



Using Hot Spots: Development of a web- based interactive tool for Command Staff meetings at the City of Wichita, Ks

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GIS Police Analyst
City of Wichita GIS

Wichita demographics



- Wichita - estimated population 375,000, 156 sq miles
- Wichita Police Department
 - 851 Personnel
 - 681 Non-Civilian
 - 170 Civilian
 - 3 Divisions
 - Investigations, Field and Support
 - Field
 - 4 Police Bureaus, 34 Beats
- 2006 Crime Figures
 - 22,266 Part 1 Crimes
 - 51,477 Part 2 Crimes
- City of Wichita GIS est. 1993
 - 6 Personnel
 - 1 Manager, 5 analyst assigned to specific departments
 - Fire
 - Planning
 - Public Works/Water-Sewer
 - Web development
 - Police

GIS Timeline for the Wichita Police Department

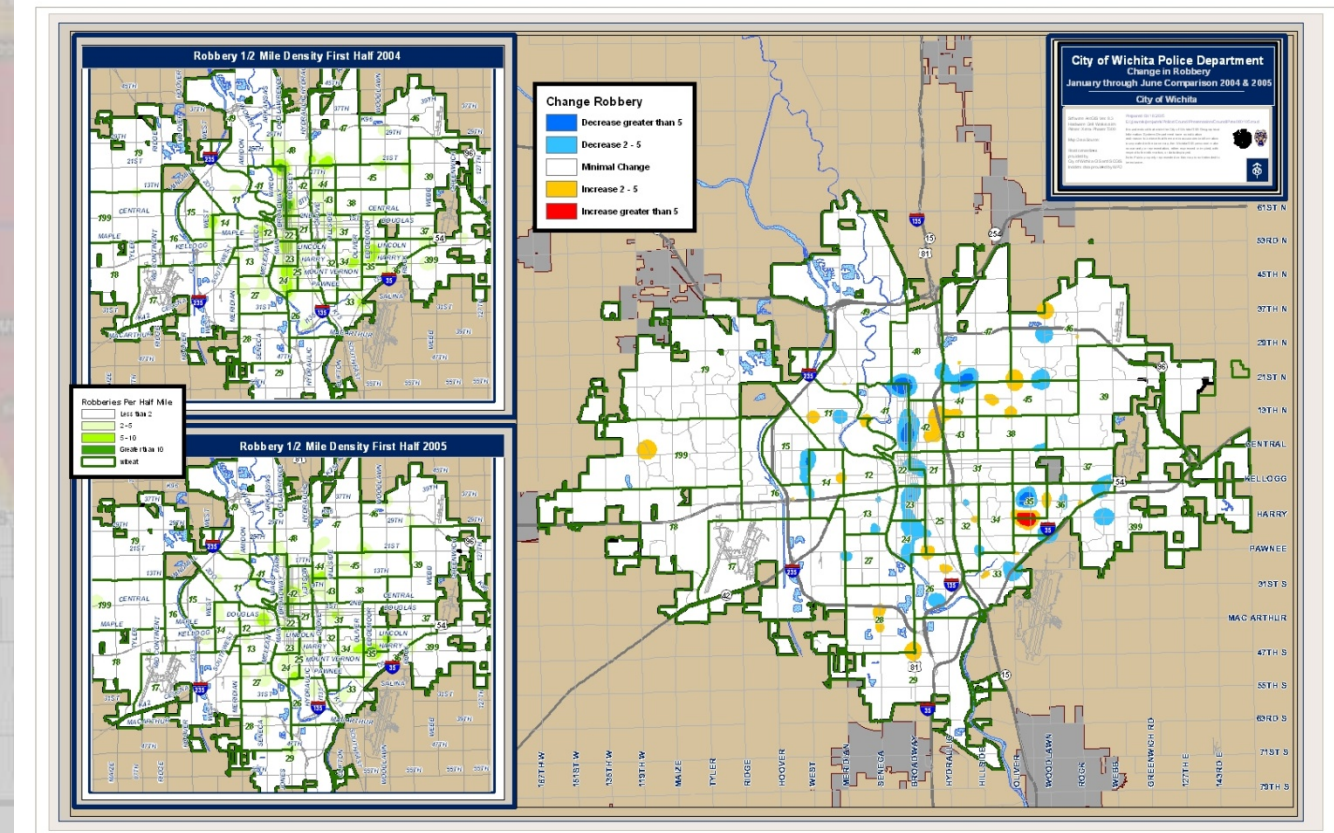


- ArcView and ArcGIS - 1995
 - Crime Analysis section
 - 2 users
- Address Verify - January 2004
 - ArcIMS 4.x technology
 - Web service for addressing consistency in case management system
 - Detectives, Officers, and Records personnel 200 current users
- GeoCrime - March 2004
 - ArcIMS 4.x, and GeoSmart.Net
 - Web application for analyzing crime patterns and suspects
 - 120 current users
- **GeoCrime Command Staff - November 2005**
 - ArcIMS 4.x, and GeoSmart.Net
 - 12 current users
- MobileView - April 2006
 - MapObjects technology
 - Deployed to all vehicles
 - All officers, Sgts and Lts - 414 current users

Initial Request



- Council Presentation Jan 2005
- Yearly Change for all Part 1
- Spurned monthly maps for Police use





