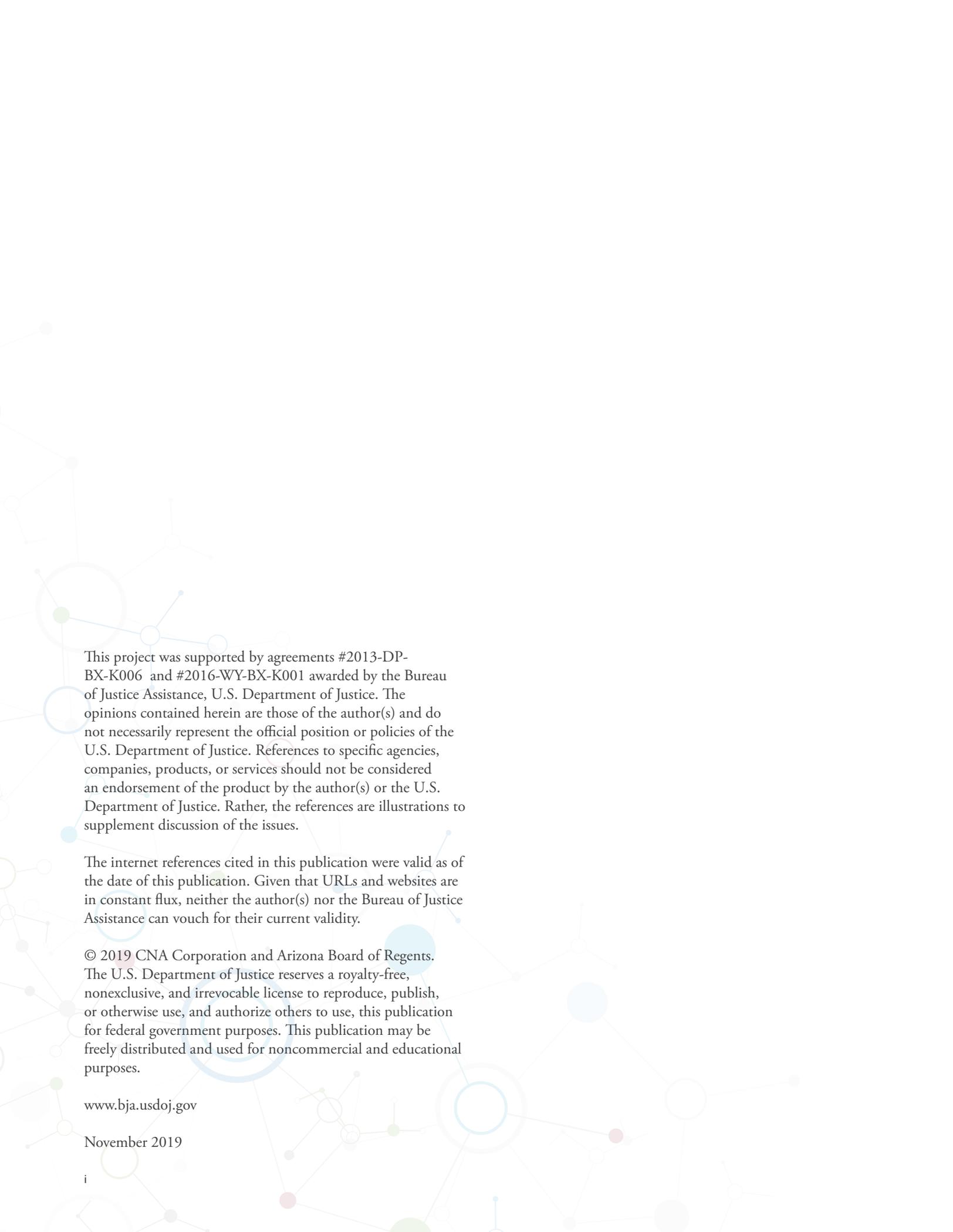


PROBLEM-ORIENTED GUIDES FOR POLICE  
PROBLEM-SOLVING TOOLS SERIES  
NO. 14

# UNDERSTANDING AND RESPONDING TO CRIME AND DISORDER HOT SPOTS

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# ABOUT THIS GUIDE

## ABOUT THE STRATEGIES FOR POLICING INNOVATION GUIDES

In 2013, the Bureau of Justice Assistance (BJA) funded CNA to work with the Center for Problem-Oriented Policing to develop a series of Strategies for Policing Innovation (SPI) Problem-Oriented Guides for Police. The purpose of these guides is to provide the law enforcement community with useful guidance, knowledge, and best practices related to key problem-oriented policing, and Strategic Policing principles and practices. These guides add to the existing collection of Problem-Oriented Guides for Police.

SPI is a BJA-sponsored initiative that supports law enforcement agencies in building evidence-based and data-driven law enforcement tactics and strategies that are effective, efficient, and economical. Strategic Policing brings more “science” into police operations by leveraging innovative applications of analysis, technology, and evidence-based practices. The goal of SPI is to improve policing performance and effectiveness while containing costs, an important consideration in today’s fiscal environment.

The SPI is a collaborative effort between BJA, CNA (the SPI training and technical assistance provider), and local law enforcement agencies that are testing innovative, evidence-based solutions to serious crime problems.

