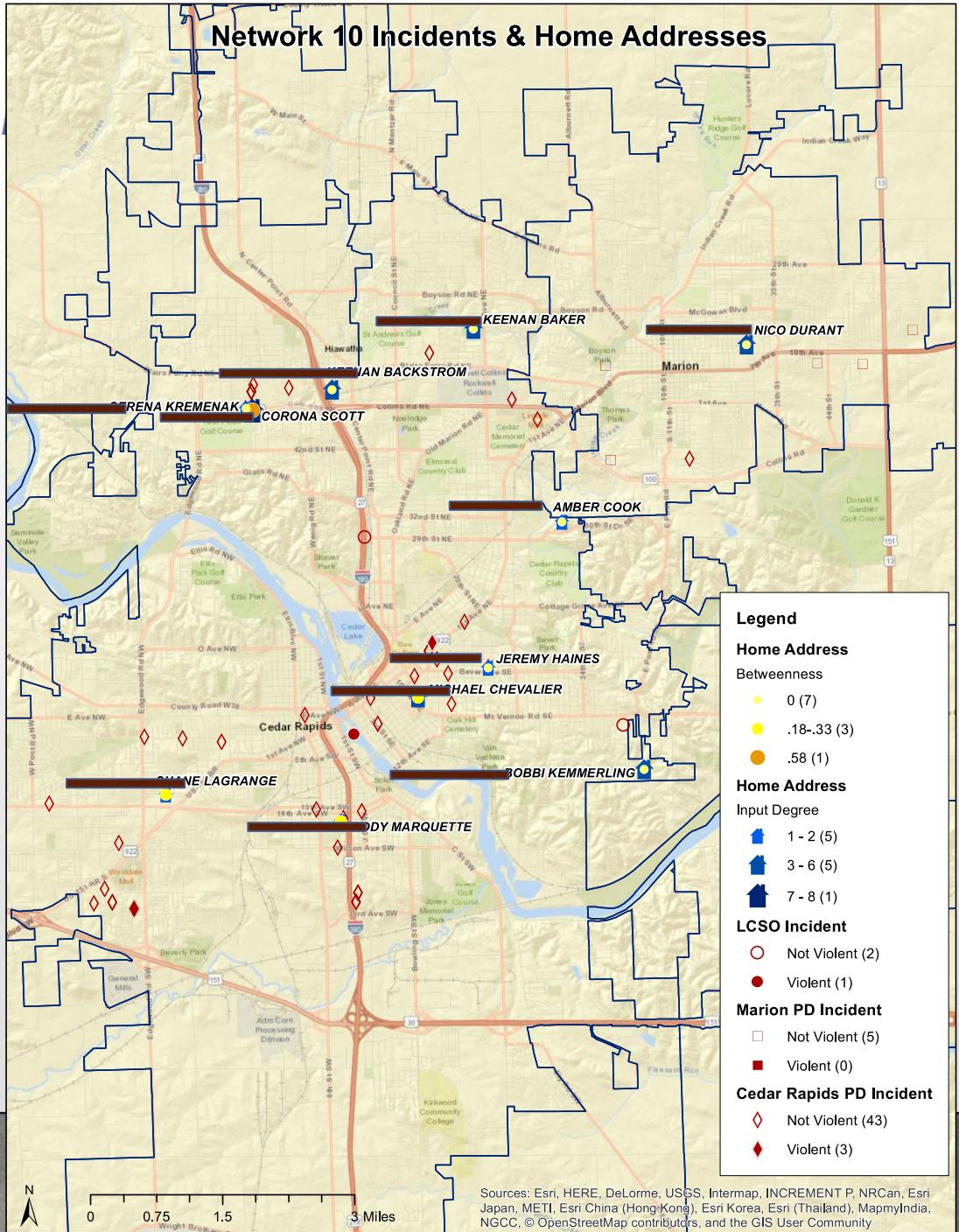
- Places of interest
- Land use (water, forest, roads)
- Potential suspect locations
- Search areas