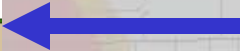
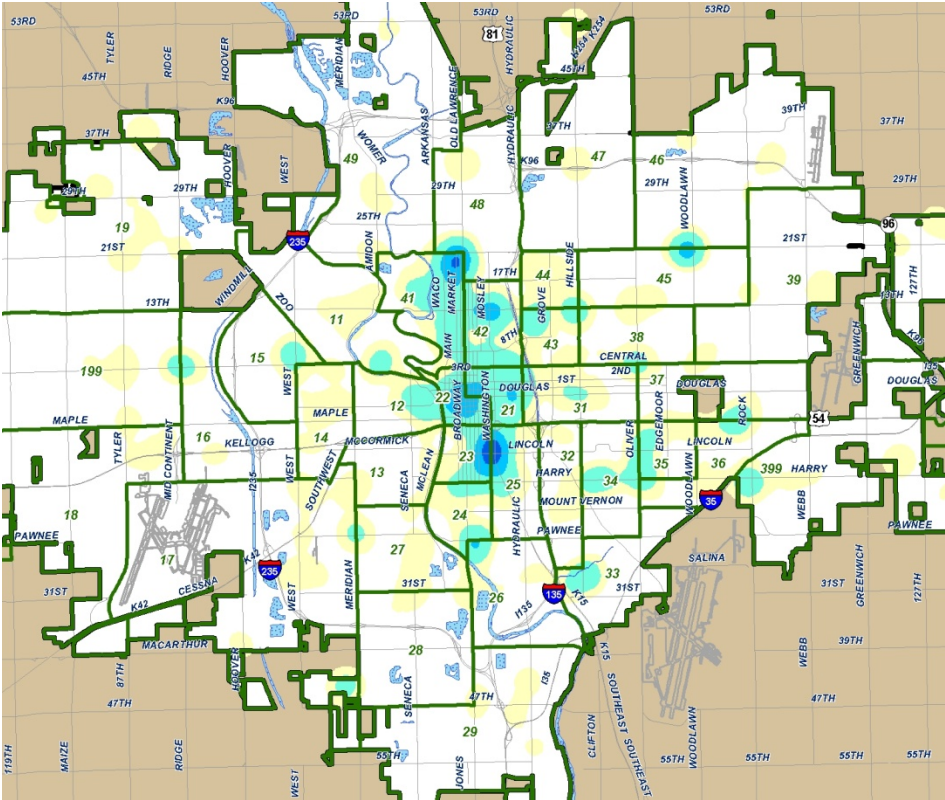
Hot Spot Maps Project

- Find a way to track trends and patterns visually
- Find areas of high crime and areas of increases/decreases
- Maps were requested on a monthly basis for Part 1 crimes

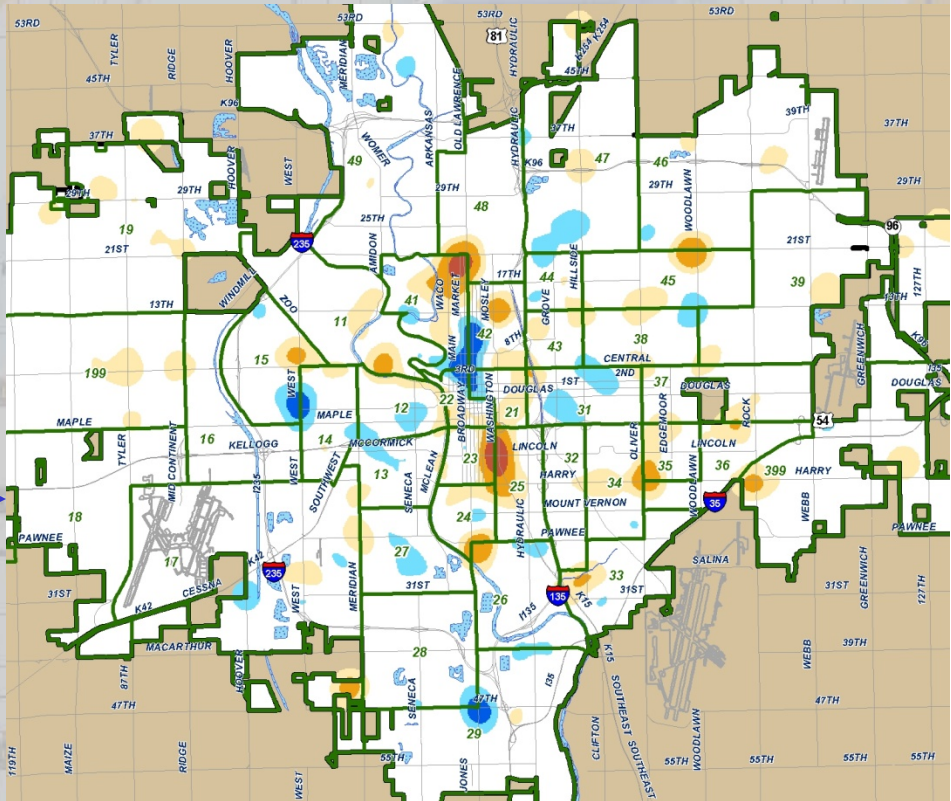
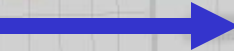


Hot Spot Maps

Density Maps
Where are the crimes occurring?



