Crime Mapping Level 2

BCJI WEBINAR

FEBRUARY 24, 2015

Offense/Arrest Report (RMS)

911 Call (CAD)

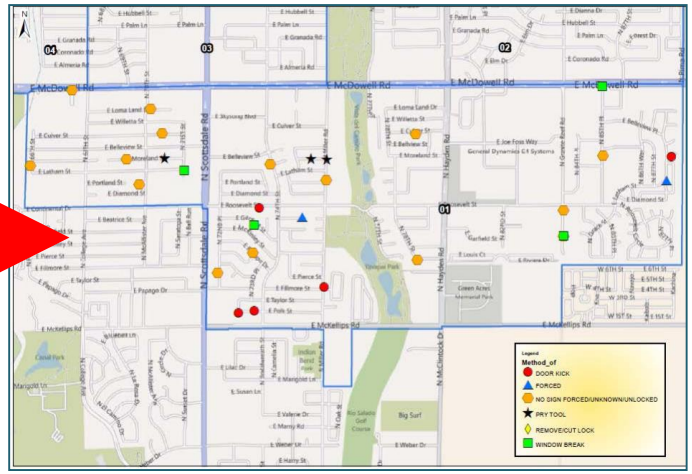
Prosecution (DA/Court System)

Parole/Probation

<u>Community Context</u>
Businesses
Schools
Parks
Alcohol Establishments
Bus Stops/Routes

G I S

An Integrator for Effective Public Safety



IMPORTANCE OF GEOGRAPHY

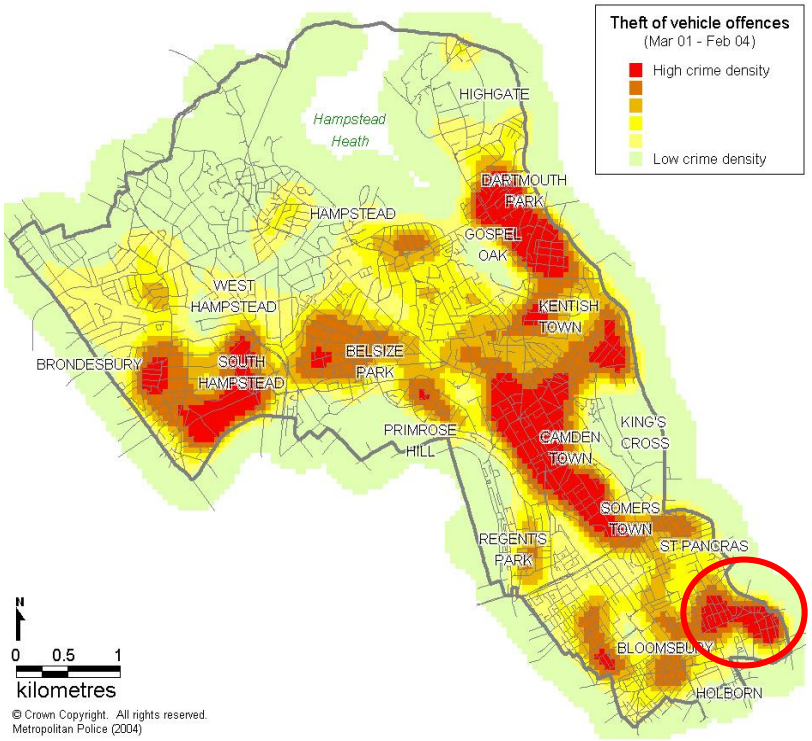
The four dimensions of crime

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

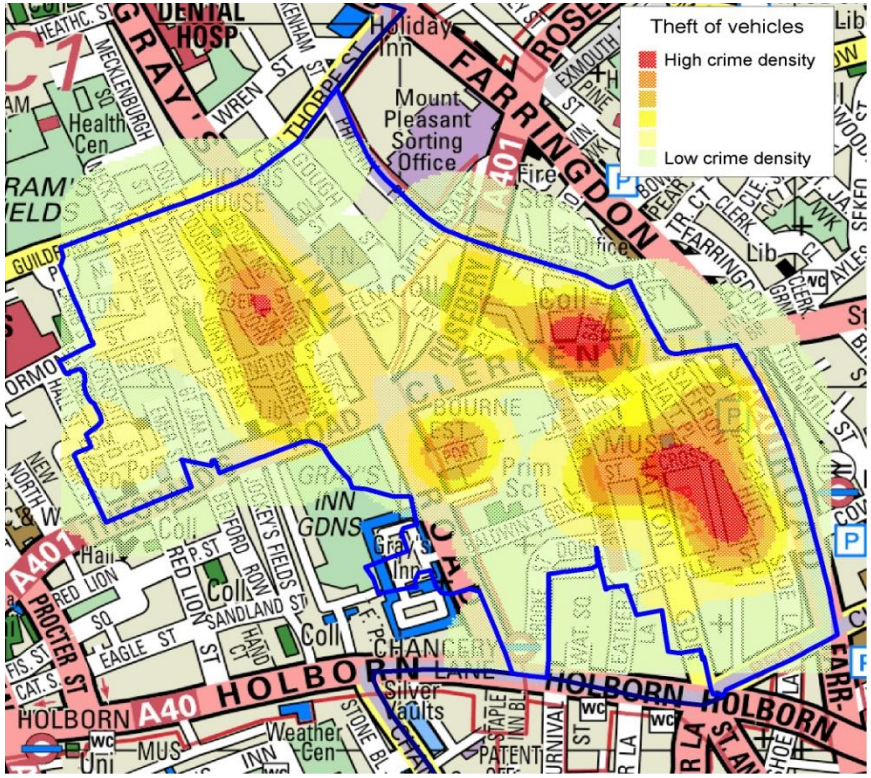
Future crime is *"six times more predictable by the address of the occurrence than by the identity of the offender. Why aren't we thinking more about whereduni*t, *rather than just whodunit?"* (Larry Sherman, 1995)

Clerkenwell Hotspot



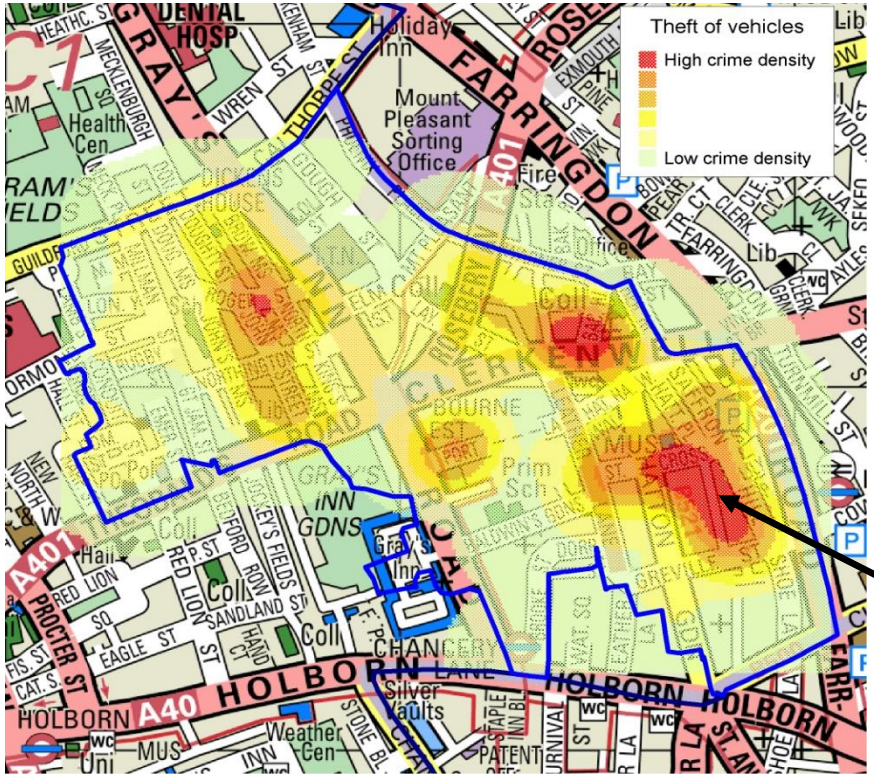
From whereunit to whodunnit

Clerkenwell Hotspot



From wheredunit to whodunnit

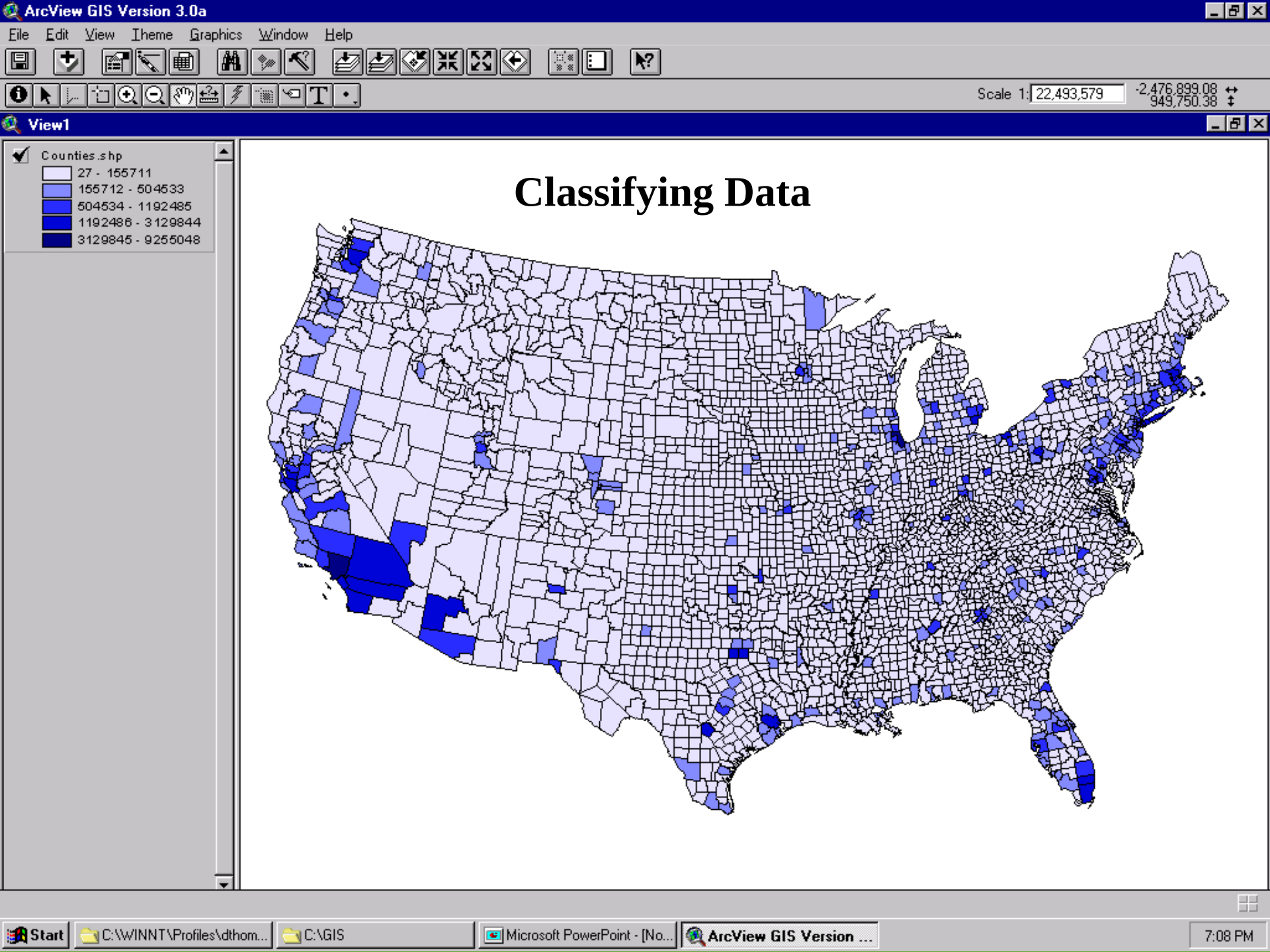
Clerkenwell Hotspot



Vehicle type	Camden	Clerkenwell (n)	Clerkenwell(%)
Car	51%	41	18%
Sports or convertible	3%	5	2%
Scooter or moped	26%	95	42%
Motor cycle	13%	70	31%
Van	5%	3	1%
Other	2.0%	10	4%
Not known	0.5%	0	0%