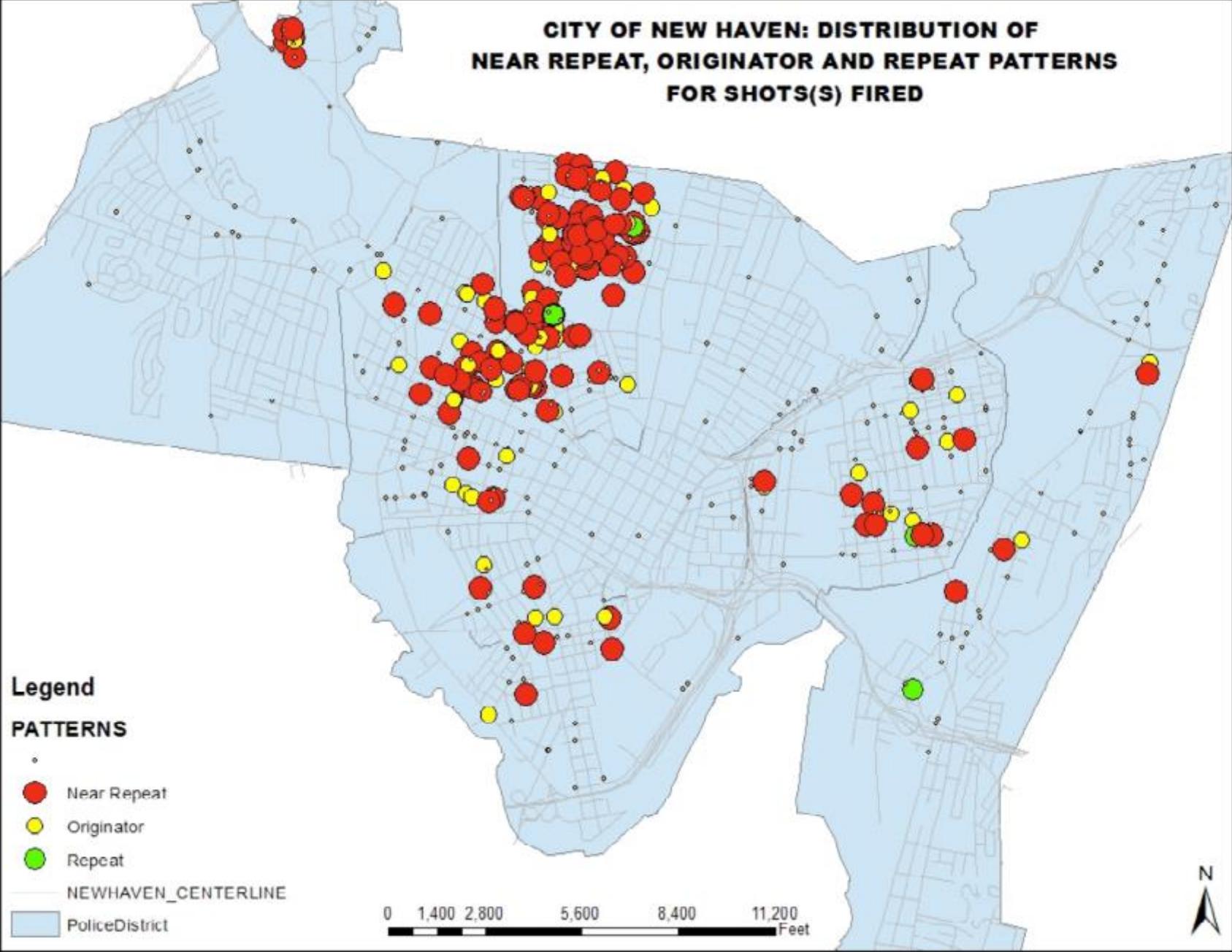
GIS & social network analysis

["Social Networks and the Risk of Gunshot Injury"](#) (Papachristos, et al.)
Journal of Urban Health

["Collaborating to Reduce Violence: The Impact of Focused Deterrence in Kansas City"](#) (Fox and Novak)
Police Quarterly