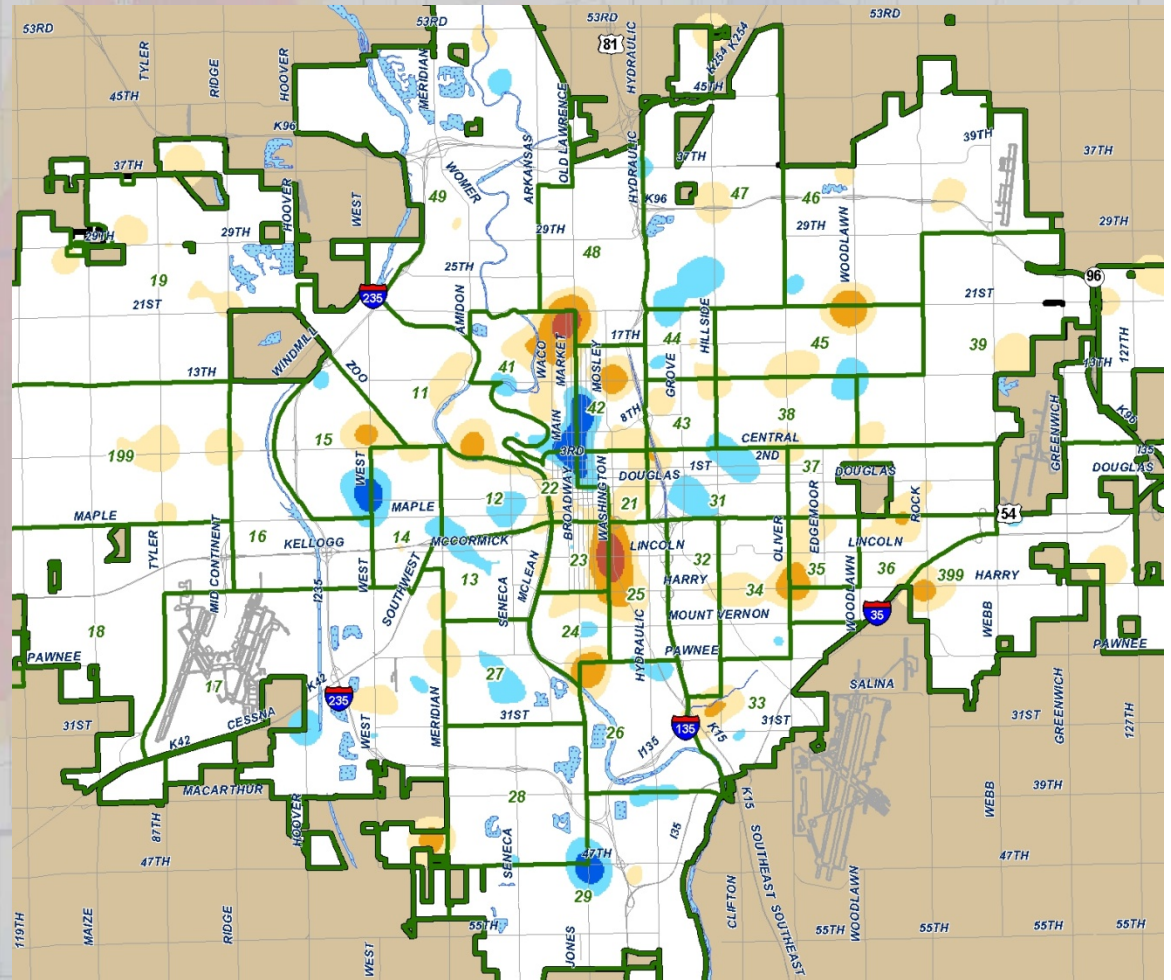
Change Maps
Where are the increases and decreases in criminal activity?





Problems with the Hot Spot Maps

- Lack of understanding by reader
- Not distributed to anyone outside of Executive Staff
- Field and Investigations couldn't tell which crimes were associated
- Never tell the entire picture
 - Crime Trend or Crime Pattern
- Incorporated maps into Command Staff Meetings





War Room (5th Floor Conference Room)

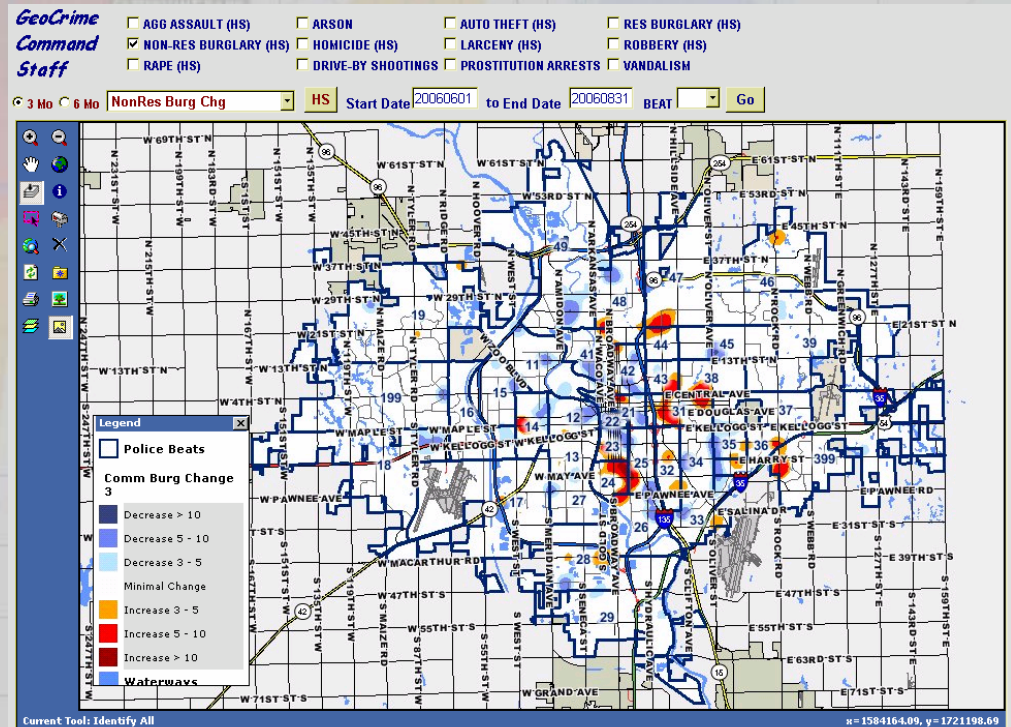
- April 2005
- Staff Meetings
- Staff presentation
- Media briefings
- Training
- Consultant Demos
- Command Staff meets monthly





Web Application?

- Interactive select hot spots
- Analyze
 - Incidents that represent the hot spot
 - Properties and neighborhoods around hot spot
 - Other crimes around the hot spots
- Print information and maps for distribution
- Utilize within Command Staff and Field





Contributors

Contributors to the GeoCrime Command Staff application

- Northrup Grummond Corp Mission Systems / E-Justice Law Enforcement Records
- ESRI
- Moosepoint Technologies
- Microsoft
- Wichita Police Department
- City of Wichita - IT/IS



Software Utilized

- Moosepoint's GeoSmart.net
- ESRI's ArcIMS 4.01
- ESRI's ArcMap 9.1
- Microsoft's SQL Server 2005
- Microsoft Visual Studio 2003
- Python



Data creation

- Focus Group determined:
 - Which crimes to include
 - What time frame to compare for Change maps
- City of Wichita's Police Department Records Management System (Northrup Grummond Corporation Mission Systems)
- SQL server extraction
- Python script geocoded shapefiles from SQL
- Layer development in ArcCatalog for time frame



Hot Spot methodology

- Utilized ESRI ArcGIS Spatial Analyst 9.1
- Utilized Layers of part 1 crimes
- Utilized Calculate Density $\frac{1}{2}$ mile kernel density
- Utilized Raster Calculator to determine Change
- Sets of data
 - 3 months and 6 months
 - Compared last year to this year