For more information about SPI, visit [www.strategiesforpolicinginnovation.com](http://www.strategiesforpolicinginnovation.com).

## ABOUT THE PROBLEM-SOLVING TOOLS SERIES

The *Problem-Solving Tools* are one of three series of the *Problem-Oriented Guides for Police*. The other two are the *Problem-Specific Guides and Response Guides*.

The *Problem-Oriented Guides for Police* summarize knowledge about how police can reduce the harm caused by specific crime and disorder problems. They are guides to preventing problems and improving overall incident response, not to investigating offenses or handling specific incidents. Neither do they cover all the technical details about how to implement specific responses. The guides are written for police—of whatever rank or assignment—who must address the specific problems the guides cover. The guides will be most useful to officers who:

- Understand basic problem-oriented policing principles and methods
- Can look at problems in depth
- Are willing to consider new ways of doing police business
- Understand the value and the limits of research knowledge
- Are willing to work with other community agencies to find effective solutions to problems



The *Problem-Solving Tools* summarize knowledge about information gathering and analysis techniques that might assist police at any of the four main stages of a problem-oriented project: scanning, analysis, response, and assessment. Each guide



• Describes the kind of information produced by each technique



• Discusses how the information could be useful in problem-solving



• Gives examples of previous uses of the technique



• Provides practical guidance about adapting the technique to specific problems



• Provides templates of data collection instruments (where appropriate)



• Suggests how to analyze data gathered by using the technique



• Shows how to interpret the information correctly and present it effectively



• Warns about any ethical problems in using the technique



• Discusses the limitations of the technique when used by police in a problem-oriented project



• Provides reference sources of more detailed information about the technique



• Indicates when police should seek expert help in using the technique

Extensive technical and scientific literature covers each technique addressed in the *Problem-Solving Tools*. The guides aim to provide only enough information about each technique to enable police and others to use it in the course of problem-solving. In most cases, the information gathered during a problem-solving project does not have to withstand rigorous scientific scrutiny. Where police need greater confidence in the data, they might need expert help in using the technique. This can often be found in local university departments of sociology, psychology, and criminal justice.

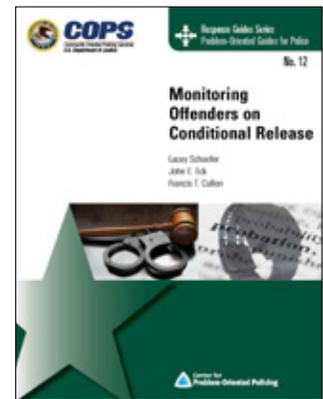
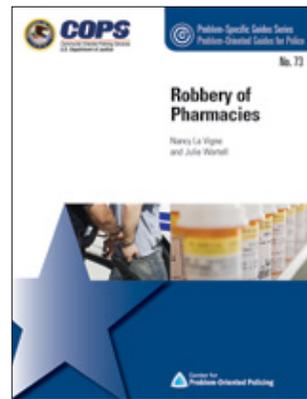
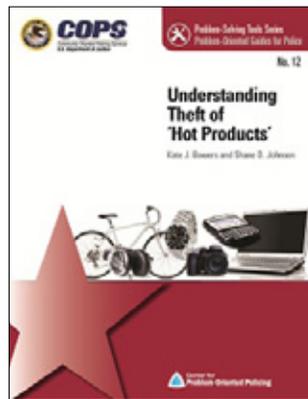
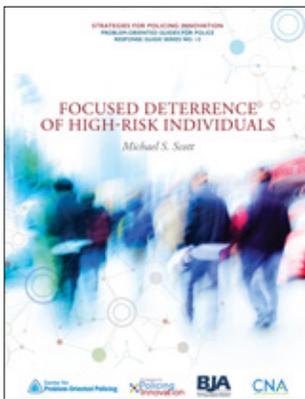
The information needs for any single project can be quite diverse, and it will often be necessary to use a variety of data collection techniques to meet those needs. Similarly, a variety of different analytic techniques may be needed to analyze the data. Police and crime analysts may be unfamiliar with some of the techniques, but the effort invested in learning to use them can make all the difference to the success of a project.

These guides have drawn on research findings and police practices in the United States, the United Kingdom, Canada, Australia, New Zealand, the Netherlands, and Scandinavia. Even though laws, customs, and police practices vary from country to country, it is apparent that the police everywhere experience common problems. In a world that is becoming increasingly interconnected, it is important that police be aware of research and successful practices beyond the borders of their own countries.

Each guide is informed by a thorough review of the research literature and reported police practice, and each guide is anonymously peer-reviewed by a line police officer, a police executive, and a researcher prior to publication. CNA, which solicits the reviews, independently manages the process.

For more information about problem-oriented policing, visit the Center for Problem-Oriented Policing online at [www.popcenter.org](http://www.popcenter.org). This website offers free online access to:

- The *Problem-Specific Guides* series
- The companion *Response Guides* and *Problem-Solving Tools* series
- Special publications on crime analysis and on policing terrorism
- Instructional information about problem-oriented policing and related topics
- An interactive problem-oriented policing training exercise
- An interactive *Problem Analysis Module*
- Online access to important police research and practices
- Information about problem-oriented policing conferences and award programs



Example Problem-Oriented Policing Guides

# ACKNOWLEDGMENTS

The Problem-Oriented Guides for Police are produced by the Center for Problem-Oriented Policing at Arizona State University. While each guide has a primary author, other project team members, CNA staff, BJA staff, and anonymous peer reviewers contributed to each guide by proposing text, recommending research, and offering suggestions on matters of format and style.