From whereunit to whodunnit

Classifying Data and Analyzing Relationships…


ArcView GIS Version 3.0a
File Edit View Theme Graphics Window Help
Scale 1: 22,493,579
-2,476,899.08
949,750.38
View1
Counties.shp
27 - 155711
155712 - 504533
504534 - 1192485
1192486 - 3129844
3129845 - 9255048
Classifying Data
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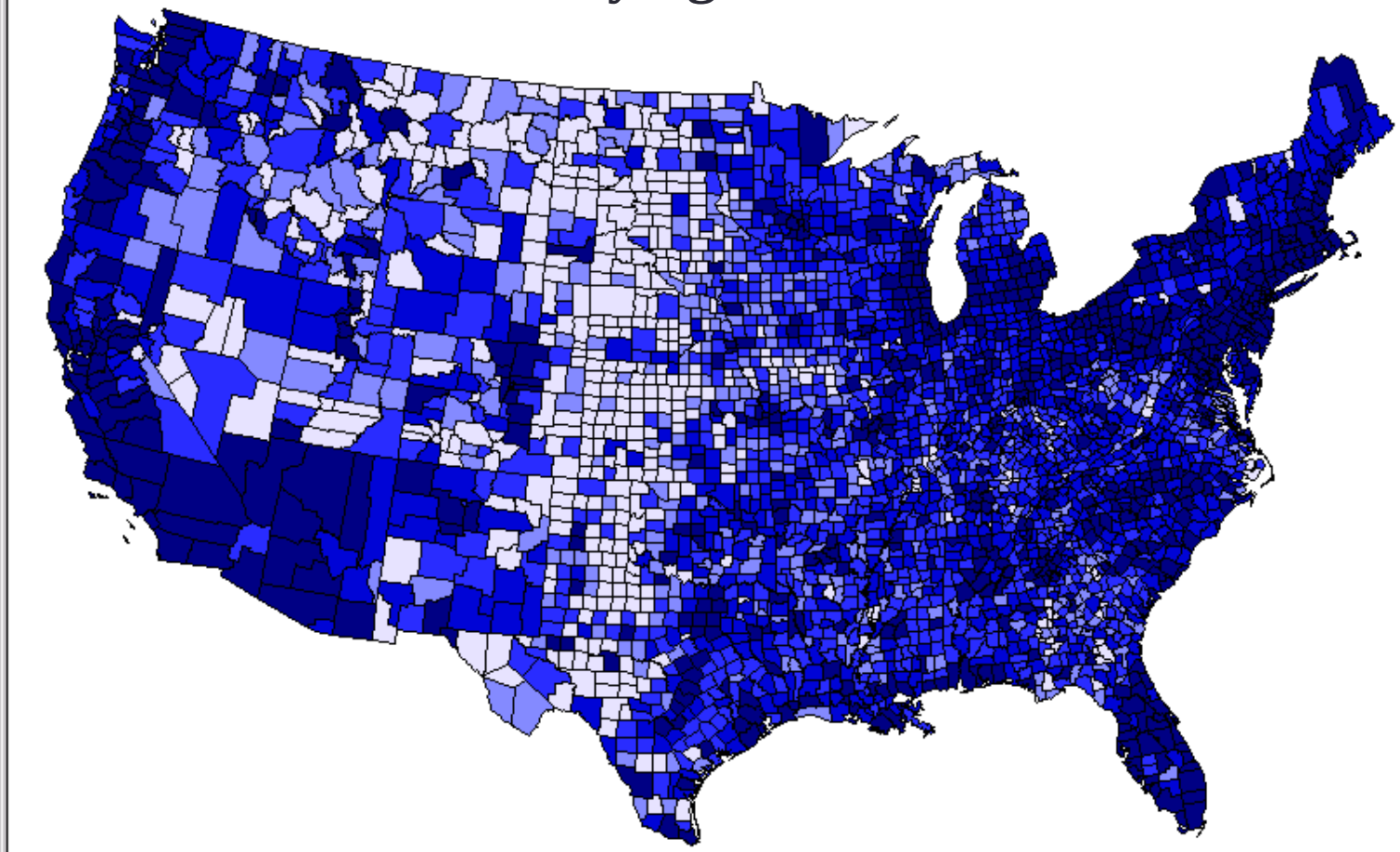
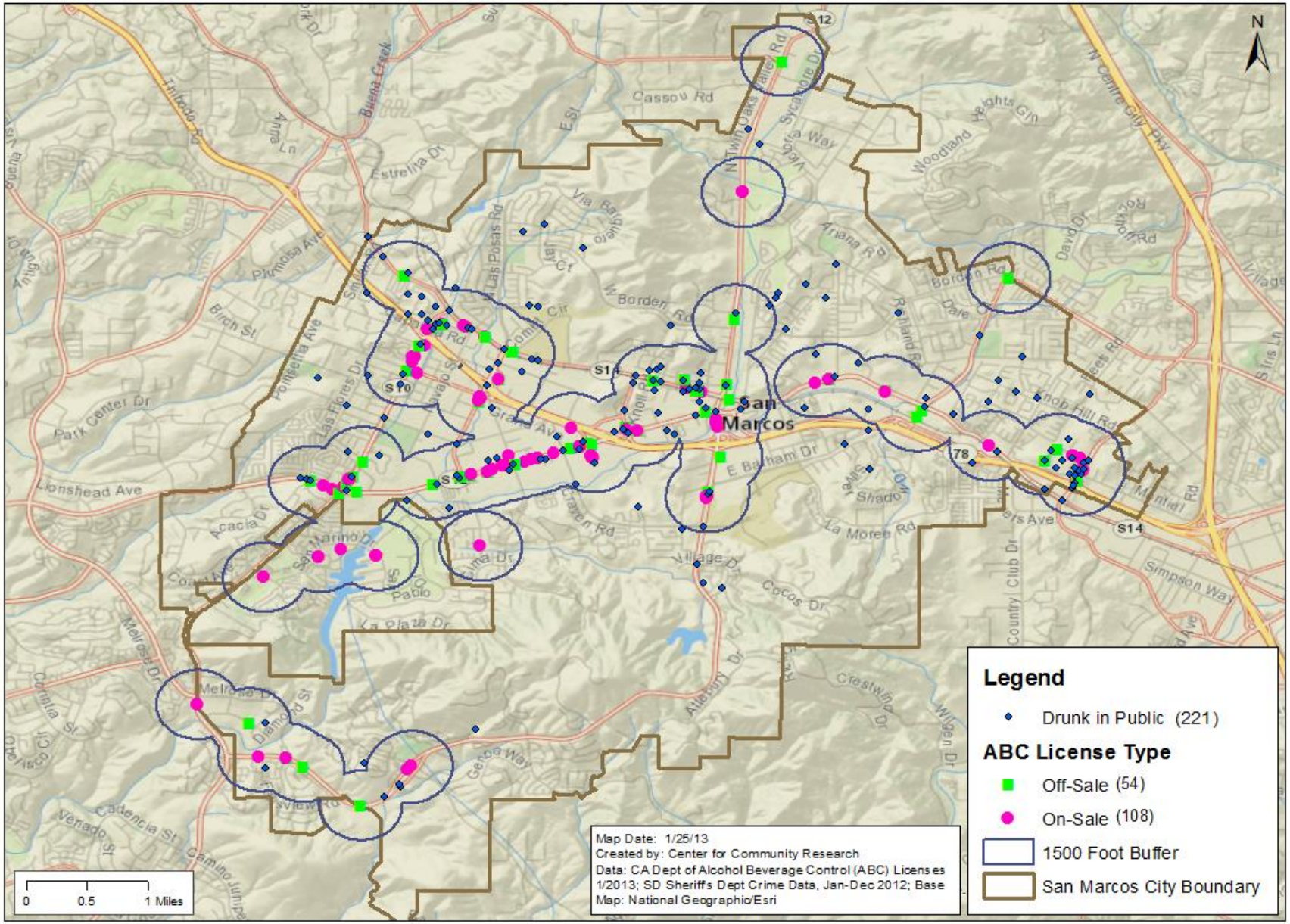
C:\GIS
Microsoft PowerPoint - [No...
ArcView GIS Version ...
7:08 PM