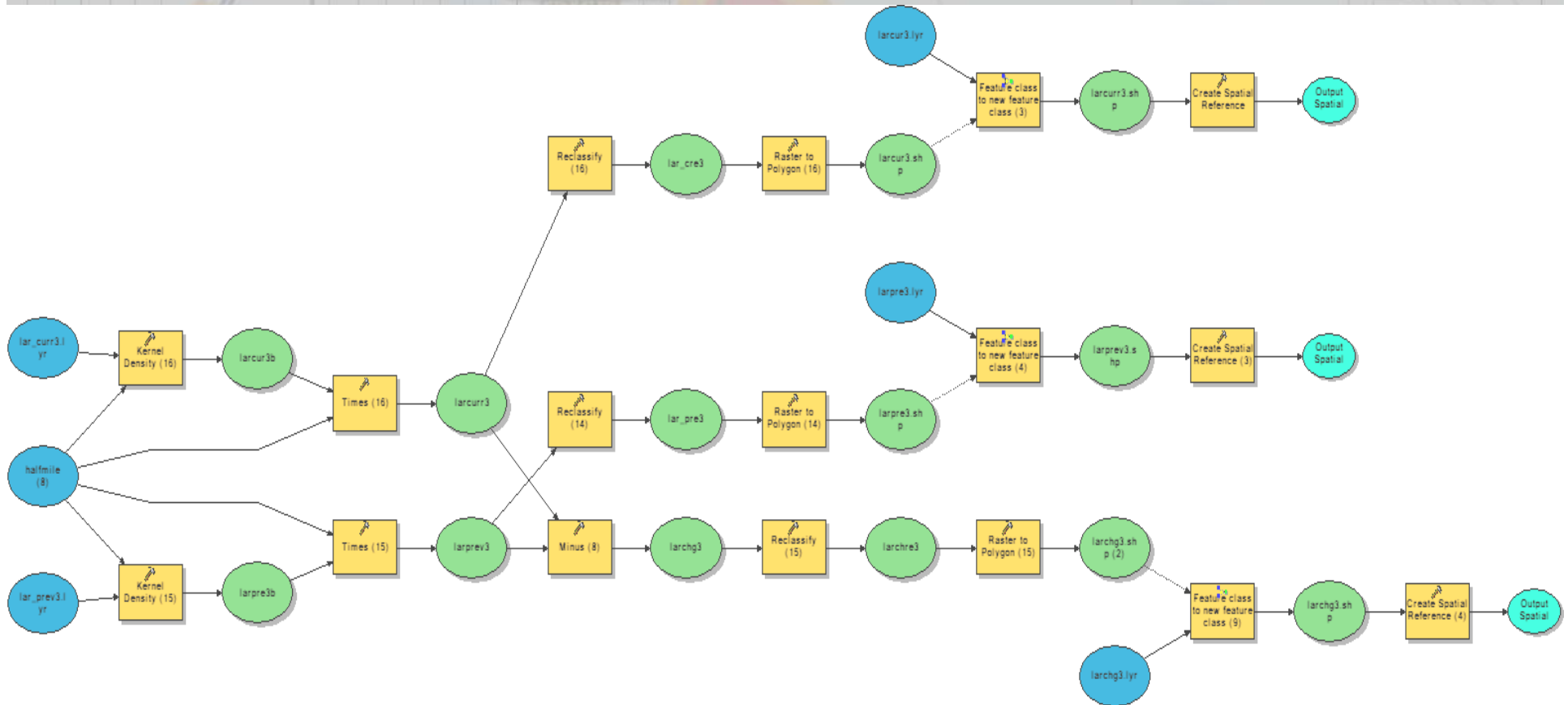


Problems with Raster

City currently utilizing ArcIMS 4.x

- Can't buffer
- Can't select
- One cell represents values collected around the cell

Development of the model



- Divide for $\frac{1}{2}$ mile
- Raster Calculator for Change
- Reclassify
- Convert to Polygons
- Join to predefined legend convert to shapefile



Development of the Website

- GeoSmart.net by Moosepoint Technologies
- Web-based interface calling ArcIMS
- Visual Studio 2003

GeoSmart.net Management Portal 4.5 - Enterprise Edition - Microsoft Internet Explorer

Address: http://gisnet/geosmart/default.asp

Site Builder Servers Layouts Renderers Security Diagnostics

Site Name: GeoCrimeCommand36

Available Functions:

- Show: All Functions
- Zoom In By Point
- Zoom In By 50%
- Zoom Out By Envelope
- Zoom Out By 50%
- Zoom To Previous View
- Pan By Point
- Panning Arrows
- Panning Compass
- Pan By Overview
- Draw User Shapes
- User Shapes Information
- Close Polygon
- Identify Features By Envelope
- Identify ALL Features By Envelope
- Measure Distance
- Select By Point
- Select By Feature
- Filter By Feature
- Filter By Shape Buffer
- Zoom To Selection
- Filter By Feature Buffer
- Map Tips
- Add Map Labels

Functions On ToolBar:

- Zoom In By Envelope
- Zoom Out By Point
- Pan By Dragging
- Zoom To Buffer
- Zoom To Full View
- Identify ALL Features By Point
- Identify Features By Point
- Select By Envelope
- Geocode
- Search
- Create Buffer
- Clear Data
- Refresh
- Retrieve & Save MapSets
- Print Map
- Save The Map Image

Additional Functions:

- About
- Clear User Shape
- Clear Attributes
- Clear Buffer
- Clear Selection By Selected
- Clear Selection
- Clear Query Results
- Clear Identify
- Clear Graphics
- Clear Filter
- Summarize Map Layer

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GeoCrime Command Staff Application



- Go-live November 2005
- Simplified for upper management
- Utilize within Command Staff and Field