The project team that developed the guide series comprised Herman Goldstein, Ronald V. Clarke, John E. Eck, Michael S. Scott, Rana Sampson, and Deborah Lamm Weisel.

Members of the San Diego, California; National City, California; and Savannah, Georgia, police departments provided feedback on the guides' format and style in the early stages of the project.

Vivian Elliott oversaw the project for CNA. Phyllis Schultze conducted research for the guide at Rutgers University's Criminal Justice Library. Andrea Wiltse at CNA edited this guide.

# INTRODUCTION

Hot spots are very small areas (e.g., addresses, single street blocks, small groups of street blocks) with high levels of crime, disorder, accidental injury, or any other matter requiring police attention. This guide focuses on understanding, identifying, analyzing, and responding to hot spots. Hot spots represent an important focus for police agencies because a small number of high-activity locations typically account for much of a jurisdiction's crime and disorder problems. After briefly reviewing what is known about the geographic distribution of police incidents and the reasons they are highly concentrated, the guide turns to identifying hot spots. This serves as an introduction to the hot spot identification process and is not intended as a detailed, technical discussion of the use of software for mapping and defining hot spots. The guide then turns to analyzing hot spots to understand why incidents are concentrated at particular places. Finally, the guide provides a detailed summary of strategies commonly used by police to respond to hot spots and reviews their effectiveness. There is convincing evidence that hot spot policing strategies effectively reduce policing problems.<sup>a</sup>

## HOT SPOTS POLICING AND THE SARA MODEL

Hot spot policing, sometimes referred to as place-based policing, is highly compatible with problem-oriented policing (POP) and the scanning, analysis, response, and assessment (SARA) model. A number of hot spot policing interventions have used the SARA model to guide analysis and develop appropriate responses. Herman Goldstein introduced this link between place and addressing problems in his original formulation of POP. He described incidents concentrating in a particular area as one of the most common ways to characterize a problem.<sup>1</sup> This guide uses the SARA model as a framework to discuss the process of understanding and responding to hot spots.

The policing models Compstat and predictive policing<sup>b</sup> also have features in common with problem-oriented policing, but also some differences. The main common feature is the use of geographic mapping to direct and prioritize police attention. However, to the extent that Compstat and predictive policing limit the police response to something like saturation patrol or an enforcement crackdown, they are distinguishable from problem-

oriented policing. Conversely, to the extent that they use the initial geographic analysis as a starting point to a deeper analysis of the problems at identified locations, and to the development and implementation of a tailored response to each problem location, these models are consistent with problem-oriented policing.

The first section of this guide focuses on defining what hot spots are, discussing why they are important, and using theory to understand the kinds of locations that are likely to exhibit high activity. These are important first steps in the scanning phase of hot spot identification.

The second section emphasizes the scanning phase of the SARA model. The scanning phase is completed by using data to identify or confirm the highest crime and disorder locations.

The third section focuses on hot spot analysis. The goal of the analysis phase is to conduct an in-depth examination of police incidents and other data sources to better understand why incidents are clustered at that location. This analysis helps to develop an appropriate response tailored to the underlying contributors to the problem at each location.

The fourth section covers the response phase in the SARA model. This section reviews effective responses to hot spots used in prior interventions, based on rigorous research evidence.

The final section on assessment discusses the results of prior reviews of the hot spot policing literature and provides advice for agencies considering hot spot policing. Assessment should focus on the implementation of the intervention (process evaluation), whether overall crime (or calls, automobile crashes, or other problems) decreased in the targeted locations, and whether the specific problems identified in the analysis phase were successfully addressed (outcome evaluation).

<sup>a</sup> See a summary of hot spots research from the National Institute of Justice at: <http://www.nij.gov/topics/law-enforcement/strategies/hot-spot-policing/pages/welcome.aspx>

<sup>b</sup> See Perry et al., 2013 for case studies of the application of predictive policing methods.

# WHAT ARE HOT SPOTS AND WHY DO THEY MATTER?

## WHAT IS A HOT SPOT?

Hot spots are small geographic units with high rates of activity that demand some sort of police response.<sup>2</sup> There is no singular definition of “small units” or “high rates.” These small units can range in size from individual addresses or buildings to single street segments (i.e., both sides of a street from intersection to intersection) to very small groups of street segments with similar policing problems, such as a drug market.<sup>3</sup> What is important is that these geographic areas are all smaller than the geographic units that police departments typically use for dividing up patrol resources (e.g., patrol beats, zones, sectors). Hot spots are often referred to as micro places because of their small size and to differentiate them from larger geographic units such as communities, districts, and neighborhoods.