Classifying Data

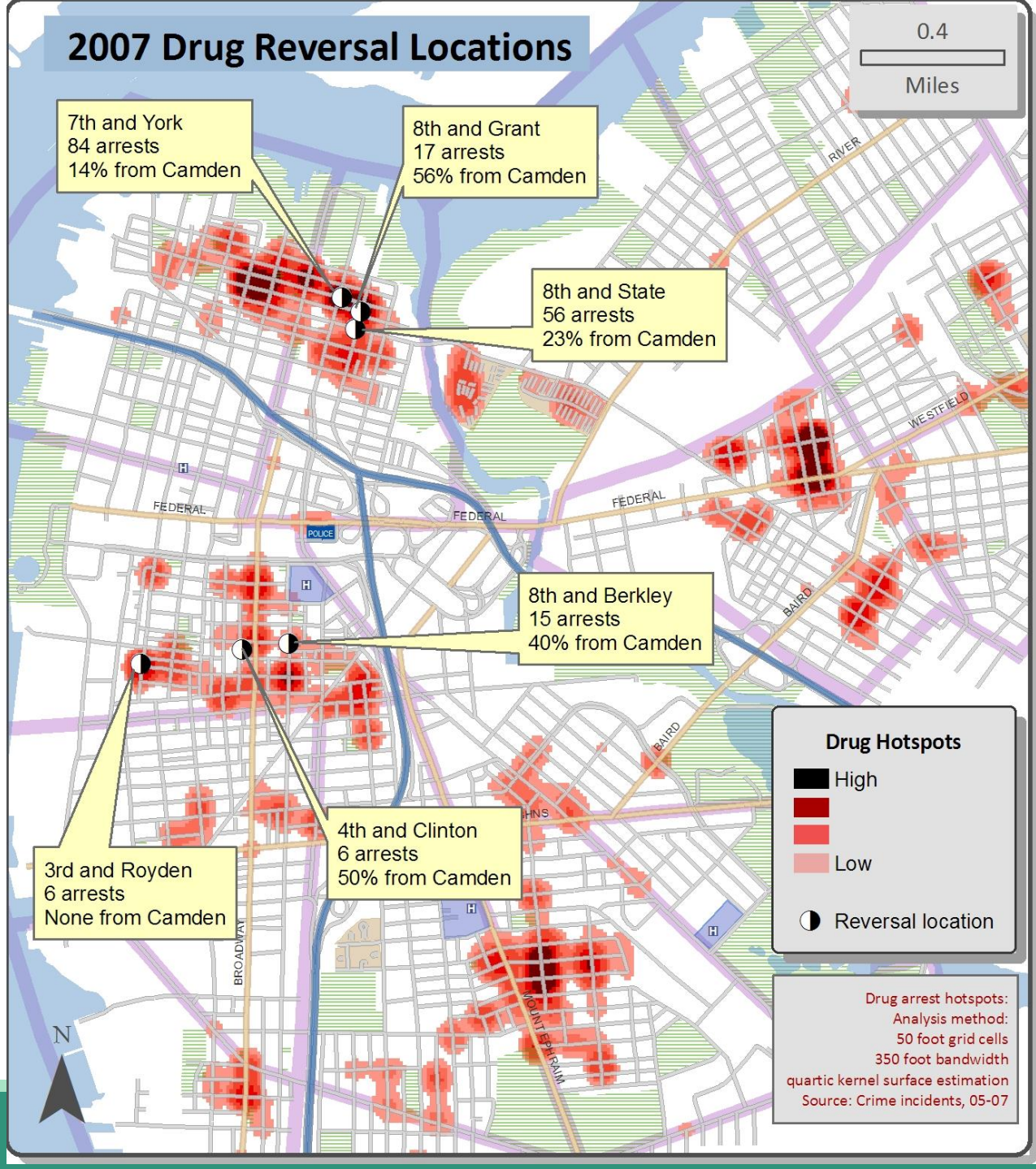


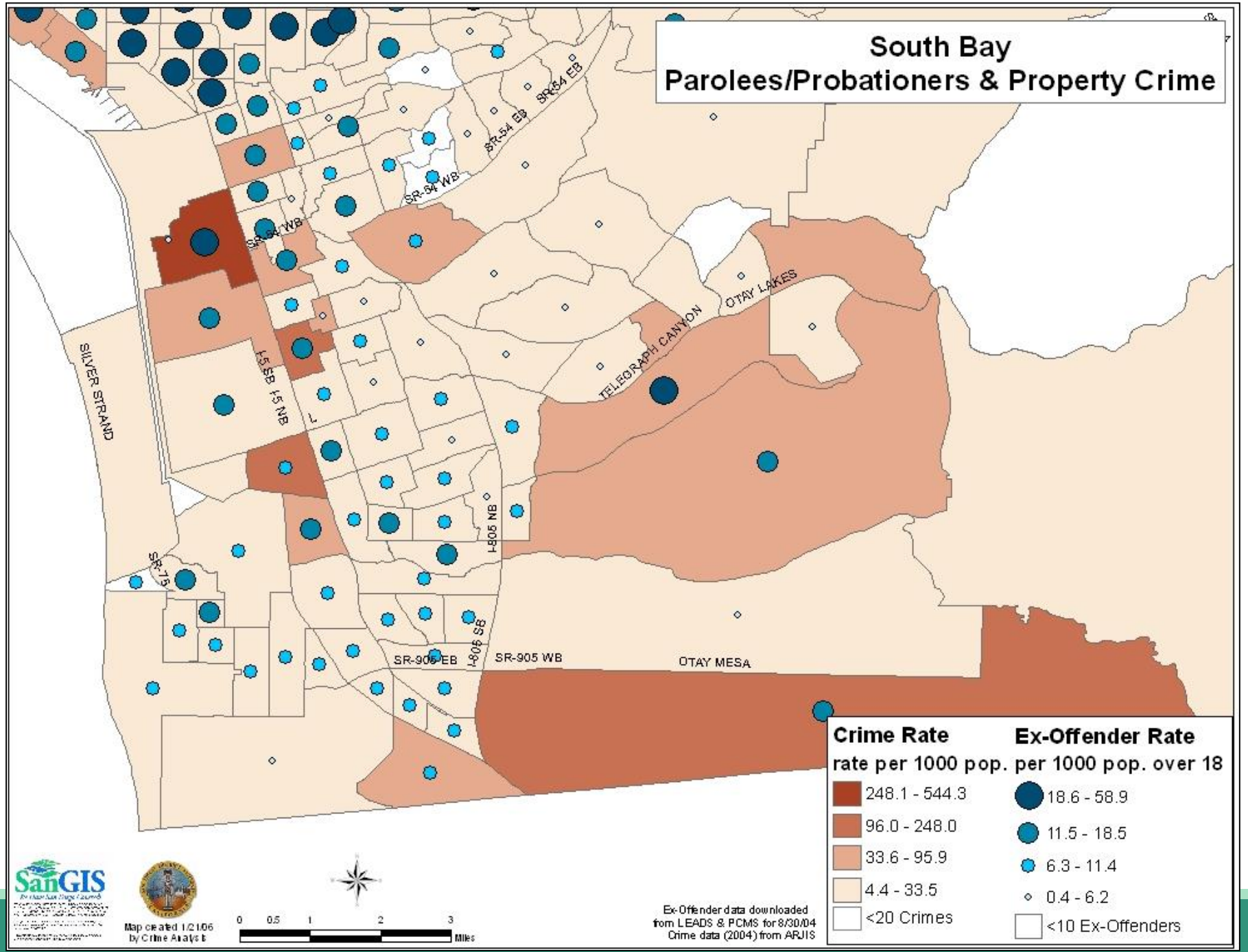
City of San Marcos - Alcohol Establishments & Drunk in Public Incidents, 2012



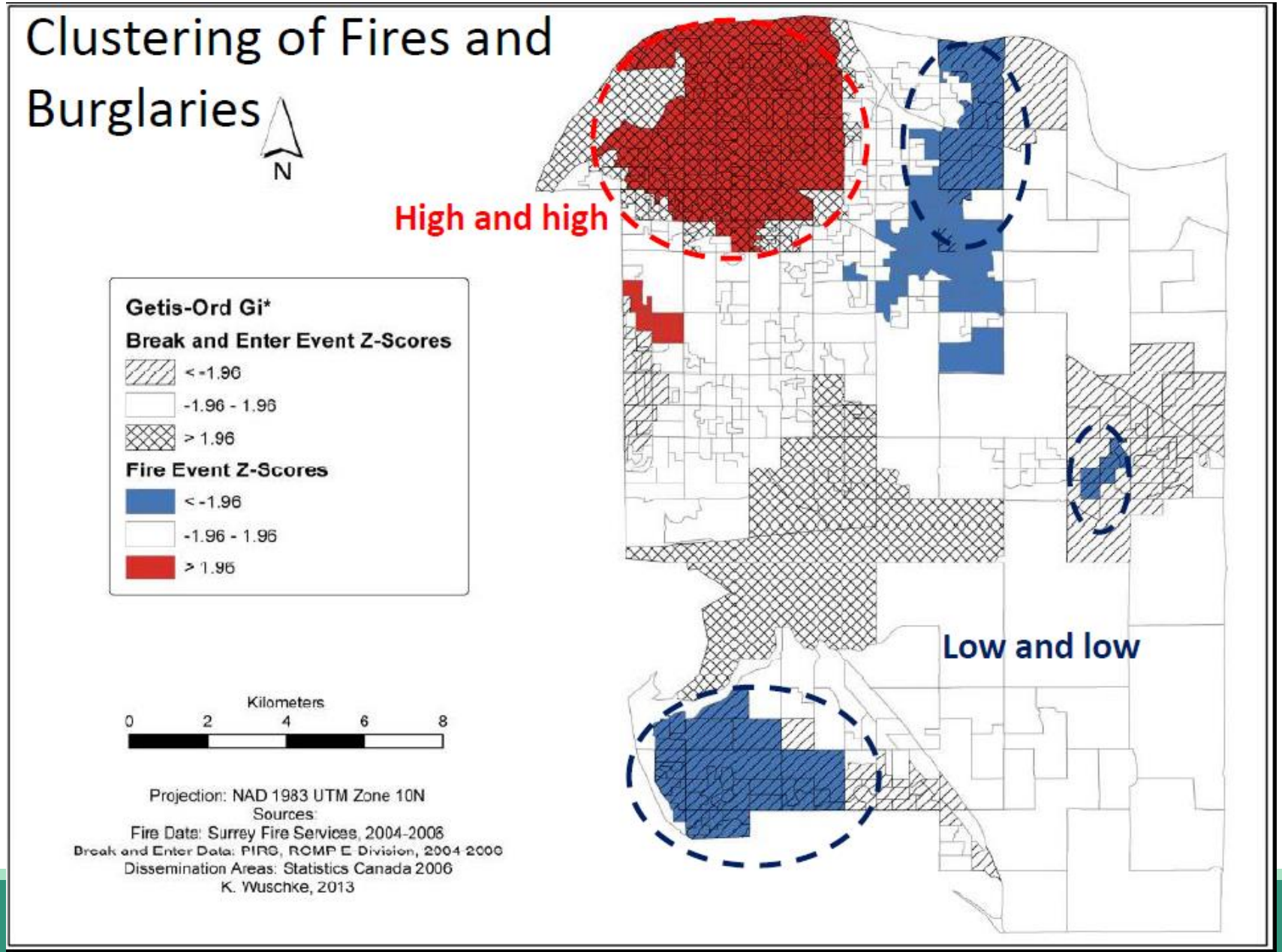
Temple University working with Camden Prosecutor's Intelligence Analysis Section

Using Drug Hotspots to target resources



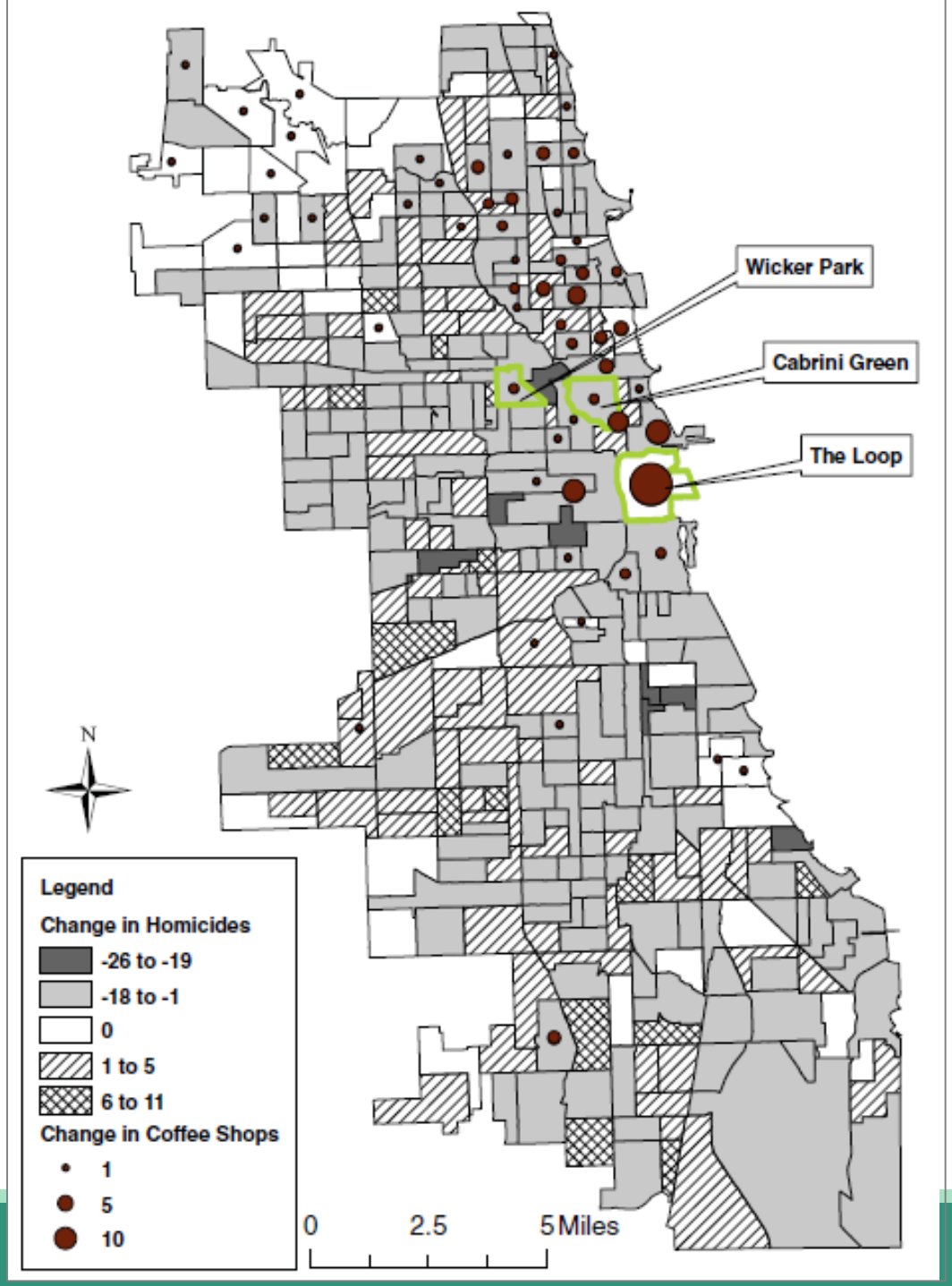

South Bay
Parolees/Probationers & Property Crime
SR-54 EB
SR-54 WB
SR-54 WB
SR-54 EB
OTAY LAKES
TELEGRAPH CANYON
SILVER STRAND
I-5 SB
I-5 NB
I-805 NB
SR-75
I-805 SB
SR-905 EB
SR-905 WB
OTAY MESA
Crime Rate
rate per 1000 pop.
248.1 - 544.3
96.0 - 248.0
33.6 - 95.9
4.4 - 33.5
<20 Crimes
Ex-Offender Rate
per 1000 pop. over 18
18.6 - 58.9
11.5 - 18.5
6.3 - 11.4
0.4 - 6.2
<10 Ex-Offenders
SanGIS
Map created 1/2/06
by Crime Analysis
0 0.5 1 2 3
Miles
Ex-Offender data downloaded
from LEADS & PCMS for 8/30/04
Crime data (2004) from ARJIS