GeoCrime Command Staff

<input checked="" type="checkbox"/> AGG ASSAULT (HS)	<input type="checkbox"/> ARSON	<input type="checkbox"/> AUTO THEFT (HS)	<input type="checkbox"/> RES BURGLARY (HS)
<input type="checkbox"/> NON-RES BURGLARY (HS)	<input type="checkbox"/> HOMICIDE (HS)	<input type="checkbox"/> LARCENY (HS)	<input type="checkbox"/> ROBBERY (HS)
<input type="checkbox"/> RAPE (HS)	<input type="checkbox"/> DRIVE-BY SHOOTINGS	<input type="checkbox"/> PROSTITUTION ARRESTS	<input type="checkbox"/> VANDALISM

3 Mo 6 Mo Agg Chg HS Start Date 20061201 to End Date 20070228 BEAT Go

Select a Hot Spot
Agg Chg
Agg Dens Curr Yr
Agg Dens Prev Yr
AT Change
AT Dens Curr Yr
AT Dens Prev Yr
Hom Chg
Hom Dens Curr Yr
Hom Dens Prev Yr
Lar Chg
Lar Dens Curr Yr
Lar Dens Prev Yr
NonRes Burg Chg
NonRes Burg Dens Curr Yr
NonRes Burg Dens Prev Yr
Rape Chg
Rape Dens Curr Yr
Rape Dens Prev Yr
ResBurg Chg
ResBurg Dens Curr Yr
ResBurg Den Prev Yr
Rob Chg
Rob Dens Curr Yr
Rob Dens Prev Yr

Legend

- Police Beats
- Agg Change 3
 - Decrease > 10
 - Decrease 5 - 10
 - Decrease 3 - 5
 - Minimal Change
 - Increase 3 - 5
 - Increase 5 - 10
 - Increase > 10
- Waterways

Current Tool: Identify All

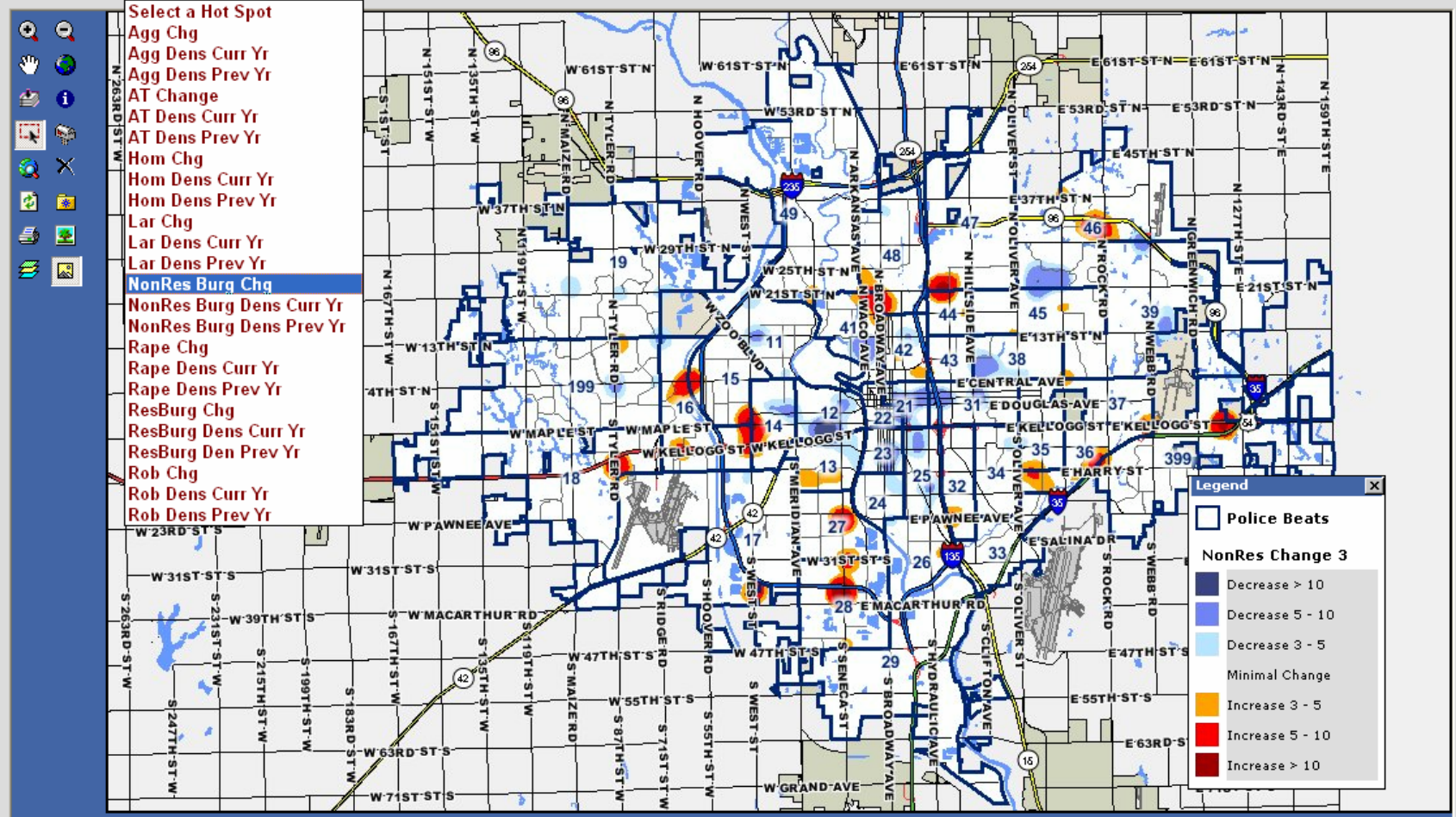
GeoCrime Command Staff Demo



GeoCrime
Command
Staff

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3 Mo 6 Mo **NonRes Burg Chg** **HS** Start Date 20061201 to End Date 20070228 BEAT Go