There is also no firm rule as to how much activity must be found in micro places before they can be considered to have “high rates.” This determination will vary across jurisdictions, based on the historical and overall levels of incidents. As described more in the next section, hot spots are often defined by drawing upon a rank-ordered list of the highest incident locations in the city (e.g., addresses, streets) based on calls for service or other indicators. Thus, places are not defined as hot spots by reaching an absolute threshold of activity, but instead because of very high levels of crime and disorder relative to other places in the city during a specified time period. Exactly how high will vary based on the community’s characteristics. Police should consider incident data in conjunction with departmental resources and resident concerns when selecting hot spots for intervention. A hot spot in a densely populated urban area is likely to have a much higher level of activity than a hot spot in a less densely populated suburban area, but both would represent the highest crime locations in their respective jurisdictions.<sup>c</sup>

## Crime concentration and stability

Regardless of how hot spots are defined, results from many cities in the United States and around the world show that a small number of micro places are responsible for a substantial amount of total crime in a city. That is, the hottest spots of crime in a city, regardless of the specific unit of geography chosen, are responsible for a large proportion of a jurisdiction’s crime problem. *About 50 percent of crime is concentrated at approximately 5 percent of the places in a city.*<sup>4</sup> These strong concentration levels remain when looking at different-sized hot spots, different data sources (e.g., calls versus incidents), and different crime types (e.g., all crime versus specific crime types).

In some cities, analysis has shown that hot spots are stable over time. A study in Seattle, Washington, that included crime incident data from 1989 to 2004 confirmed not only the concentration of crime, but also that crime hot spots tend to stay hot over long periods of time.<sup>5</sup> Between 5 and 6 percent of street segments accounted for 50 percent of crime incidents each year, reinforcing the idea that crime is highly concentrated at a relatively small number of places.

Crime was especially stable in a small group of high-crime segments the authors refer to as the “chronic group.” The streets in this chronic group remained among the hottest in the city throughout the 16-year study period, and although they represented only 1 percent of all street segments in Seattle, they were the sites of 22 percent of crime in the city. Subsequent studies have found similar results.<sup>6</sup>

This level of concentration and stability is also found in specific crime types. In Boston, Massachusetts, for example, just 4.8 percent of the street segments were the site of 73.9 percent of all gun assaults between 1980 and 2008. Only 3 percent of streets and intersections showed variability in levels of gun assaults over time, suggesting a great deal of stability.<sup>7</sup> Results were similar when examining the concentration and stability of robberies over time.<sup>8</sup>

## Are hot spots all in one neighborhood?

Are hot spots of crime all clustered in the same part of a city? This is important to explore, because it addresses the issue of whether it is necessary for resources to be focused on micro places for hot spot policing. For example, if all the crime hot spots were concentrated in only one or two neighborhoods in a city, then neighborhood- or beat-level initiatives might be just as effective as hot spot approaches in addressing crime concentrations.

Evidence to date suggests that crime hot spots can be found throughout a city. For example, an examination of 56 drug markets in Jersey City, New Jersey, found that although drug locations were more concentrated in socially disadvantaged areas, they were also found in areas that were generally seen as more established and better off.<sup>9</sup> This suggested that even “good” neighborhoods can have “bad” places. Importantly, most places, even in very disadvantaged neighborhoods, were relatively free of serious drug problems.

<sup>c</sup>See Problem-Solving Tools Guide No. 13, Identifying and Defining Policing Problems, for further discussion of this topic.

The Seattle study mentioned earlier found that although hot spots may be more common in high-activity places like the central business district, they were also found in a variety of neighborhoods. Furthermore, neighborhoods with a higher concentration of hot spots tended to have sizable proportions of crime-free locations. There is also evidence of street-by-street variability. In other words, hot spots are often close to or even border streets with little or no crime. These findings suggest the usefulness of a crime-prevention approach that narrows the focus to high-crime street segments or micro places as opposed to larger geographic units like neighborhoods or beats. Initiatives at larger areas are less likely to use resources efficiently because crime and disorder problems are typically concentrated on only a small number of streets or addresses within a neighborhood.

## WHY IS CRIME CONCENTRATED AT HOT SPOTS?

Many place-based theories have been used to help explain why crime and other police problems are so highly concentrated at a small number of places. These theories generally fall into one of two categories: opportunity theories and social disorganization theories.

Opportunity theories have been the most common approach for understanding the emergence and stability of hot spots. In general, these theories focus specifically on crime problems and examine the opportunity structures of particular places or situations to explain why crime is common at some places and not others. Just as crime is not randomly distributed across cities and jurisdictions, opportunities to engage in criminal activity are also more highly concentrated in some places than others.