Co-Analyzing Police & Fire Data



Chicago neighborhood change in homicides and coffee shops, 1991 - 2005

"More Coffee, Less Crime?
Papachristos, et al.
City & Community, Sept. 2011



Using GIS for Assessment

Identifying Crime Locations with a Victim Survey

High-definition GIS

BEFORE Crime Reduction Efforts

Figure 1: Temple University Police Department Assaults 1997-1998

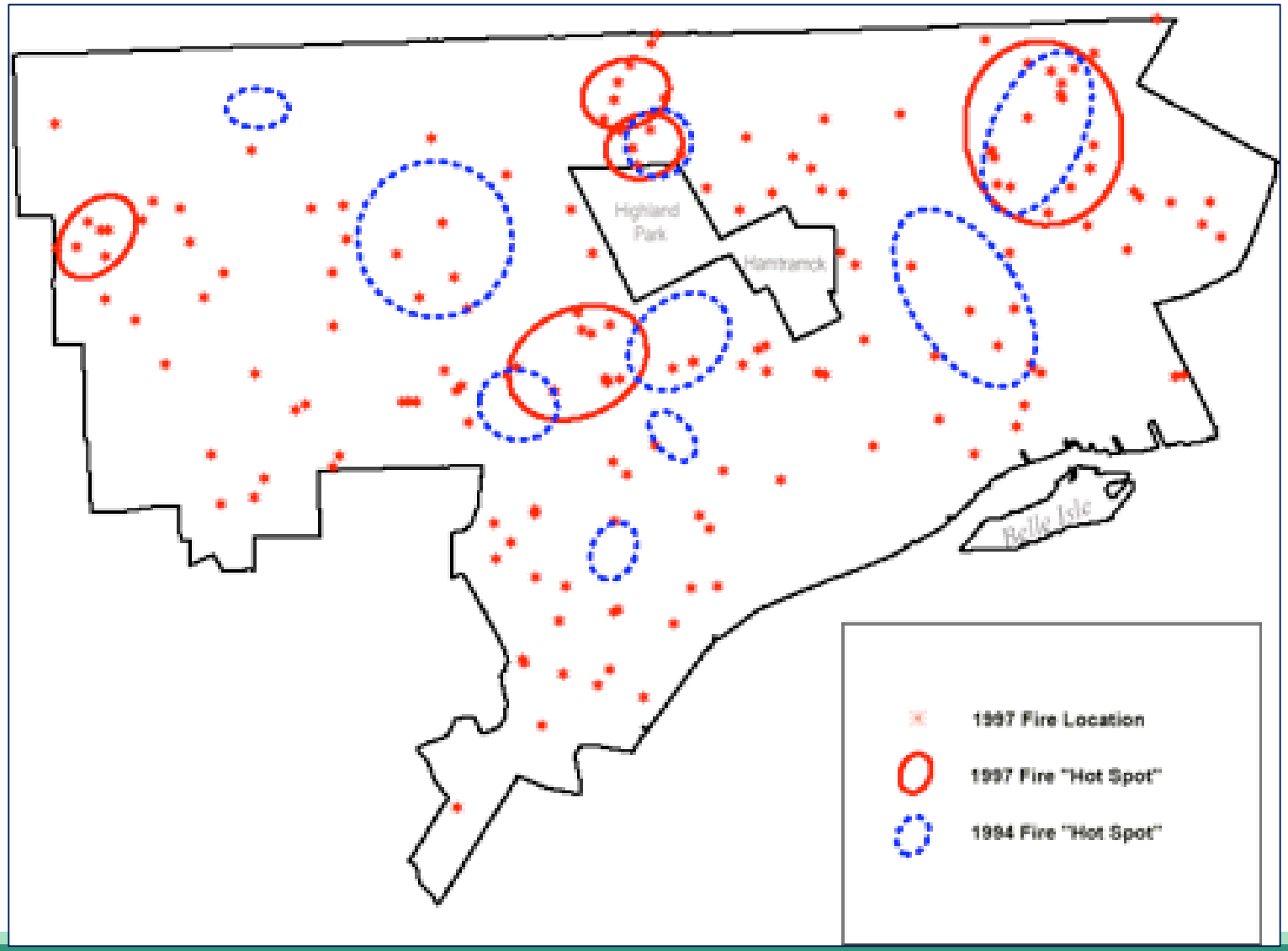
Lighting, Kiosks, CSOs in Key Locations

1 Year Later

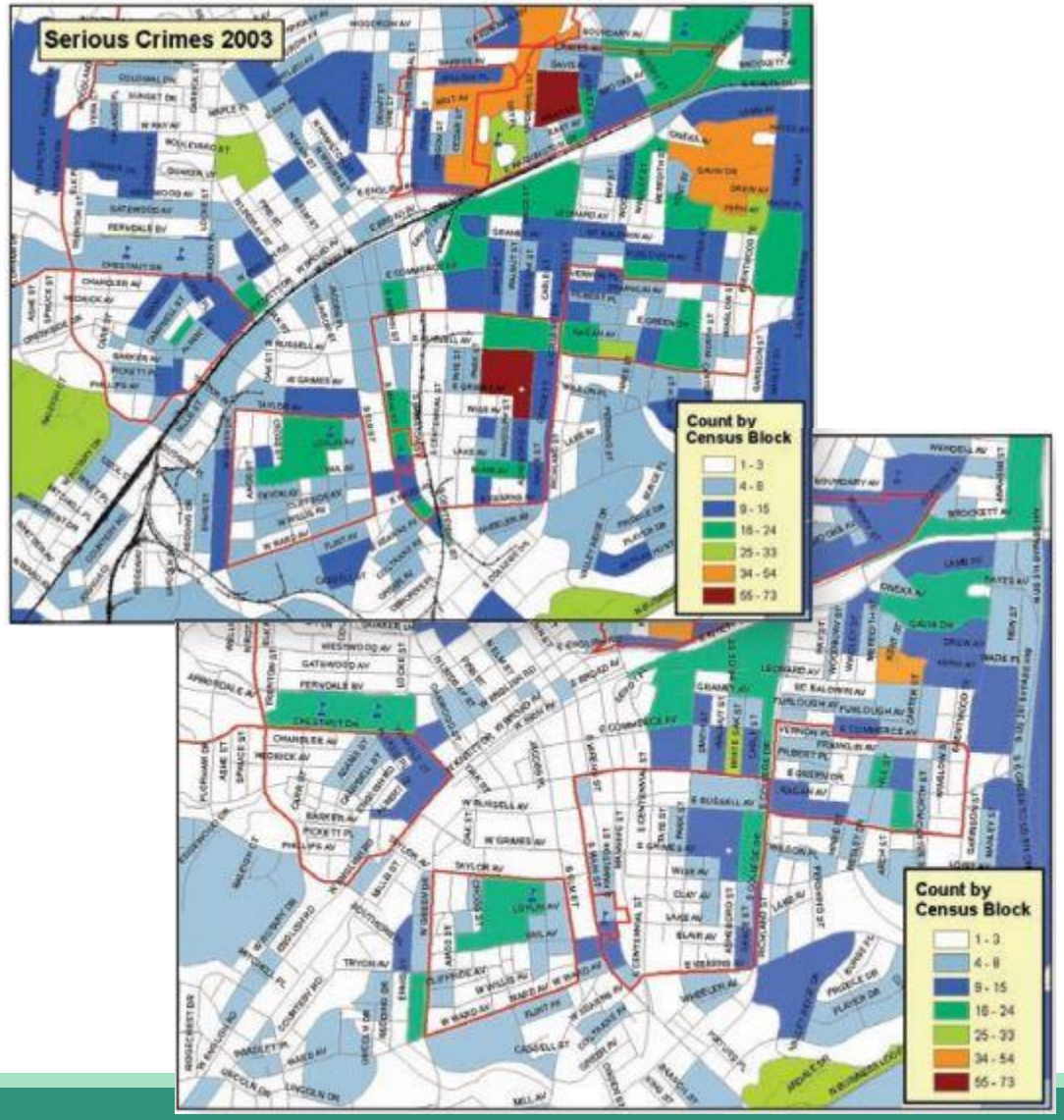
Figure 3: Temple University Police Department Assaults 1998-1999

Hot Spots: Statistical Ellipses

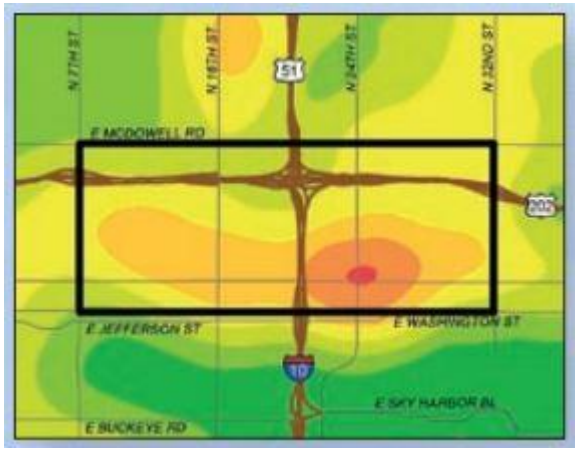
Arson Hot Spots in Detroit 1994 & 1997



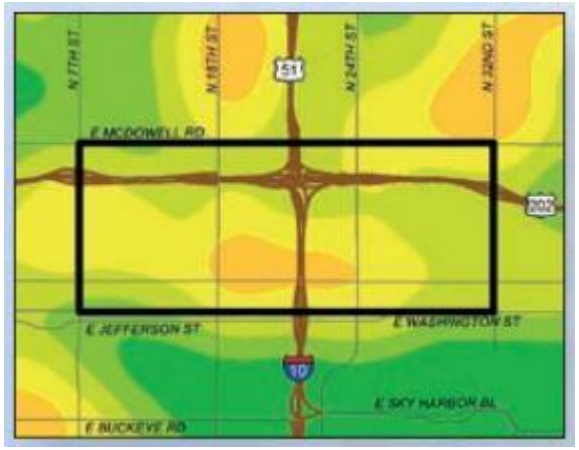
Hot Spots: Choropleth



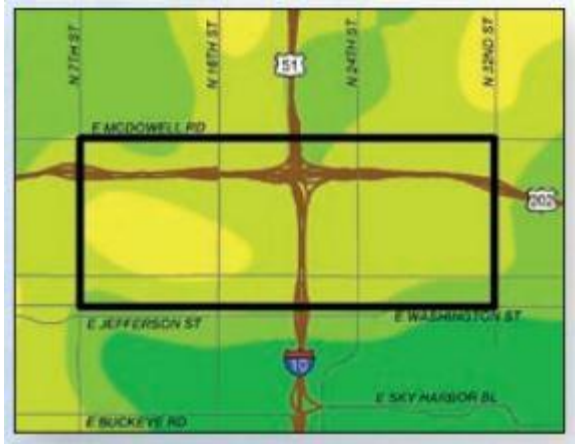
Hot Spots: Kernel Density



Hot Spot



1 year later



2 years later

Don't forget to use the same algorithm & criteria!

Using GIS to Analyze Population and Housing

POPULATION AND HOUSING ESTIMATES (2007)

2007 Wildfire Evacuation Areas

SANDAG

The following population and housing unit data are based on parcel-level housing counts from the San Diego County Assessor's Office, the U.S. Census Bureau, and SANDAG's Regional Information System.

POPULATION (January 1, 2007)

	Persons
Total Population	**515,077**
Household Population	507,976
Group Quarters Population	7,101

HOUSING (January 1, 2007)

	Units
Housing Units	**187,785**
Single Family - Detached	127,101
Single Family - Multi-Unit	14,340
Multiple Family	39,672
Mobile Home and Other	6,672

It is not possible to reliably estimate detailed demographic characteristics for this area. The following information provides the characteristics of a larger geographic area that includes the study area. While not a precise representation of the study area, it does provide an indication of its general demographic and economic characteristics.