**CITY OF NEW HAVEN: DISTRIBUTION OF
NEAR REPEAT, ORIGINATOR AND REPEAT PATTERNS
FOR SHOTS(S) FIRED**





GIS, CPTED & Campus Crime

**Figure 1: Temple University Police Department
Assaults
1997-1998**



- Temple University
- Outside Assaults
- Victim Survey
- High-definition GIS

**Figure 3: Temple University Police Department
Assaults
1998-1999**



Three-dimensional Mapping

Gladfelter Hall

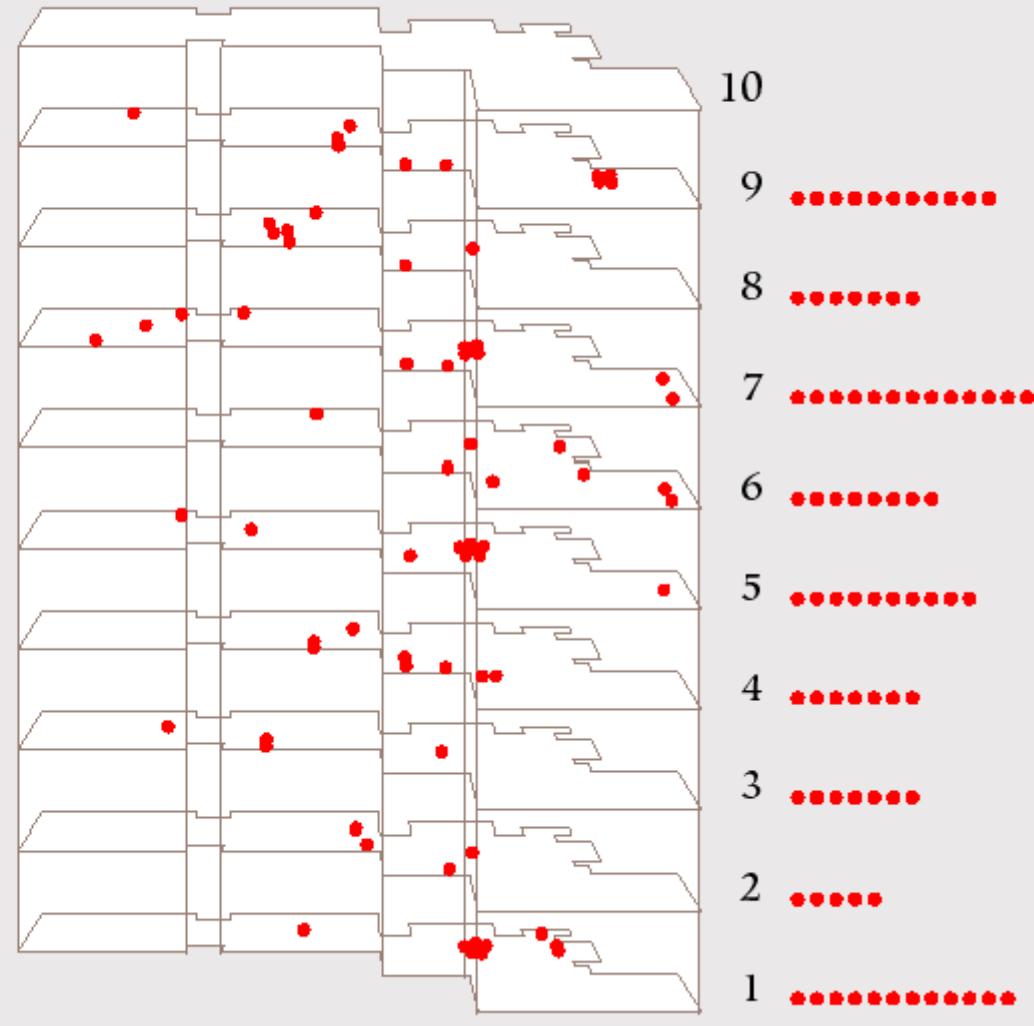


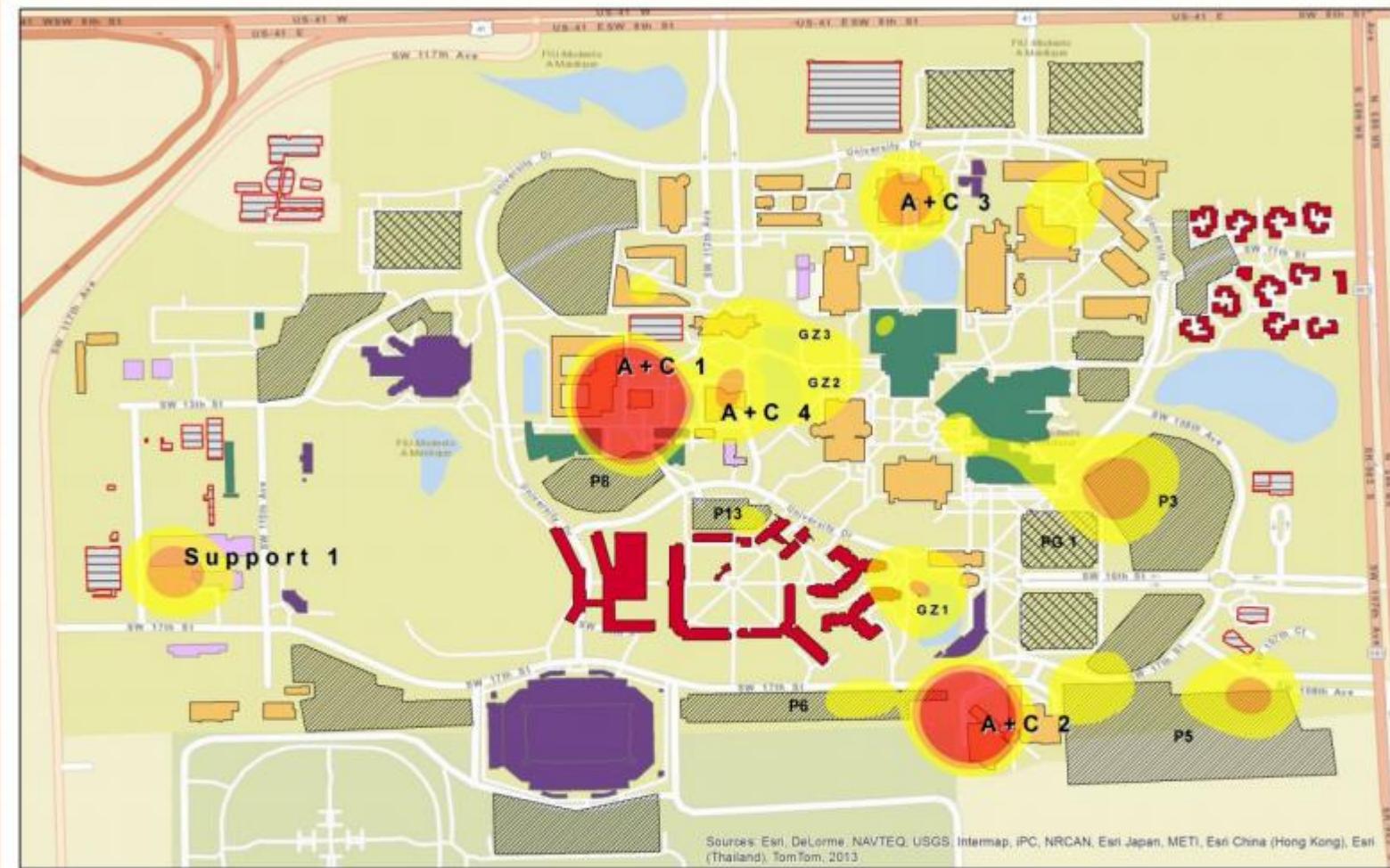
Vertical and Horizontal Pattern Detection

Crime Projected on Building Footprint



Crime on Building Floors





0 250 500 1,000 Feet

N

Figure 1. Smoking violation hot spots at FIU's MMC campus.