Current Tool: Select By Envelope

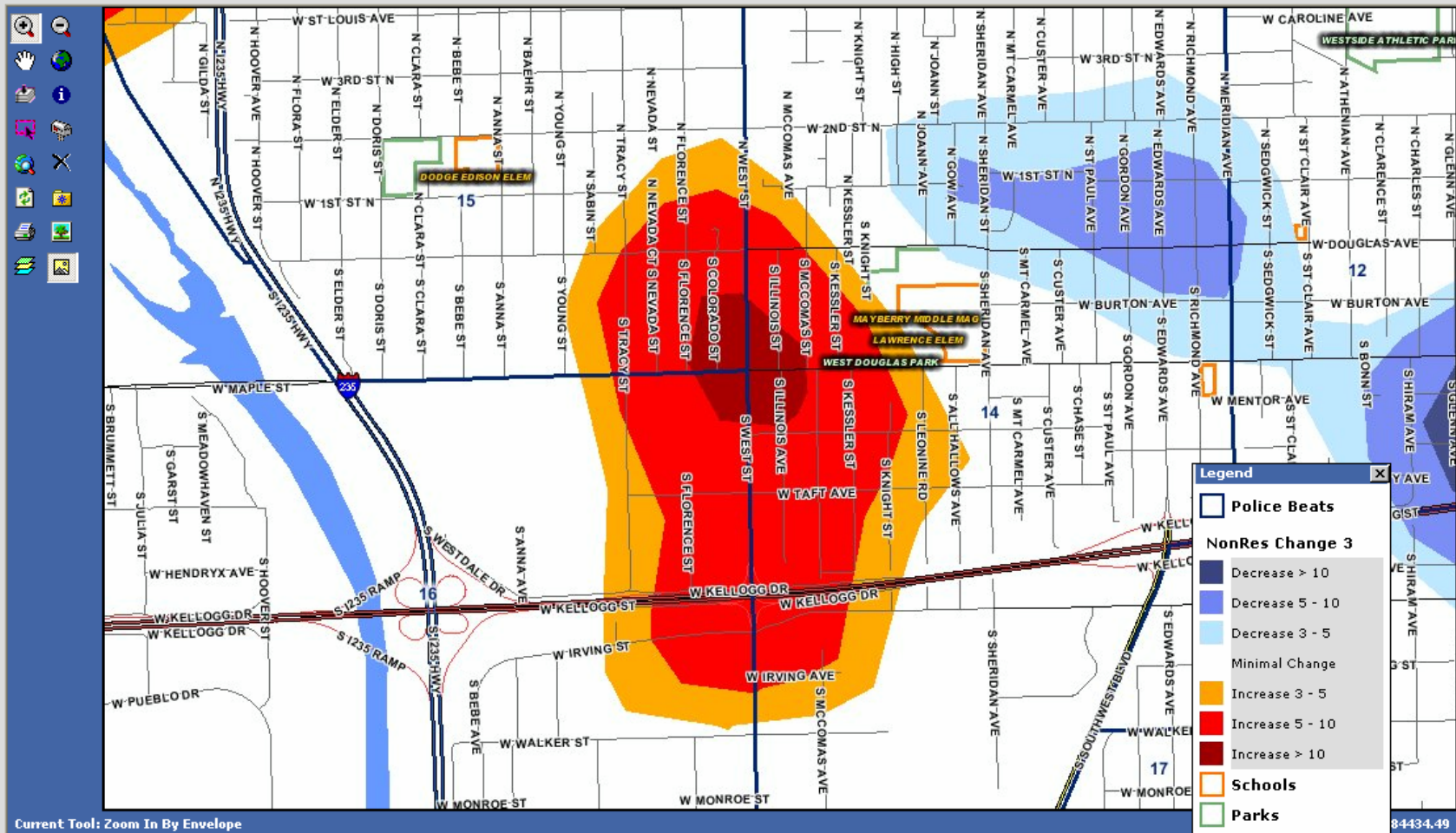
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3 Mo 6 Mo
 NonRes Burg Chg
HS Start Date to End Date BEAT