HOUSING TENURE (January 1, 2007)

	Occupied Units	Vacancy Rate	Persons per Household
Occupied Housing Units	**177,776**	**5.3%**	**2.86**
Single Family - Detached	68%	--	--
Single Family - Multi-Unit	8%	--	--
Multiple Family	20%	--	--
Mobile Home and Other	4%	--	--

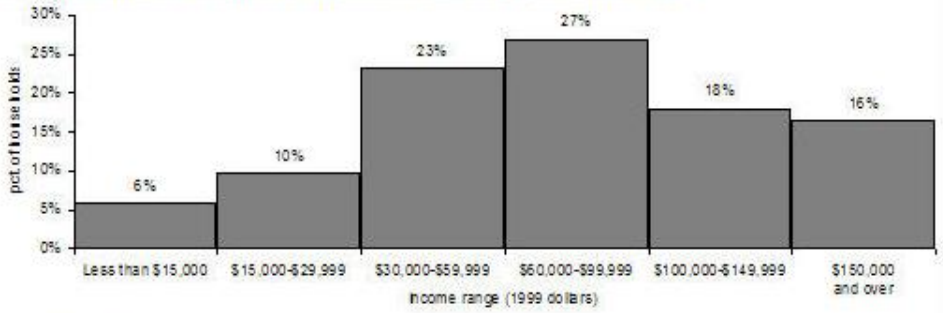
GENDER AND AGE (January 1, 2007)

	Male	Female
0 to 17	12%	12%
18 to 34	11%	9%
35 to 64	21%	22%
65 and older	6%	7%
Total Population	50%	50%

RACE AND ETHNICITY (January 1, 2007)

	Percent
Hispanic	18%
Non-Hispanic	82%
White	67%
Black	3%
American Indian	1%
Asian & Pacific Islander	9%
Other	3%

HOUSEHOLD INCOME DISTRIBUTION (real 1999 dollars, adjusted for inflation)



Median Household Income	
Adjusted for inflation (1999 $)	$74,498
Not adjusted for inflation (current $)	$98,339

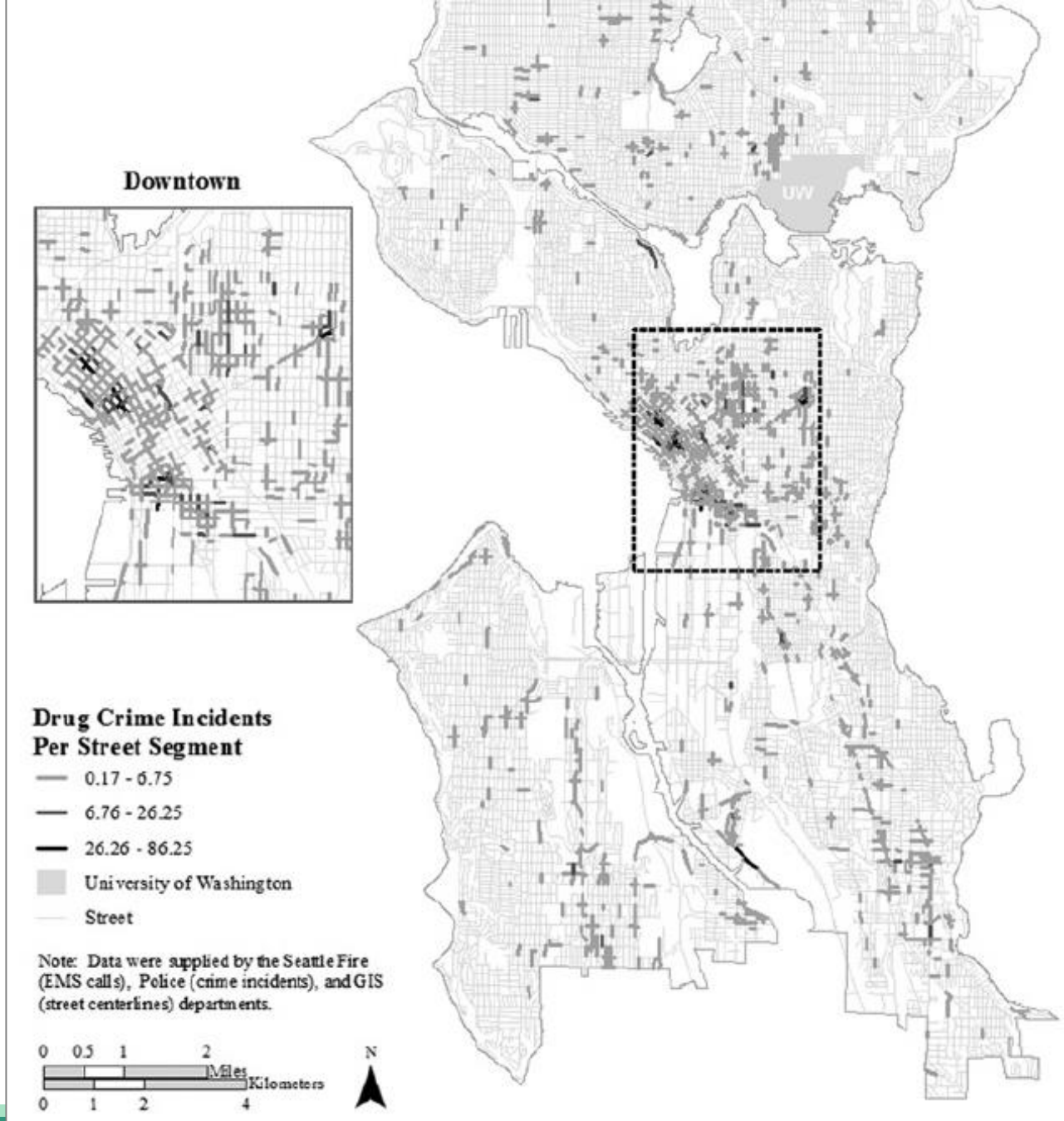
Source: SANDAG, Current Estimates (2007)

October 2007

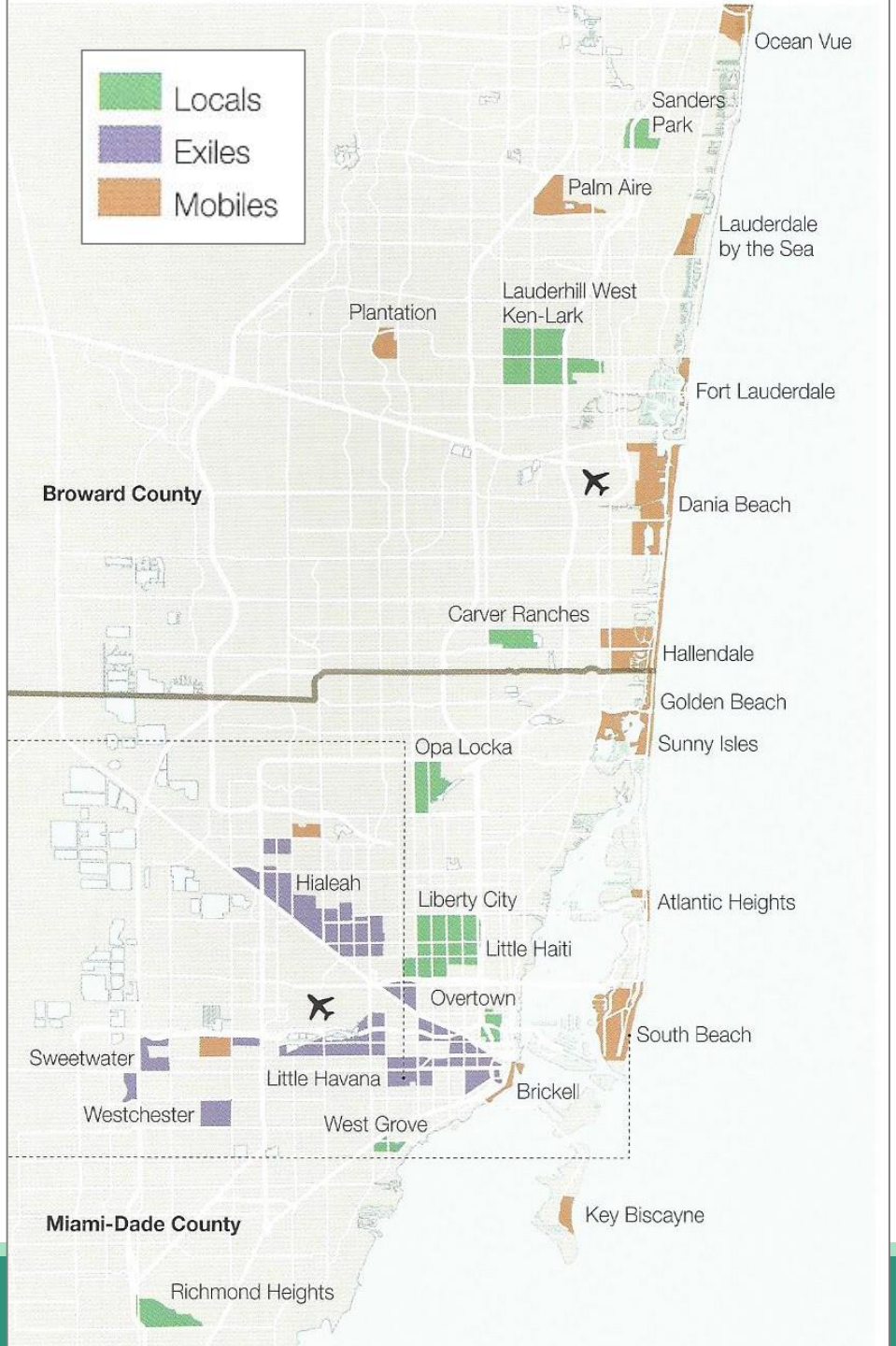
Using GIS in Research

Seattle Distribution of drug crime

"What you find depends on where you look"
Hibdon & Groff
Journal of Contemporary Criminal Justice, 2014



Residential Locations for Particular Identity Groups in Miami



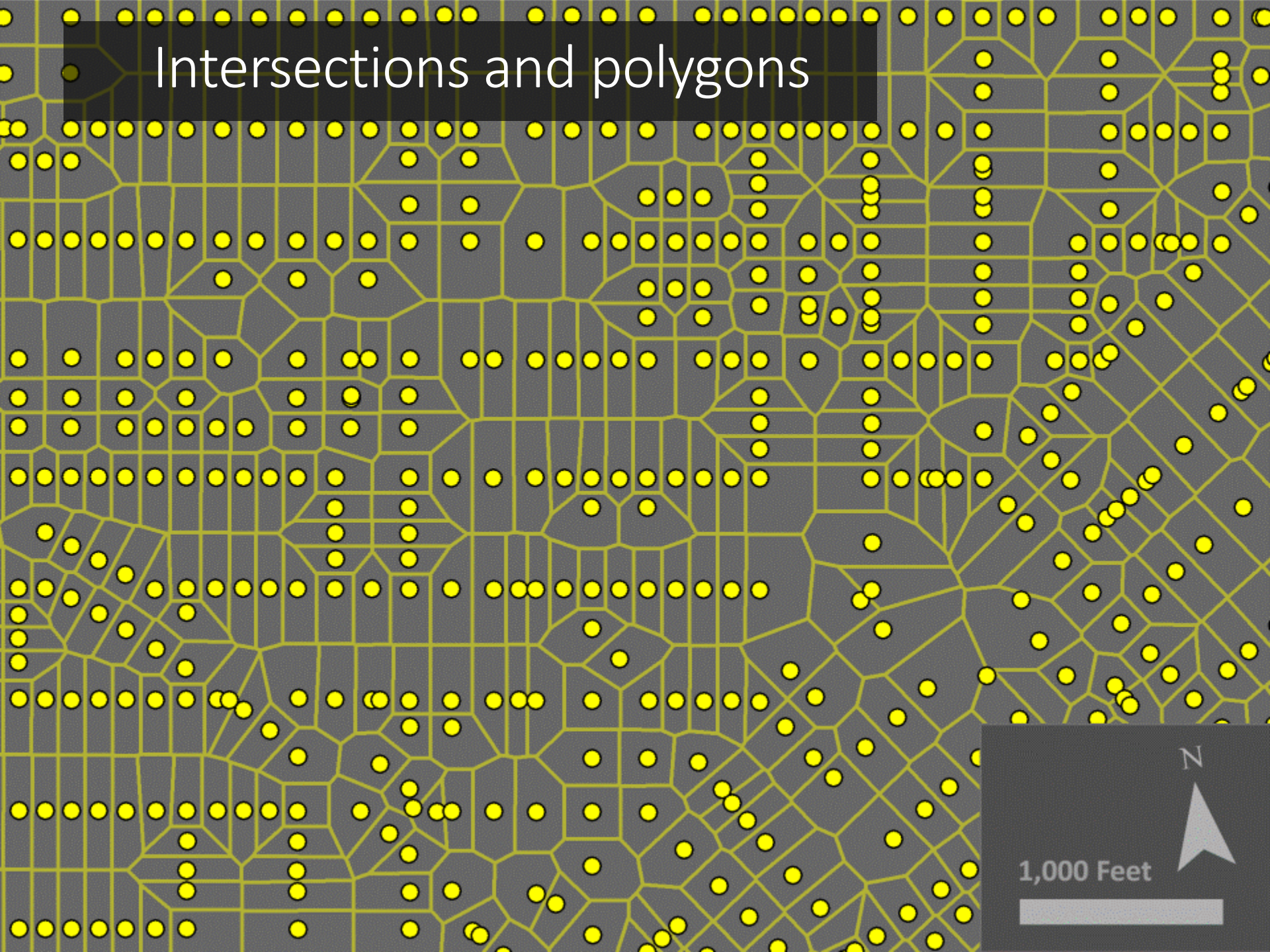
Source: *Atlas of Cities*, Paul Knox, Editor