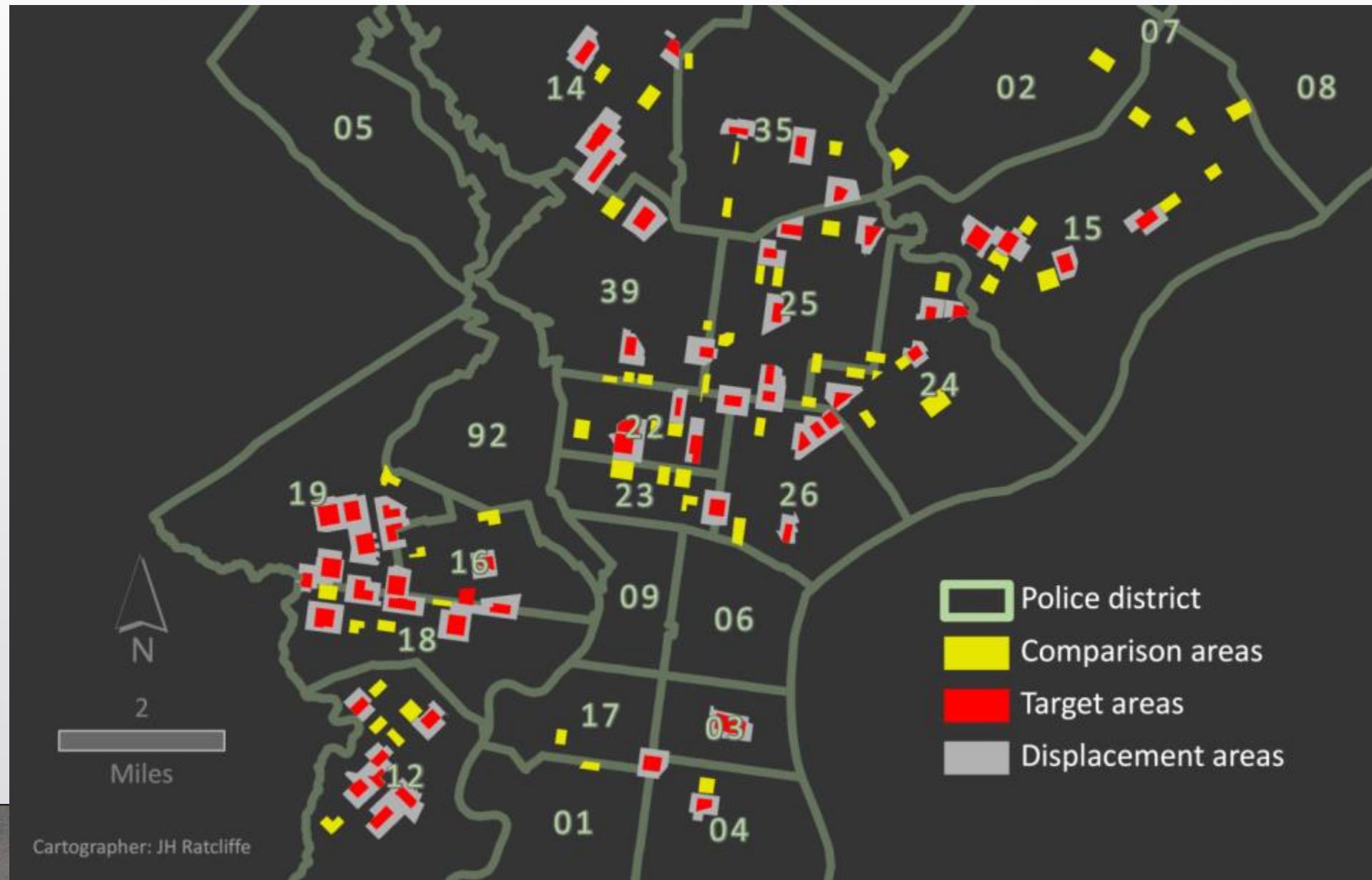


Using GIS for Crime & Justice Research

Philly Foot Patrol Experiment

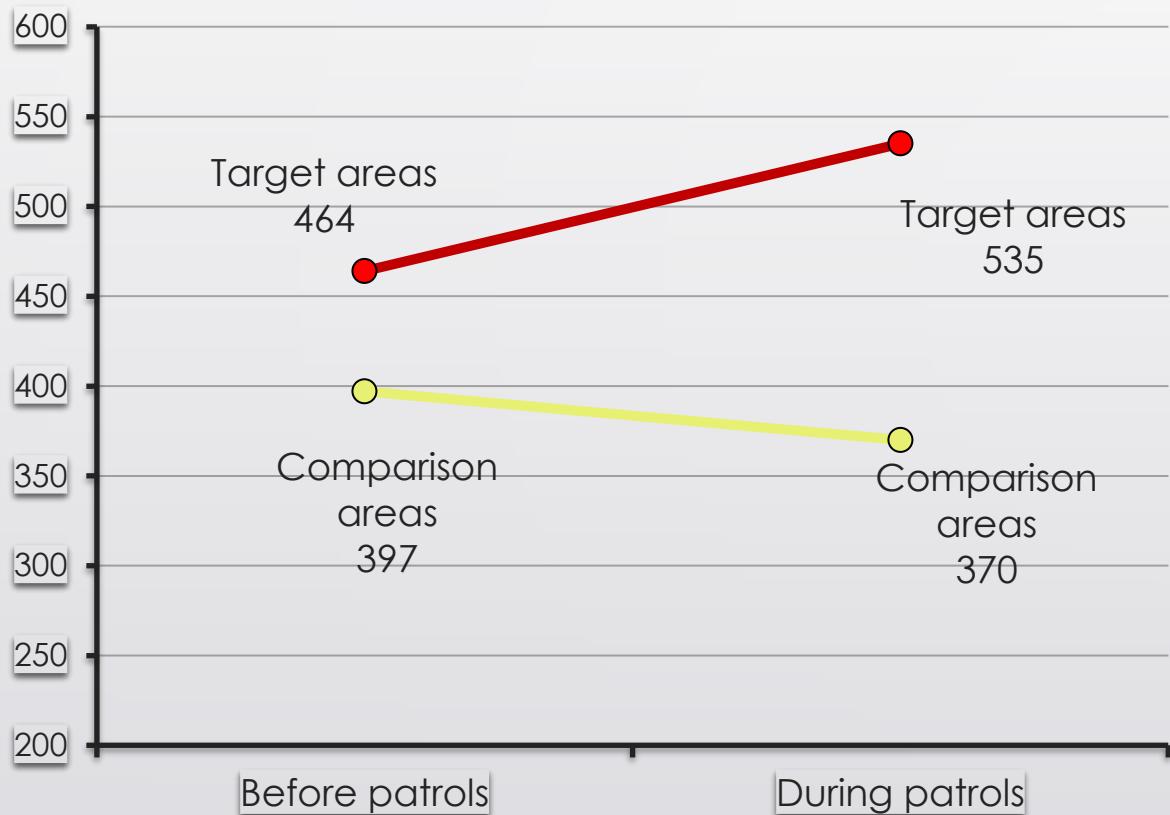
- Philadelphia PD partnered with Temple University
- **Does foot patrol work?**
- Experiment (randomized controlled trial):
 - Identified violent crime locations
 - Geocoded addresses, then aggregated and summed to spatial units (Thiessen polygons) around intersections
 - Identified 120 beats, ranked by crime volume, paired
 - Random sampling of each pair for target and comparison
 - Assigned officer pairs to do foot patrol (10am-2am, Tue-Sat)
- Analyzed traffic stops, drug activity, arrests and violent crimes
- <https://www.jratcliffe.net/phila-foot-patrol-experiment>