Routine activity theory—which argues that crime occurs when a motivated offender, a suitable target, and the lack of capable guardianship converge in space and time—has been an especially important theory for understanding hot spots.<sup>10</sup>

Suitable targets and a lack of capable guardianship create opportunities for crime. Suitable targets can be physical items (e.g., expensive merchandise) or potential victims (e.g., a person walking alone late at night) that may attract potential offenders. Capable guardianship can be provided not only by the police, but also by place managers (e.g., a landlord, a bus driver), community residents (e.g., a neighborhood watch), or physical devices (e.g., CCTV cameras). Making targets less suitable or increasing levels of guardianship are common approaches to block opportunities and reduce crime in hot spots. Police can also increase levels of guardianship through their presence alone. This can have important deterrent effects, because crime and disorder are likely to be witnessed by police.<sup>11</sup> Rational choice theory assumes that potential offenders consider the

costs and benefits before committing a criminal act, and so increasing the costs of crime—the risk of police witnessing the crime—through guardianship and reducing the benefits through opportunity blocking should help prevent crime.<sup>12</sup>

Social disorganization theories have a long history in criminology, but have typically been used to understand differences in crime at the neighborhood or community level. The focus of these theories tends to be on the social characteristics of neighborhoods that are associated with higher crime rates. These social characteristics often include economic disadvantage, racial diversity, and frequent turnover in residents.<sup>13</sup>

The concept of collective efficacy helps explain why socially disorganized neighborhoods may have more crime. *Collective efficacy refers to a community's level of social cohesion and the extent to which residents are willing to intervene to bring social control to the neighborhood.*<sup>14</sup> In other words, neighborhoods high in collective efficacy have higher levels of mutual trust among neighbors, and there is a greater shared sense of the importance of working together to keep the community safe. Components of social disorganization make it difficult for collective efficacy to develop. For example, when residential tenure is short, neighbors are less likely to know one another and thus less frequently look out for one another and the neighborhood.

This focus on informal social control is also in line with the broken windows theory.<sup>15</sup> This theory argues that when disorderly behavior is ignored by residents and the police, over time potential offenders recognize the neighborhood as a place with low social control and allow more serious crime to move in. Based on the theory, police can play a role in disrupting this cycle through improving quality-of-life issues and dealing with disorder problems.

*Although police have little control over neighborhood economic conditions, they could play a role in building collective efficacy through efforts to build relationships with and between residents.* This could help increase social control and reduce crime.<sup>16</sup>

Both opportunity and social disorganization perspectives play a role in understanding why crime is highly concentrated in particular places.<sup>17</sup> Opportunity factors seem to play an especially large role. Hot spot streets are more likely to have high numbers of residents and employees, which provide opportunities for victimization. Main roads in a city also are more likely to be crime hot spots, since these offer opportunities to easily make contact with suitable targets (and to easily leave after the criminal event). Social disorganization and broken windows factors are also influential. Streets with more physical disorder, higher levels of economic disadvantage, and lower levels of collective efficacy are more likely to be crime hot spots.

# HOT SPOT IDENTIFICATION: WHERE ARE THE PROBLEMS?

To understand where crime and disorder incidents are concentrated, the incidents need to be associated with a location (e.g., address, street segment, block, neighborhood). While this may seem simple enough, several steps must be considered prior to placing events on a map. Below is a general guide to the steps for hot spot identification. If your agency employs a crime analyst or has a relationship with an external researcher with crime mapping experience, this individual should be a first point of contact to assist with hot spot identification.<sup>d</sup>

Hot spots are most often identified using police data—usually calls for service data or incident reports. These data traditionally provide the most specificity about the location of events because they are recorded with a corresponding address, and in some cases with geographic coordinates (e.g., latitude and longitude, x and y coordinates). Furthermore, these data are conveniently available to police departments and arguably best record and represent crime. However, problems and reporting errors often occur in police location data.<sup>e</sup> It is important to be mindful of these errors and to deal with them prior to mapping and analyzing the events.<sup>f</sup>

Think also of other data sources that can help identify hot spots. Emergency medical services data has been used to identify locations of injury incidents unreported to police, specifically violence and drug issues.<sup>18</sup> These and other types of data (e.g., disorder complaints from a 311 system or graffiti hotline, school truancy data, emergency room data on gunshot wounds) can be useful in developing a more comprehensive picture of crime and disorder concentrations because they can help reveal locations that are experiencing a higher volume of events, despite low numbers of reports to police.

Once all the relevant data sources have been identified, the data must be cleaned for problem analysis. There are often differences in how two events at the same location are reported (e.g., “1234 George Washington Ave” versus “1234 GW Av”). Appendix A contains a more comprehensive list of common data cleaning issues. Errors like these can affect the number

of events associated to that address; therefore, results can be misleading in that the identified hot spots are inaccurate. Overall, data cleaning issues, which are unique to each data source, need to be dealt with prior to mapping and analyzing events.

After the data are adequately cleaned, the crime and disorder events need to be placed on a map. This process is often referred to as geocoding, where the corresponding addresses or, in some cases, the geographic coordinates (e.g., latitude and longitude, x and y coordinates) are used to mark the location of each event. Allocating a point for each event is helpful because it allows for very precise analysis (e.g., identifying a specific address or intersection that is generating many incidents). These points can be aggregated to larger areas of interest (e.g., street segment, block).

In many instances, meaningful information about events is housed in multiple data sources. Once events are located on a map, additional data can be associated with geocoded records through a function known as a join. Two types of joins are commonly used with police data.