Philly Foot Patrol Experiment

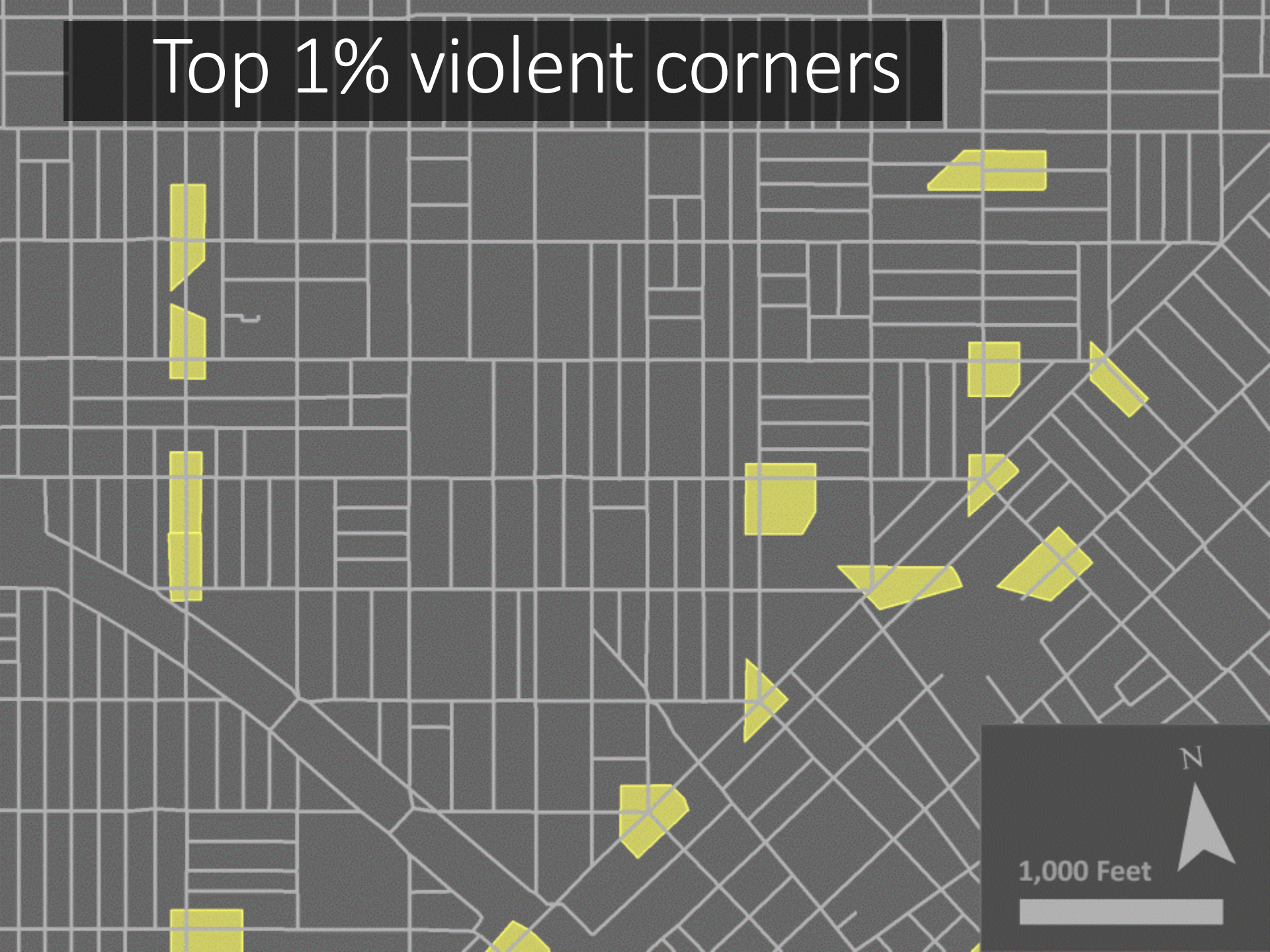
- Philadelphia PD partnered with Temple Univ.
- Does foot patrol work?
- Experiment (randomized controlled trial):
  - Identified violent crime locations
    - Geocoded addresses, then aggregated and summed to spatial units (Thiessen polygons) around intersections
  - Identified 120 beats, ranked by 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