GeoCrime Command Staff Demo

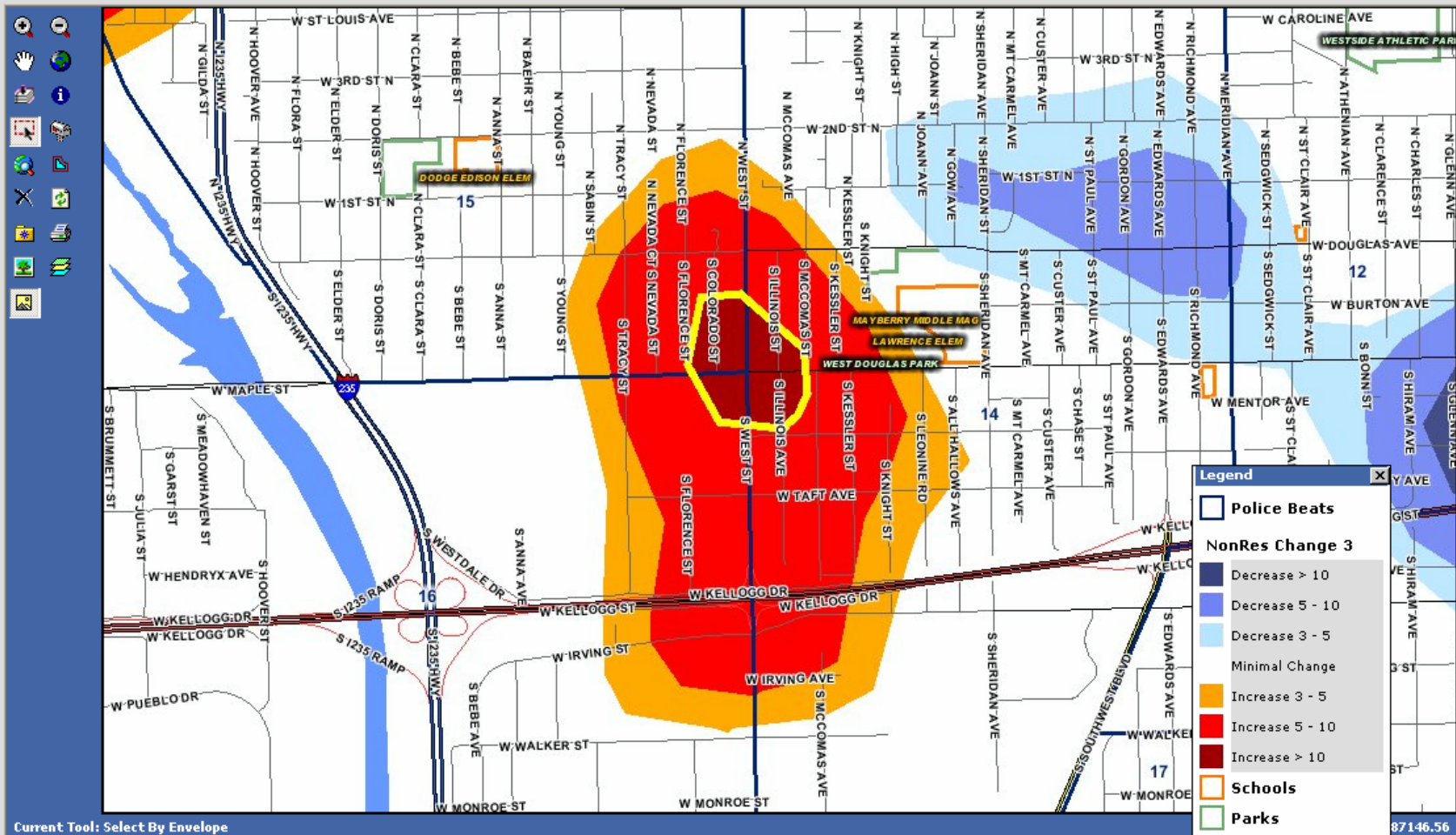


<http://gistest/projects/>

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3 Mo 6 Mo **NonRes Burg Chg** **HS** Start Date to End Date BEAT



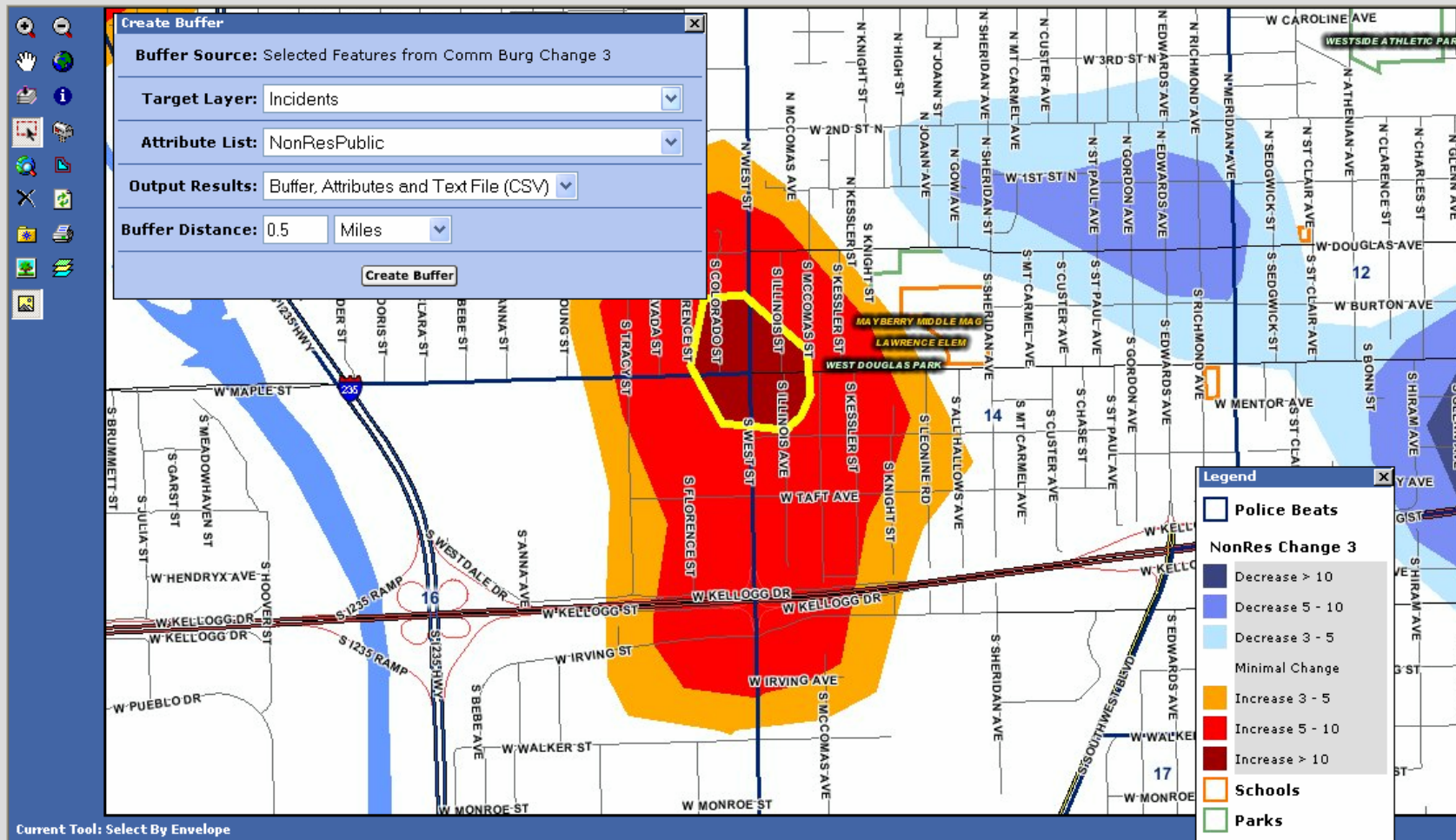
GeoCrime Command Staff Demo



GeoCrime
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3 Mo 6 Mo **NonRes Burg Chg** **HS** Start Date **20061201** to End Date **20070228** BEAT **12** **Go**