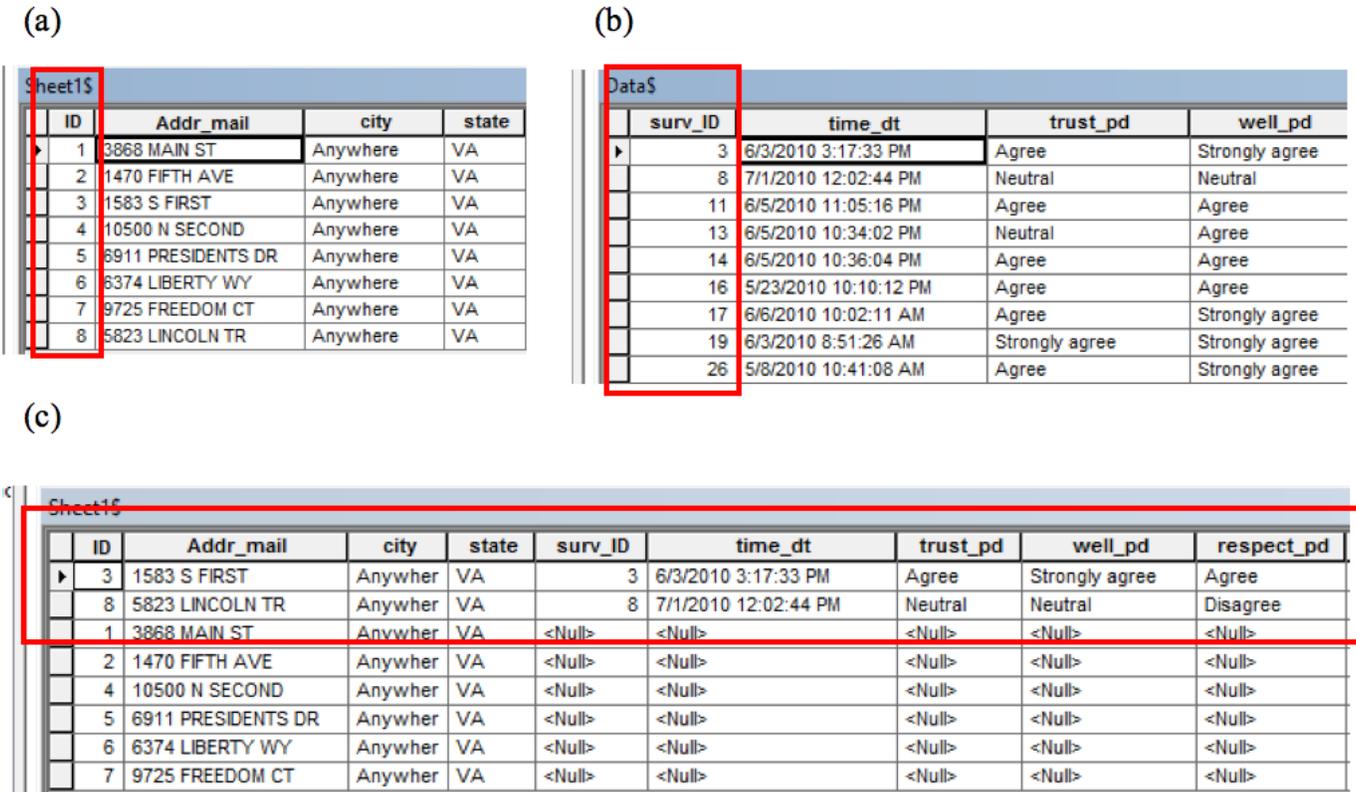
The first are attribute joins. Attribute joins can be done when data about the same incident are located in multiple tables but have a common field (such as an incident number). One example of this would be joining incident data to arrest data based on a common, unique identifier (e.g., case number). Figure 1 demonstrates this concept. Respondent identification information (e.g., respondent ID number and address) for a sample of residents who were sent surveys about attitudes toward police is contained in (a). The information in (b) represents the confidential survey responses collected for each survey participant. Note the data in (b) are not geographic and cannot be mapped because they do not have any geographic identifiers. The goal here is to join the address information to the survey data so that these responses can be inspected visually. The final product of an attribute join produces (c). Note that for surveys that were not returned, the addresses for those sent a survey are retained, but the values for the fields in the survey variables are null.

<sup>d</sup>For more on the value of crime analysis and crime analysts, see Problem-Solving Tools Guide No. 9, Enhancing the Problem-Solving Capacity of Crime Analysis Units; Crime Analysis for Problem Solvers: In 60 Small Steps; and Matthies and Chiu (2013). For more on crime analysis and identifying hot spots, see the International Association of Crime Analysts (IACA) white paper “Identifying High Crime Areas” at [http://www.iaca.net/Publications/Whitepapers/iacawp\\_2013\\_02\\_high\\_crime\\_areas.pdf](http://www.iaca.net/Publications/Whitepapers/iacawp_2013_02_high_crime_areas.pdf)

<sup>e</sup>Many police datasets have multiple addresses recorded for one event. For example, a dataset may have the address where the crime occurred as well as the address where the crime was reported. When identifying hot spots, use the address or location information for the actual location where the crime occurred, as reporting often takes place later (e.g., an assault where a person left the scene, went home, and then reported the event to police). Another common error is the use of a single street address for a tract of land (e.g., park), which suggests that all events at that park occurred in that one location.

<sup>f</sup>In addition to cleaning the data, these entry errors can be minimized by using software features such as spell-check and forced data-entry fields, as well as through in-service training to help officers more accurately report incident locations (Santos 2013).