2009 foot patrol areas

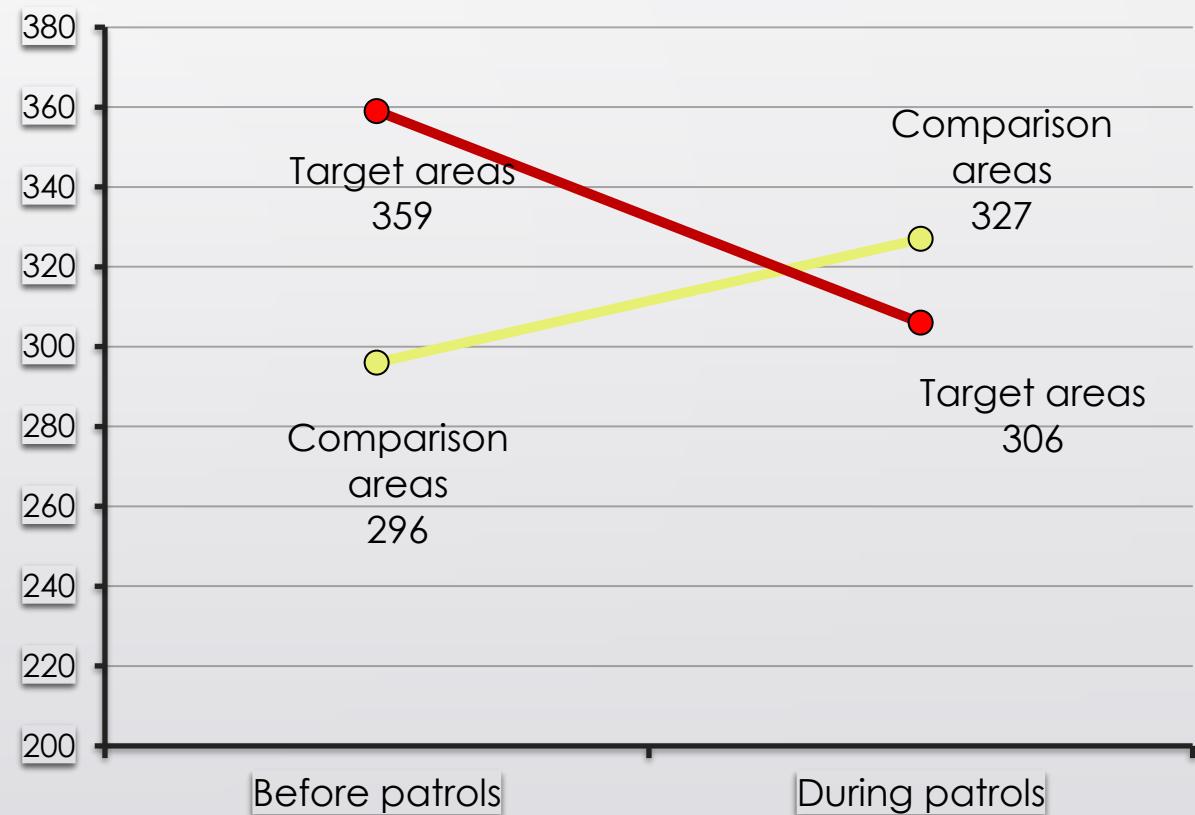




Detected drug activity



Violent crime





Why is Geography Important in Jessica's Law?

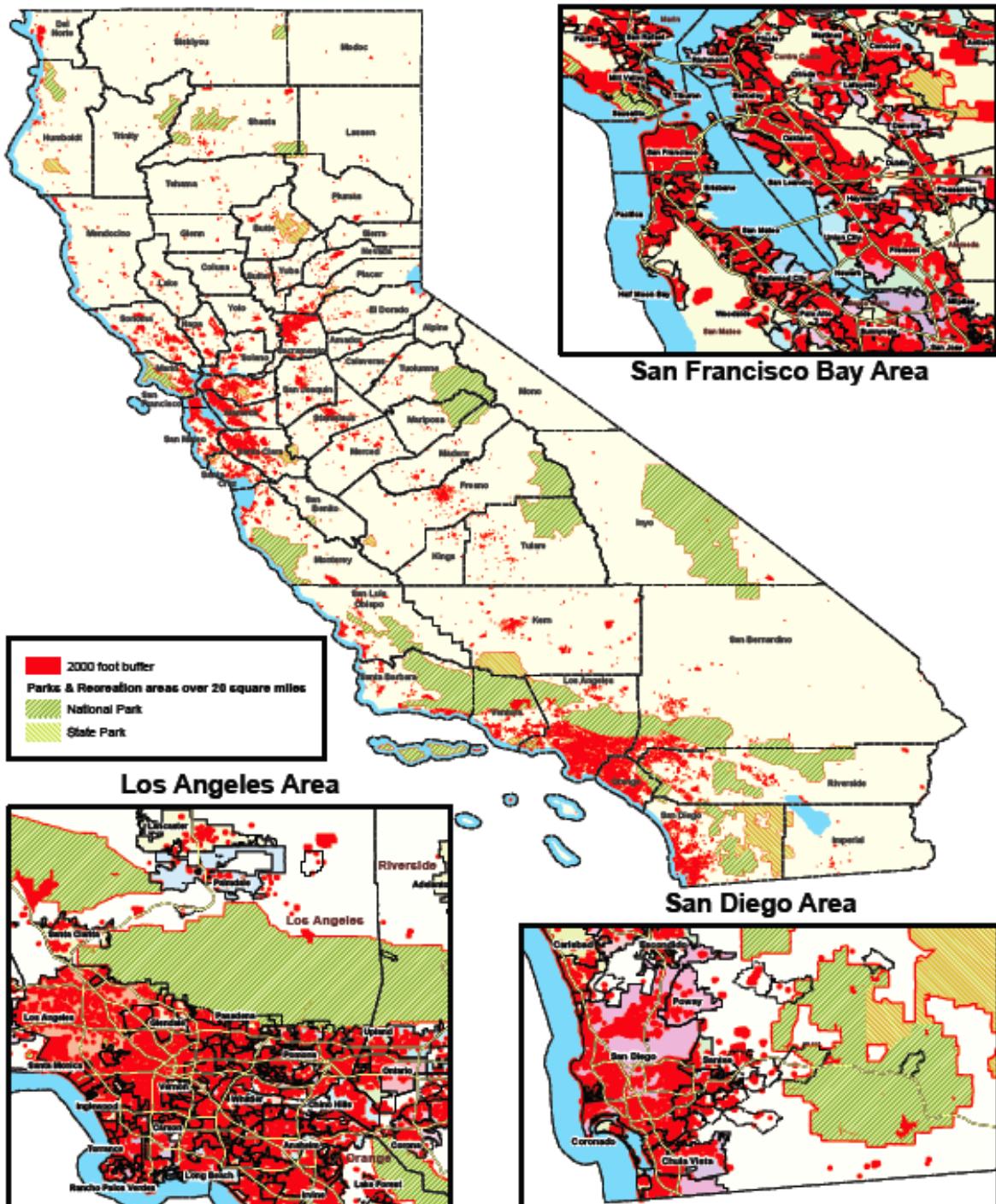
- Restrictions are based on *distance* from a *place* to a *place*
- Places have definitions and attributes
 - Data accuracy
- Geocoding issues
 - Parcel v. address
- Measurement issues
 - i.e. across a river



A look at the State of California

Scale Matters

*Produced by the
California State Senate
Demographic Office, 2006*





The San Diego Experience

Where do the sex offenders live?