http://www.temple.edu/cj/FootPatrolProject/documents/PFPE_research_brief.pdf

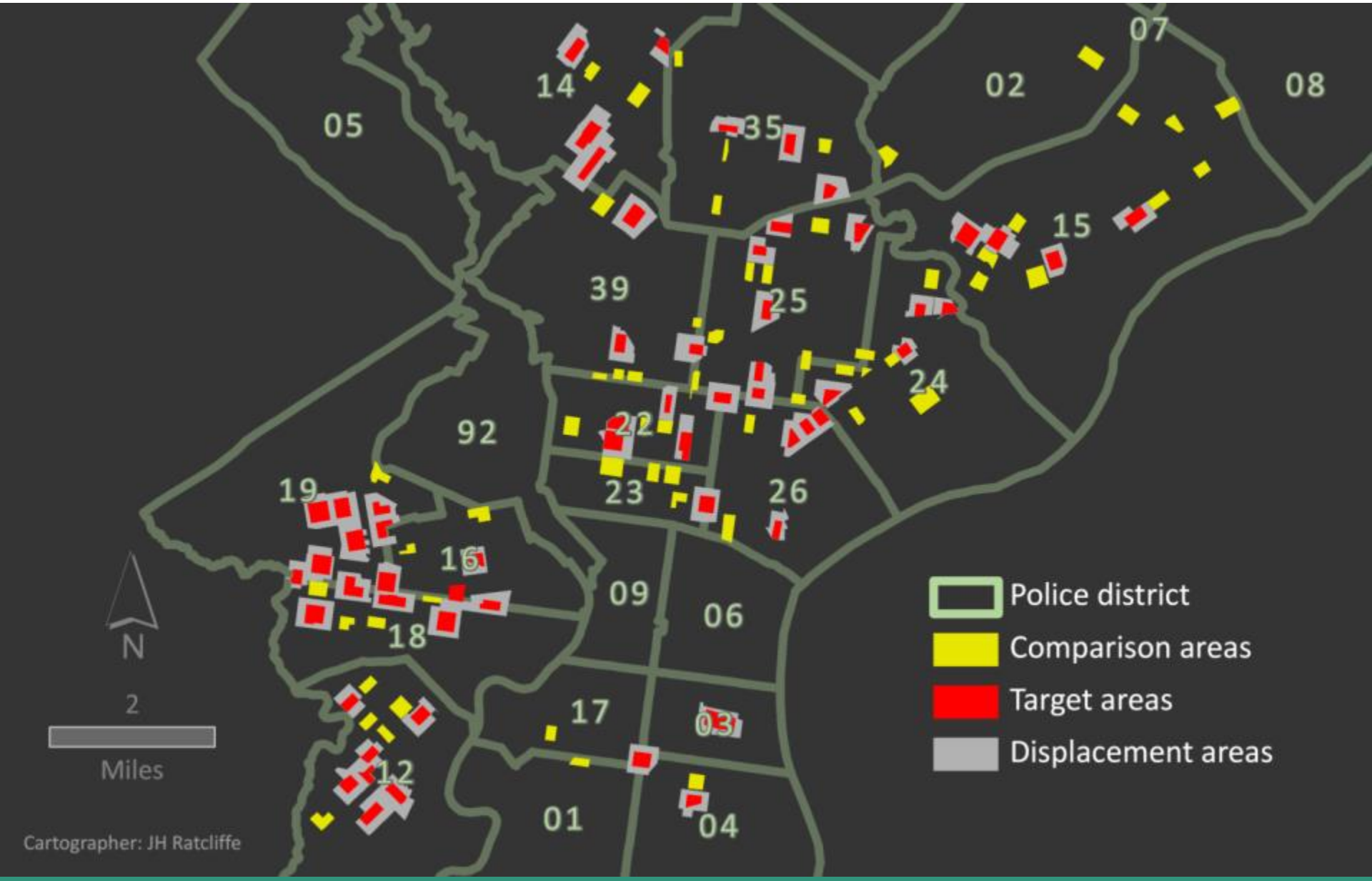
Intersections and polygons



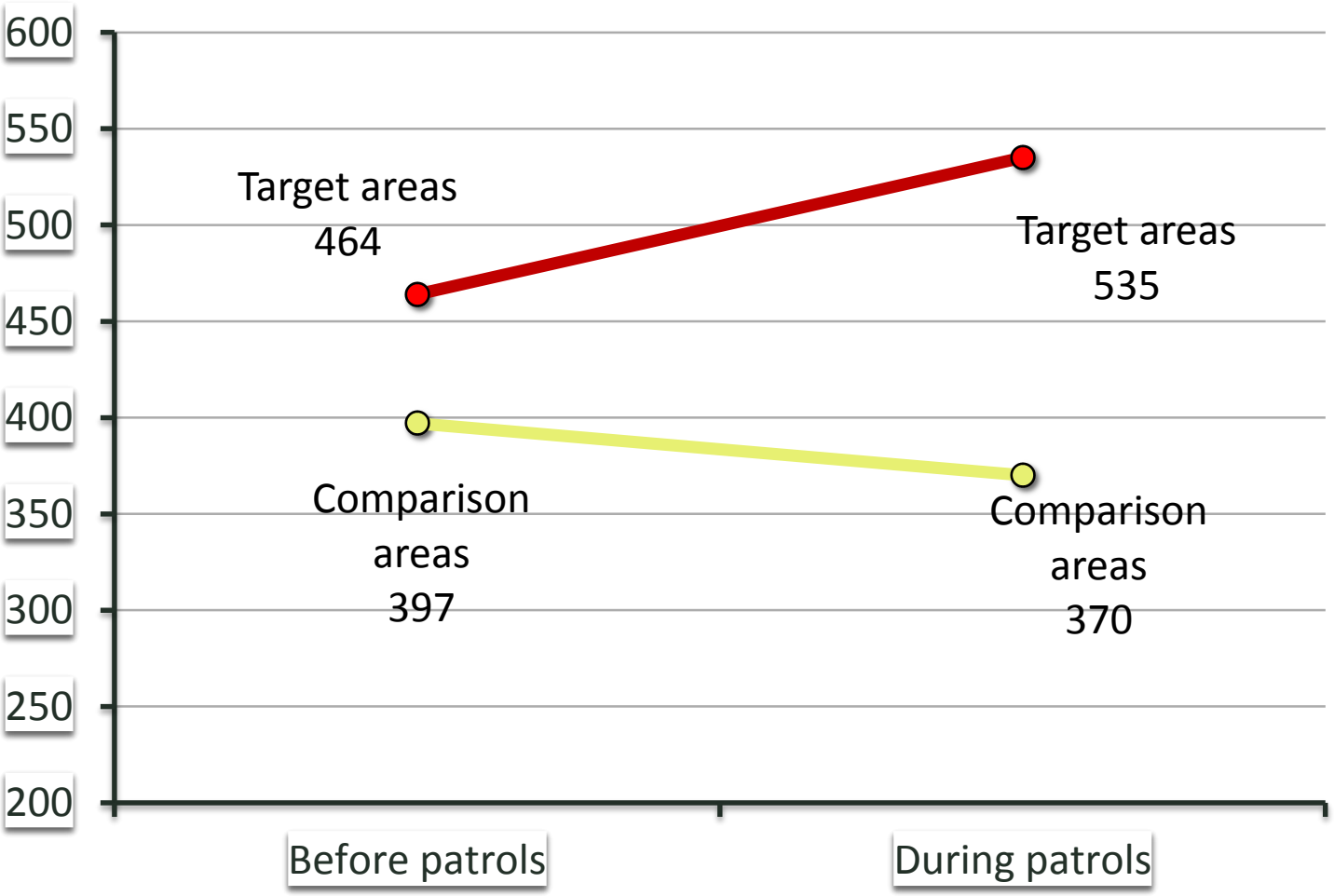
Top 1% violent corners



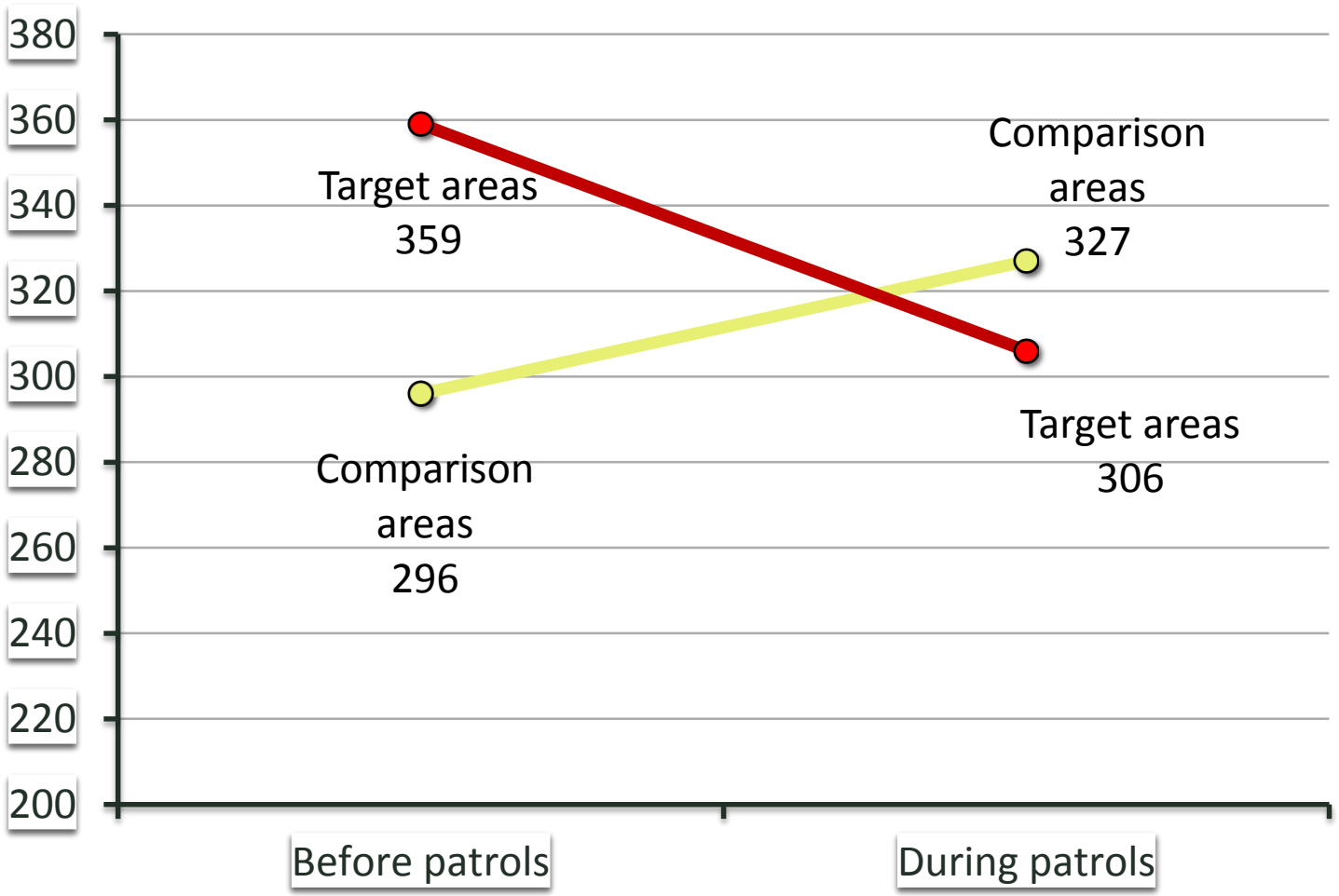
2009 foot patrol areas



Detected drug activity



Violent crime



Jessica's Law in California

- 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

GIS is a Valuable Tool

- Identify potential housing
- Analyze offender movement
- Allocate resources to supervise offenders
- Assess legislation impacts

… as long as you have good data

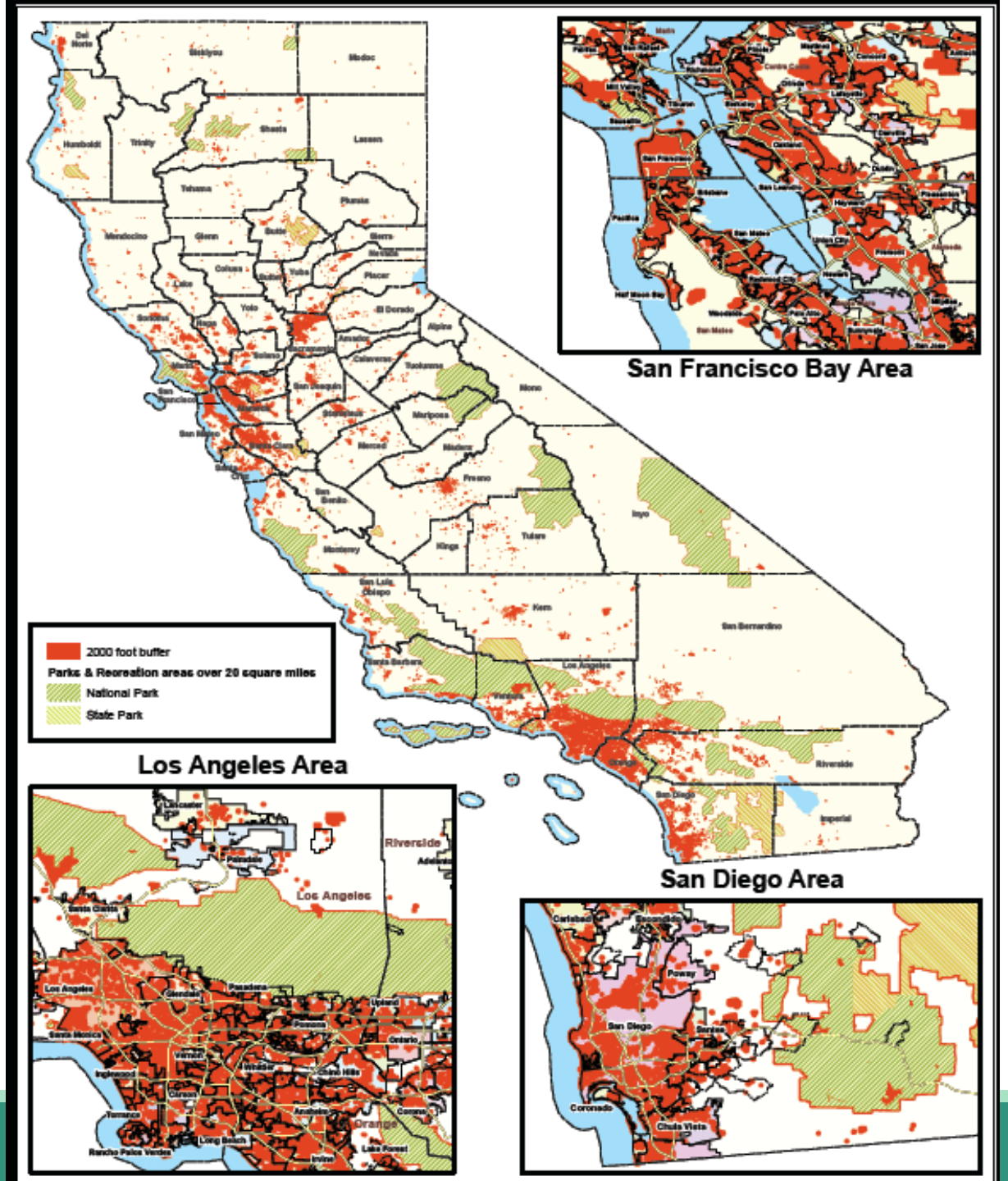
The San Diego Experience

- Initial maps and analysis in 2006
  - Where do the sex offenders live?
  - Where are the schools and parks?
  - Where will sex offenders be allowed to live?
- Issue re-surfaces with court case in 2010
  - Parolee Sex Offenders (represented by the San Diego County Public Defender) v. State of California, Department of Corrections/Parole
  - Is it legal to have these restrictions on everyone regardless of circumstances
  - Where CAN they live?

A look at the State of California

Scale Matters

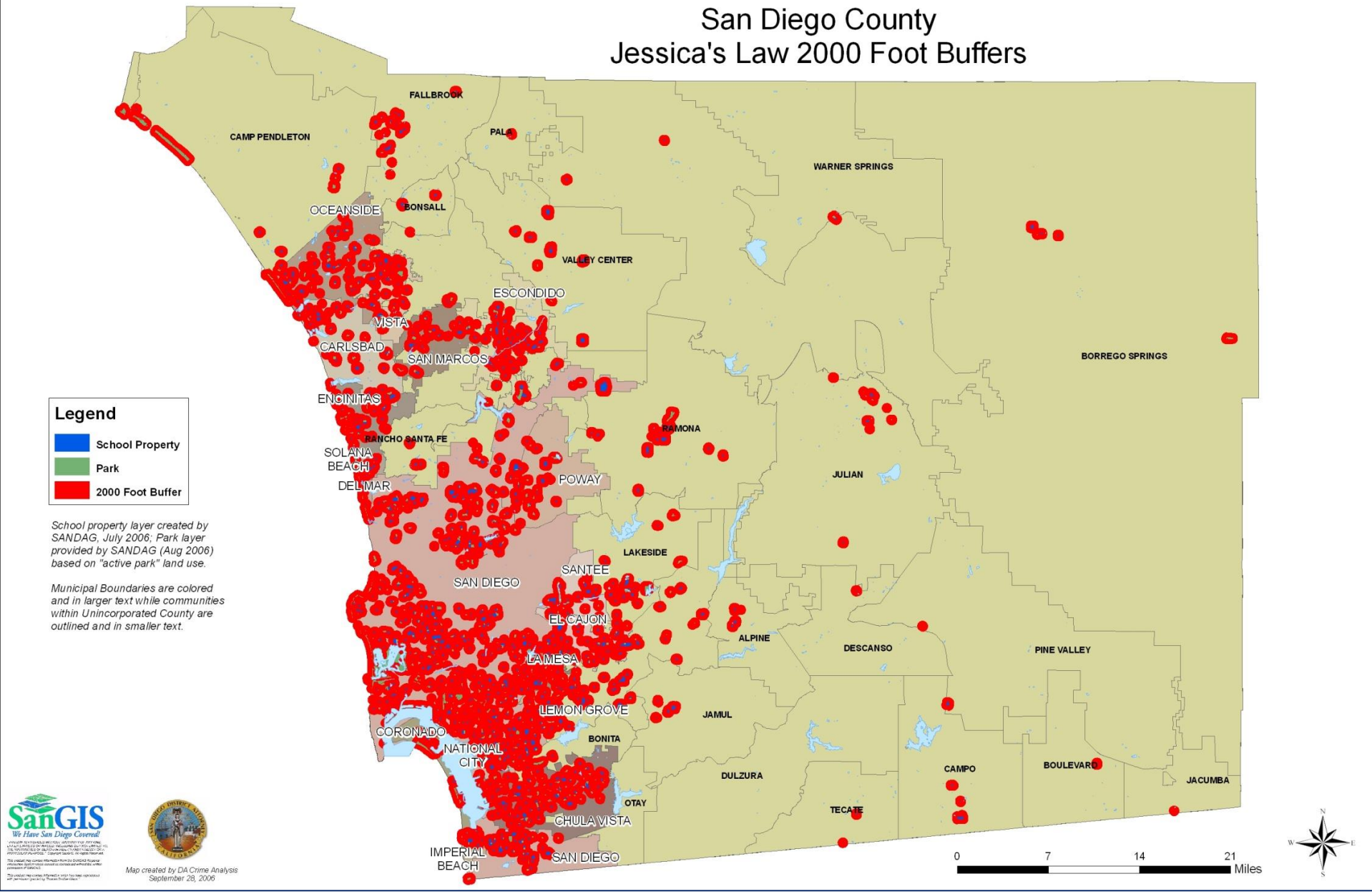
Produced by the California State Senate Demographic Office, 2006



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



School property layer created by SANDAG, July 2006; Park layer provided by SANDAG (Aug 2006) based on "active park" land use.