**FIGURE 1 – VISUAL EXAMPLE OF AN ATTRIBUTE JOIN**



The second type of join is a spatial join. Spatial joins are used when two data sources that share a location or are within a certain proximity. For instance, one approach commonly used in hot spot analysis is a spatial join of the number of crime and disorder events to a street segment. This process is not necessarily linear; joins may need to be performed after hot spots are identified and further investigations of the issues at selected locations are underway.

Figure 2 is an illustration of the data behind a spatial join of drug events to street segments. Portion (a) of the figure represents the data for each street block or line within the dataset. The data in (b) represent the data behind each drug event. Note that with a spatial join, no common identifier in each dataset is needed—the join is based on the mapped location of each incident. The results of this spatial join are illustrated in (c). We can see that the number of points was counted for each street segment. The results are contained in the “count” field of (c).

**IDENTIFYING HOT SPOTS**

The best approach to hot spot identification will vary based on department priorities and available data. For example, a broader approach to hot spot identification would be to locate all the hot spots using computer-aided dispatch (CAD) and records management system (RMS) data to understand the spatial trends of incidents throughout a jurisdiction. However, depending on the problem at hand, a narrower approach may be needed. For instance, maybe there are only one or two incident types that are of interest. Or the identification approach could focus on problem hot spots related to a specific incident type at a predetermined location (e.g., park, campus, neighborhood).

Additionally, identifying hot spots is often driven by the type of data available. Data that provide more specific information, like addresses, can be used to understand policing issues at very small places but can also be used to identify larger problem areas, like a beat, service area, district, or community because it can be aggregated to these larger locations. Conversely, if address- or coordinate-level data are not available, there are limitations to the type of techniques that can be used for hot spot identification. For instance, it is impossible to generate accurate street segment hot spots if the only data available are incident counts within a larger area (or polygon) like a block, neighborhood, or patrol area. A visual example of a street segment hot spot map is provided in Figure 3.

**FIGURE 2 – VISUAL EXAMPLE OF A SPATIAL JOIN**

(a)

StrUofA_NoUW											
FID	Shape *	OBJECTID	FNODE	TNODE	LPOLY_	RPOLY_	LENGTH	SND_	SND_ID *	FEACODE	STNAME
0	Polyline	1	8980	8935	0	0	289.8076	1	11522	5	N PACIFIC ST
1	Polyline	3	6558	6485	0	0	329.53331	4	12779	1	VASSAR AVE NE
2	Polyline	4	10600	10499	0	0	450.03463	5	19408	1	PARKSIDE DR E
3	Polyline	5	8454	8298	0	0	426.34874	6	15895	1	14TH AVE W
4	Polyline	7	4389	4352	0	0	131.32345	8	5248	1	27TH AVE NW
5	Polyline	8	13124	13148	0	0	226.5961	9	28587	1	21ST AVE S
6	Polyline	9	6522	6556	0	0	435.32076	10	12777	1	NE 61ST ST
7	Polyline	10	9274	9149	0	0	665.81129	11	16728	1	23RD AVE W
8	Polyline	11	9930	9874	0	0	225.72996	12	18997	1	22ND AVE E
9	Polyline	12	10634	10555	0	0	399.19556	13	19436	1	25TH AVE E
10	Polyline	13	14019	14153	0	0	523.21272	14	29548	1	34TH AVE S
11	Polyline	14	7679	7680	0	0	118.9512	16	10596	5	N 45TH ST

(b)

09-10DrugATStreet					
FID	Shape *	Status	Score	Match_type	Sid
0	Point	M	100	A	R
1	Point	M	100	A	R
2	Point	M	100	A	L
3	Point	M	100	A	R
4	Point	M	100	A	R
5	Point	M	100	A	L
6	Point	M	100	A	R
7	Point	M	100	A	L
8	Point	M	100	A	R
9	Point	M	100	A	L
10	Point	M	100	A	L
11	Point	M	100	A	L
12	Point	M	100	A	R
13	Point	M	100	A	L
14	Point	M	100	A	L

(c)

example_for_POP_guide													
FID	Shape	09-10DrugATStreet_FID	OBJECTID	FNODE	TNODE	LPOLY_	RPOLY_	LENGTH	SND_	SND_ID	FEACODE	STNAME	Count
0	Polyline	0	1	8980	8935	0	0	289.8076	1	11522	5	N PACIFIC ST	0
1	Polyline	1	3	6558	6485	0	0	329.53331	4	12779	1	VASSAR AVE NE	0
2	Polyline	2	4	10600	10499	0	0	450.03463	5	19408	1	PARKSIDE DR E	0
3	Polyline	3	5	8454	8298	0	0	426.34874	6	15895	1	14TH AVE W	0
4	Polyline	4	7	4389	4352	0	0	131.32345	8	5248	1	27TH AVE NW	0
5	Polyline	5	8	13124	13148	0	0	226.5961	9	28587	1	21ST AVE S	0
6	Polyline	6	9	6522	6556	0	0	435.32076	10	12777	1	NE 61ST ST	0
7	Polyline	7	10	9274	9149	0	0	665.81129	11	16728	1	23RD AVE W	0
8	Polyline	8	11	9930	9874	0	0	225.72996	12	18997	1	22ND AVE E	0
9	Polyline	9	12	10634	10555	0	0	399.19556	13	19436	1	25TH AVE E	0
10	Polyline	10	13	14019	14153	0	0	523.21272	14	29548	1	34TH AVE S	0
11	Polyline	11	14	7679	7680	0	0	118.9512	16	10596	5	N 45TH ST	0