Where are the schools and parks?

Where will sex offenders be allowed to live?

2006: Initial Maps & Analysis

2010: Issue resurfaces w/court case

Parolee Sex Offenders (represented by the San Diego County Public Defender) v. State of California, Department of Corrections/Parole

San Diego Analysis & Maps

*It's all about
the data*

School Points (existed)

School Polygons (created layer)

Park Polygons (created layer)

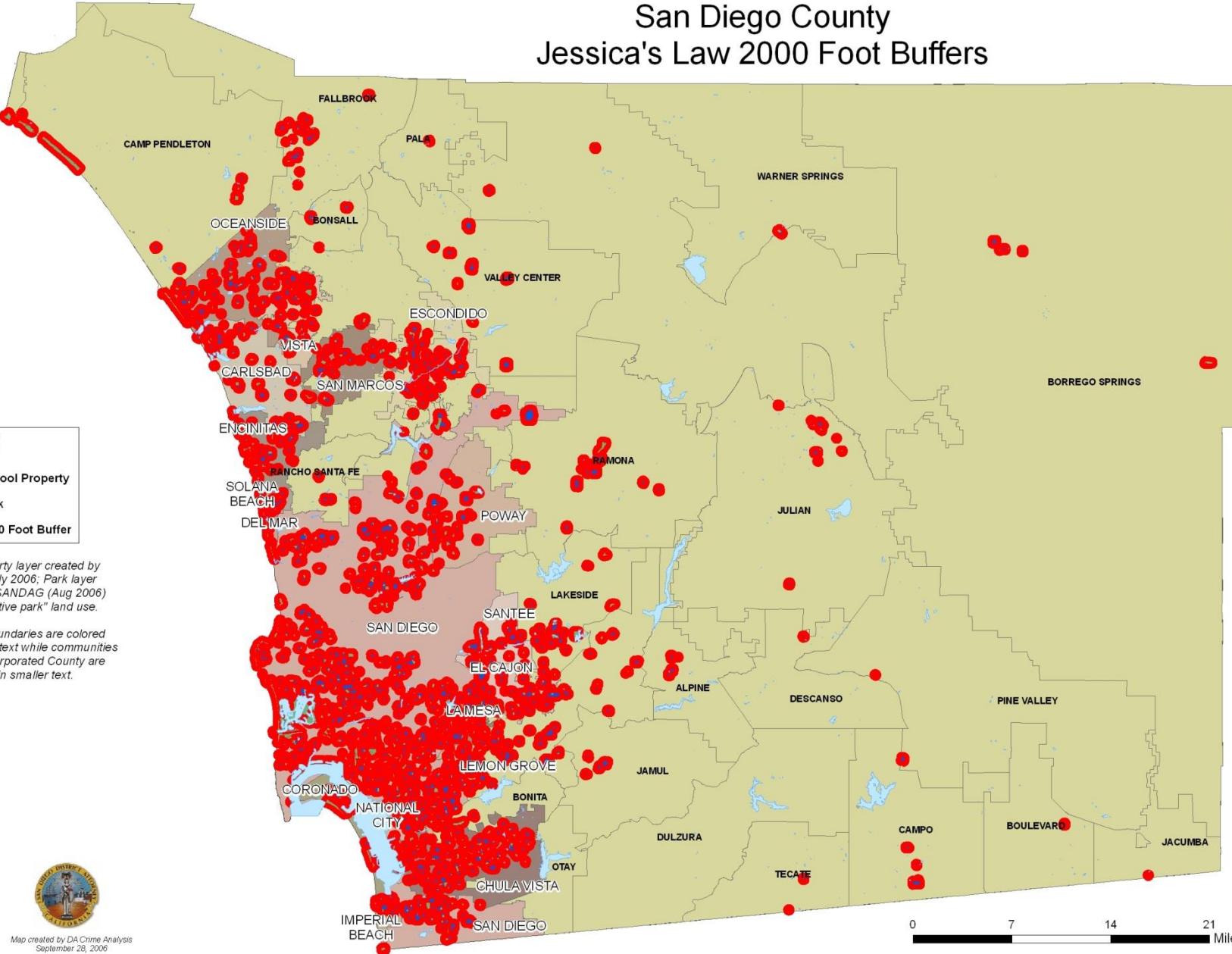
Tax Assessor Parcel Layer (existed)