Municipal Boundaries are colored and in larger text while communities within Unincorporated County are outlined and in smaller text.

SanGIS
We Have San Diego Covered!

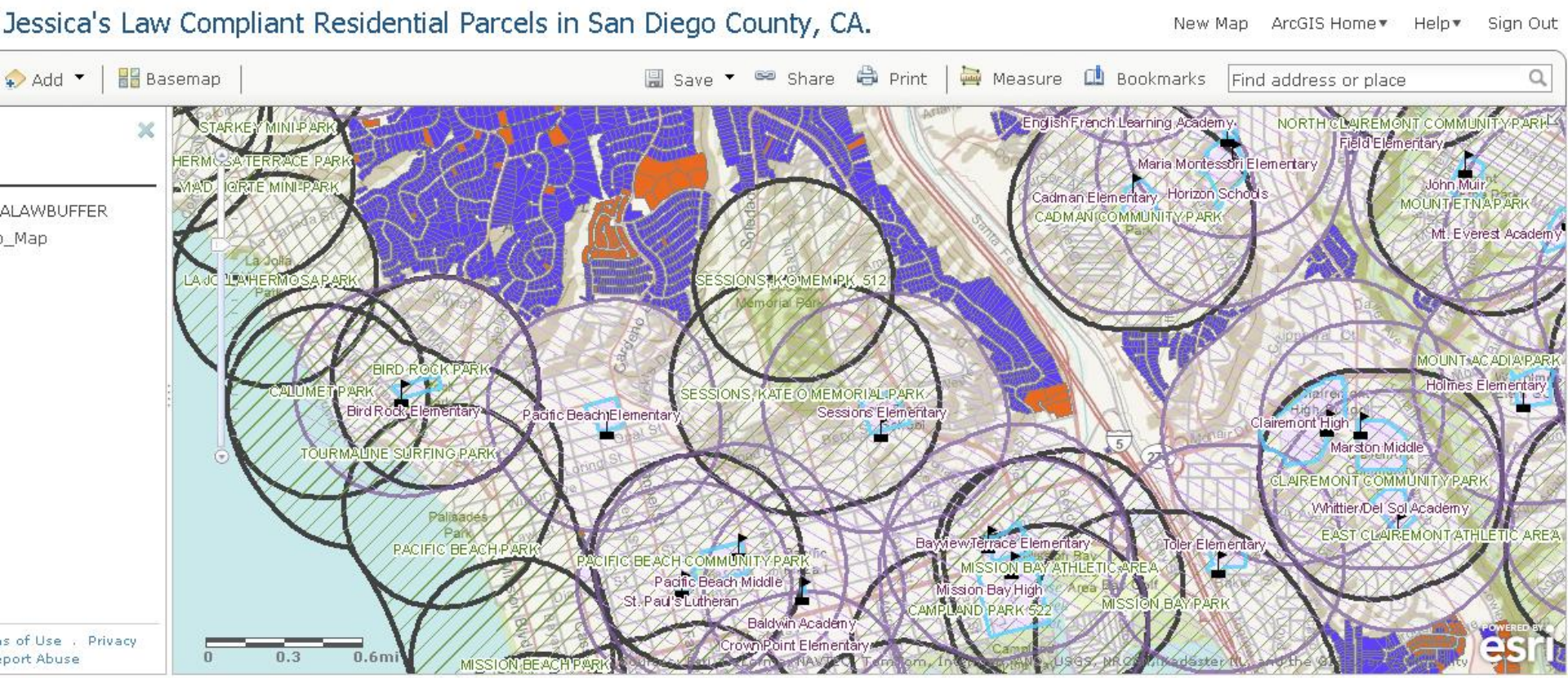
Map created by DA Crime Analysis
September 28, 2006

Residential Parcel Analysis

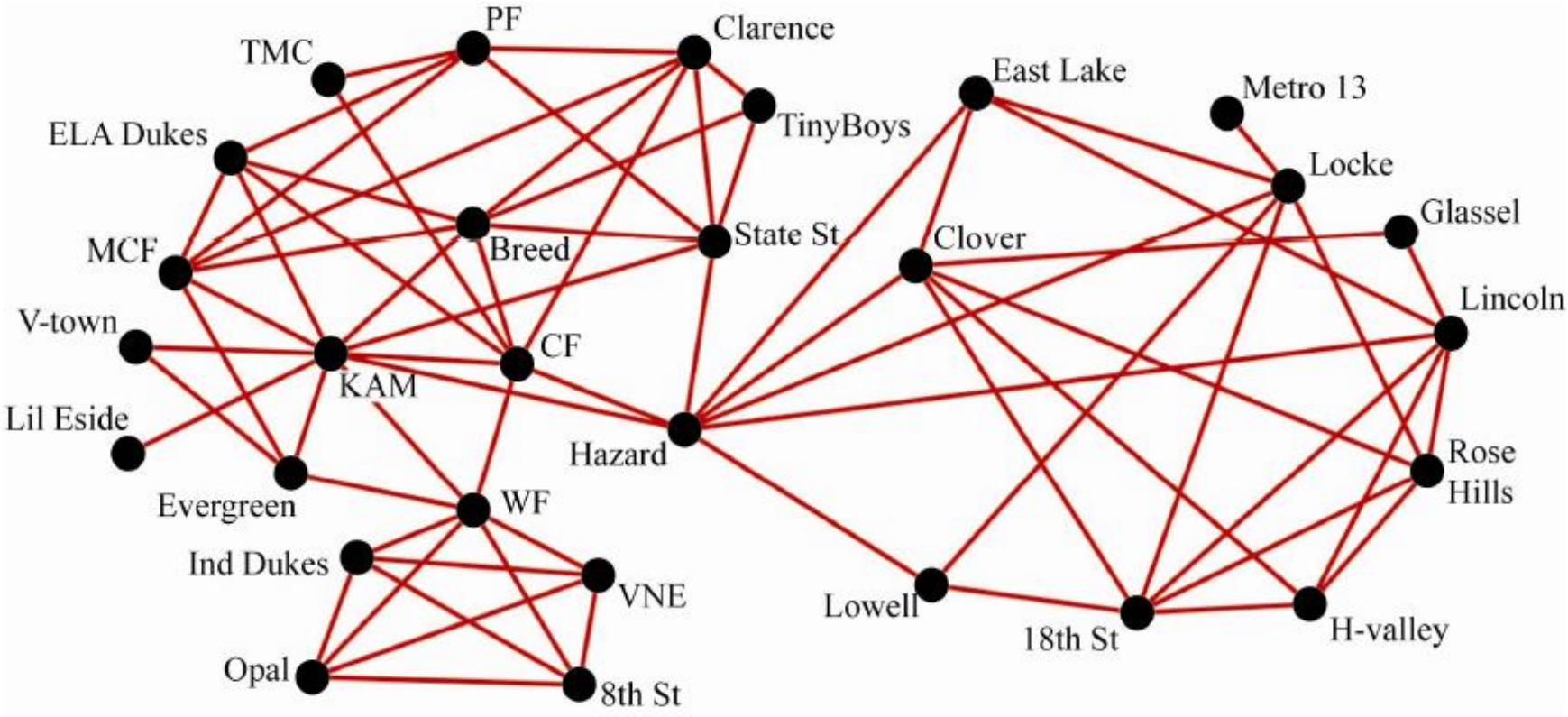
1. Started with all parcels countywide
2. Extracted out residential parcels and multi-family
3. Overlaid school and park buffers
4. Analyzed parcels that were not within the buffer

	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%**

Interactive Mapping App made for the Public Defender

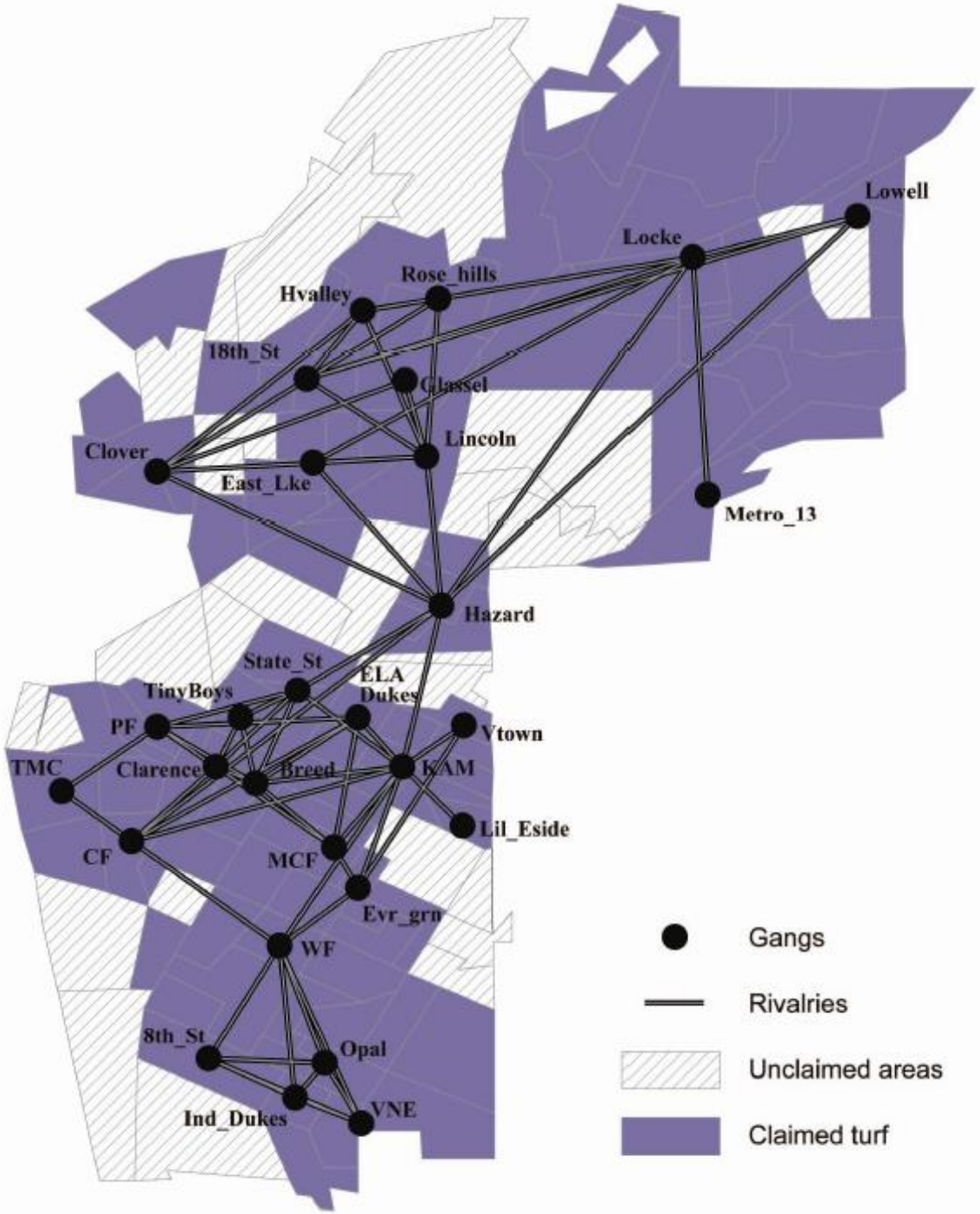


Social Network Analysis



"Spatializing Social Networks: Making Space for Theory in Spatial Analysis"
Dissertation by Steven Radil

GIS & Social Network Analysis



GIS Resources

DATA

http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml (http://egis3.lacounty.gov/eGIS/wp-content/uploads/2012/04/CensusBureau-Accessing-Data-from-the-New-American-Factfinder.pdf)

http://www.icpsr.umich.edu/icpsrweb/NACJD/gis/data.jsp

Don't forget your local Council of Governments, City/County GIS, local or transportation agencies

OTHER

http://www.icpsr.umich.edu/CrimeStat/

http://www.nij.gov/topics/technology/maps/pages/ncj209393.aspx

Thank You.

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