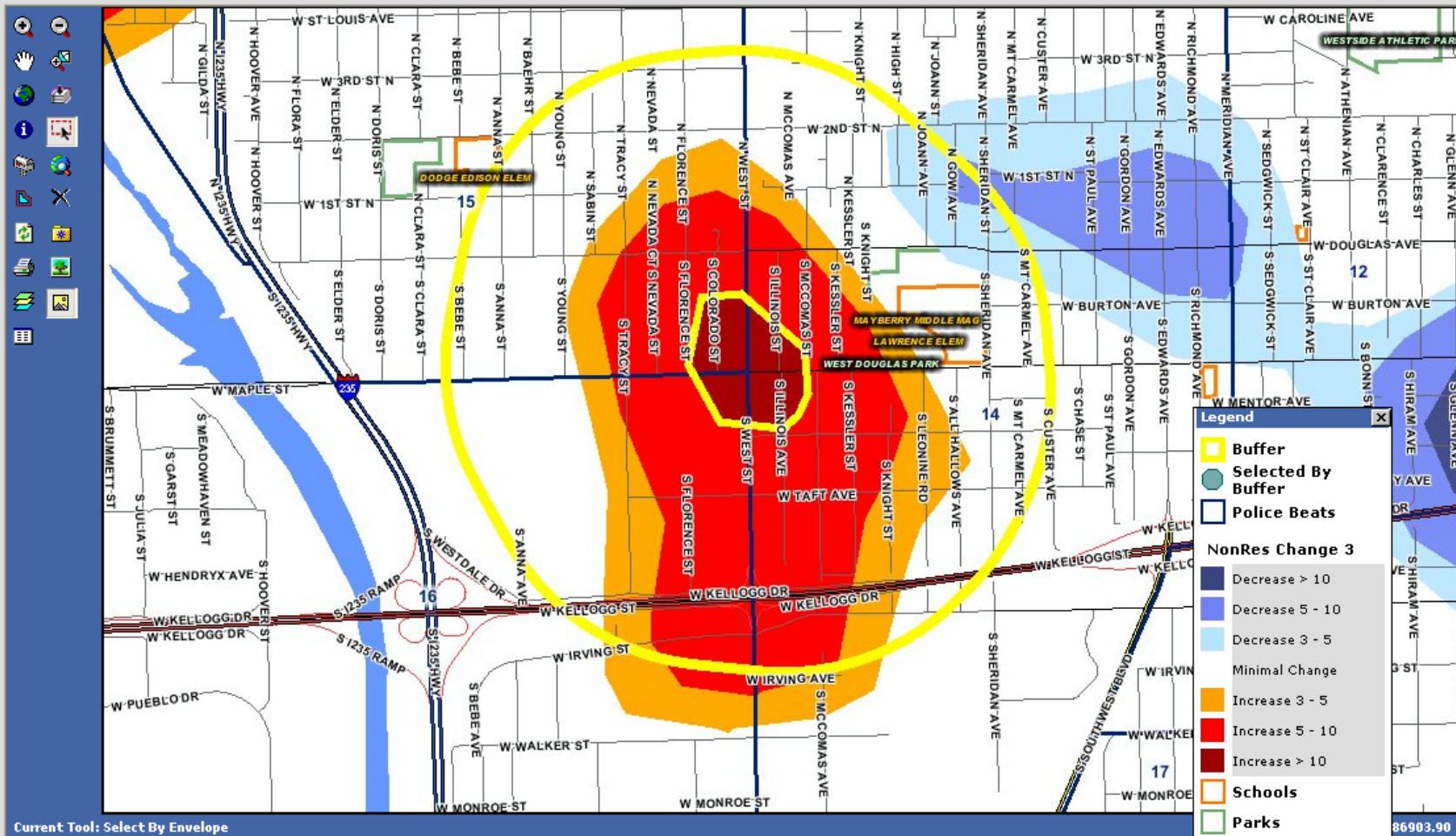
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3 Mo 6 Mo
 NonRes Burg Chg
HS Start Date to End Date BEAT



GeoCrime Command Staff Demo



GeoCrime
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- LARCENY (HS)
- ROBBERY (HS)
- RAPE (HS)
- DRIVE-BY SHOOTINGS
- PROSTITUTION ARRESTS
- VANDALISM

3 Mo 6 Mo **NonRes Burg Chg** **HS** Start Date to End Date BEAT

Inc Number	Offense Desc	Address	Start Date	Start Time
06C094131	AGGRAVATED BURGLARY NON-RESIDENCE	4600 BLOCK OF W KELLOGG ST	20061205	1401
06C095945	BURGLARY NON-RESIDENCE	500 BLOCK OF S WEST ST	20061212	0300
06C096808	BURGLARY NON-RESIDENCE	200 BLOCK OF S WEST ST	20061215	0620
06C096829	BURGLARY NON-RESIDENCE	200 BLOCK OF S WEST ST	20061215	0620
06C096830	BURGLARY NON-RESIDENCE	200 BLOCK OF S WEST ST	20061215	0620
07C000668	BURGLARY NON-RESIDENCE	4100 BLOCK OF W KELLOGG DR	20070103	1300
07C001922	BURGLARY NON-RESIDENCE	100 BLOCK OF S WEST ST	20070107	2030
07C004453	BURGLARY NON-RESIDENCE	500 BLOCK OF S WEST ST	20070118	0025
07C007634	BURGLARY NON-RESIDENCE	3200 BLOCK OF W UNIVERSITY AVE	20070129	2100
07C010605	BURGLARY NON-RESIDENCE	100 BLOCK OF N WEST ST	20070210	0313
07C010883	BURGLARY NON-RESIDENCE	100 BLOCK OF S WEST ST	20070211	0311
07C011937	BURGLARY NON-RESIDENCE	3500 BLOCK OF W MAPLE ST	20070214	1600
07C012686	BURGLARY NON-RESIDENCE	4400 BLOCK OF W MAPLE ST	20070218	0015
07C018219	BURGLARY NON-RESIDENCE	3500 BLOCK OF W MAPLE ST	20070220	1700

Current Tool: Select By Envelope



Benefits to Wichita PD

- Pinpoint Crime spikes
- Improved communication:
 - Field and Investigations
 - Beat to Beat, Bureau to Bureau
 - Police Dept to Citizens
- Ensures accountability to personnel regarding problem solving
- Timely response to geographic crime trends
- Holistic change to deployment
- Tracks effectiveness of operations



Future Improvements

- Migrate to ArcSDE
- Further automation
- Suspect activity space
- Gang activity
- Higher frequency
- Smaller time frames



Questions?