- Extracted Residential Parcels
- Extracted Multi-family v. Single

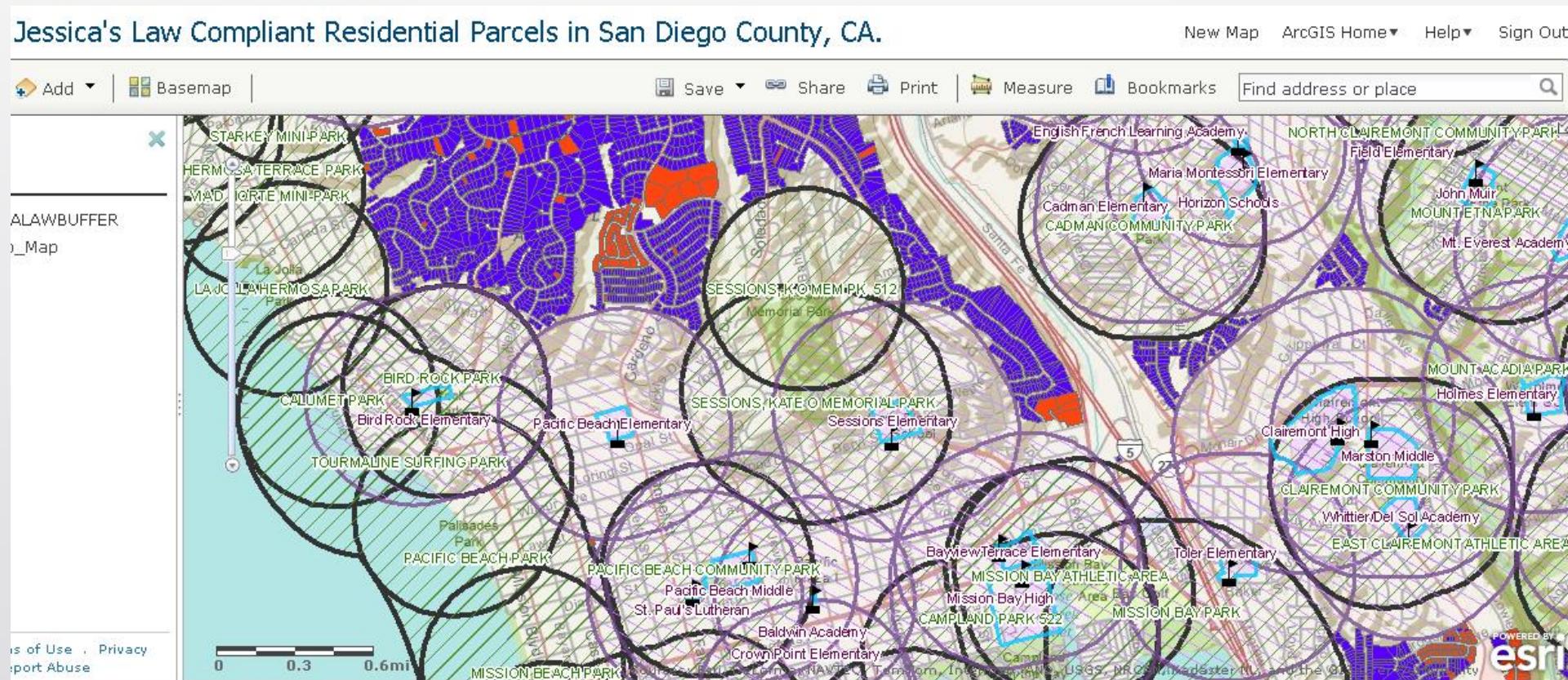
SANDAG Land Use (existed)

- Extracted Residential Parcels
- Extracted Multi-family v. Single

San Diego County Jessica's Law 2000 Foot Buffers



Interactive Mapping App made for the Public Defender



Residential Parcel Analysis

Started with all parcels countywide

Extracted out residential parcels and multi-family

Overlaid school and park buffers

Analyzed parcels that were *not* within the buffer

	TOTAL	RESID.	RES OUTSIDE SCHOOL & PARK	% PARCELS COMPLIANT	% RESID COMPLIANT	MULT-FAM** OUTSIDE SCHOOL& PARK	% PARCELS MULT-FAM COMPLIANT	% RESID PARCELS MULT-FAM COMPLIANT
CARLSBAD	34,104	27,434	17,507	51.3%	63.8%	902	2.6%	3.3%
CHULA VISTA	54,536	44,957	15,149	27.8%	33.7%	641	1.2%	1.4%
UNINC. COUNTY	183,333	148,610	117,699	64.2%	79.2%	3,417	1.9%	2.3%
VISTA	21,223	17,038	8,685	40.9%	51.0%	389	1.8%	2.3%
COUNTYWIDE	830,013	664,472	361,324	43.5%	54.4%	18,679	2.3%	2.8%

GIS & Crime Resources

- <https://www.ncjrs.gov/pdffiles1/nij/178919.pdf> (Mapping Crime book - free!)
- <http://www.amazon.com/Tutorial-Crime-Analysis-Wilpen-Gorr/dp/158948214X> (Crime Analysis GIS Tutorial – not free!)
- <https://www.ojp.gov/pdffiles1/nij/209393.pdf> (Crime Hot Spots - free!)