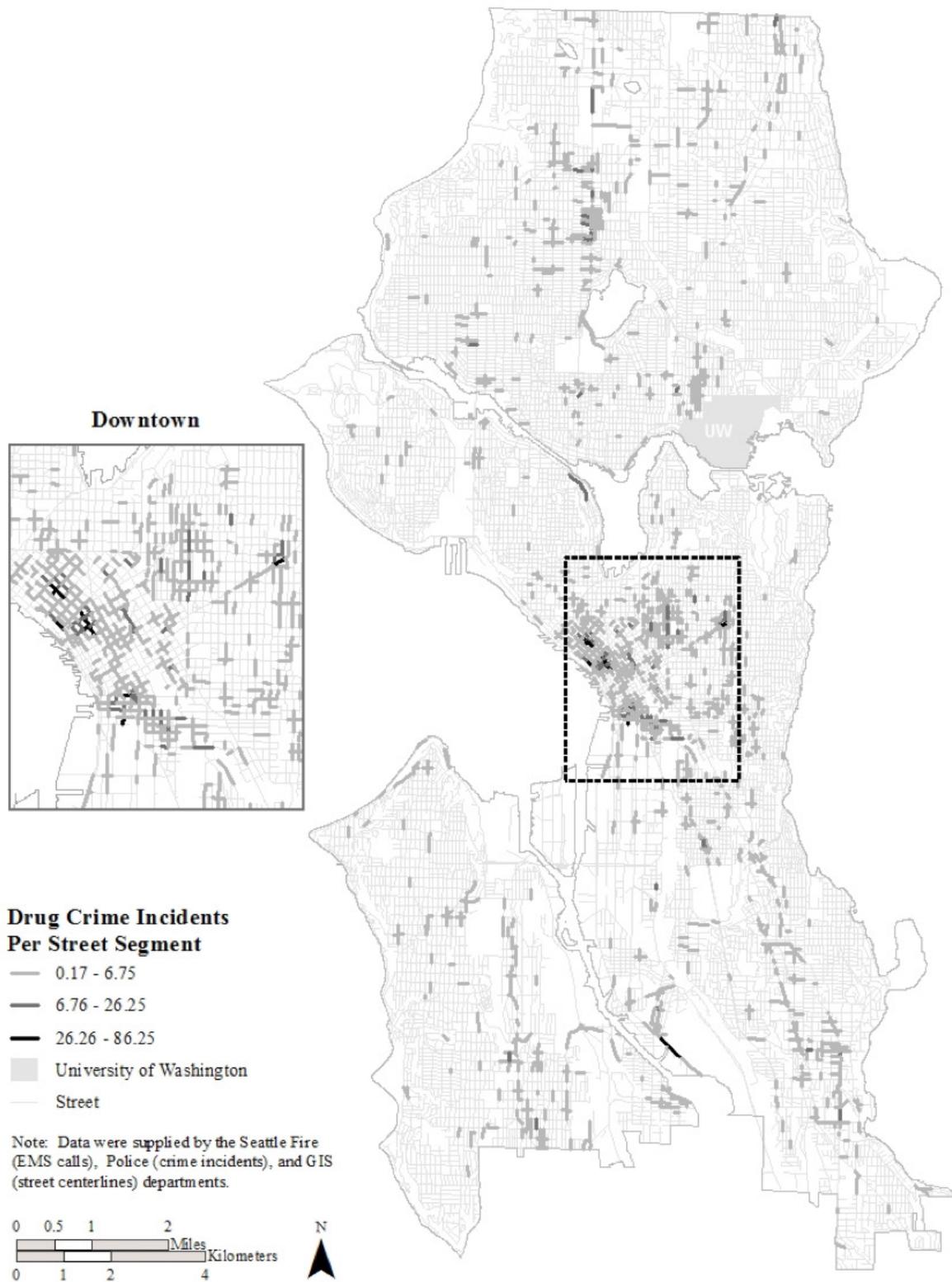
There is a great deal of information available on identifying and generating hot spots.<sup>19</sup> Appendix B provides a summary chart that features the different types of hot spot mapping techniques and their appropriate use, followed by examples of each type of map.

Although maps that use larger areas to display incident concentrations can be helpful (a common practice when using choropleth and isoline maps—see Appendix B), they also present issues that make it difficult to effectively analyze the specific problem and implement targeted responses. Given the limitations of using larger areas, hot spot identification should, when possible, begin with techniques that use smaller locations or areas to improve the precision of targeted responses. Studies demonstrate the variability of hot spots within larger geographies and highlight potential errors and oversights associated with using larger areas to identify hot spots.<sup>20</sup>

Additionally, the type of hot spot maps discussed and demonstrated above are not mutually exclusive approaches; they often can and should be used together. For instance, there may be situations where it is meaningful and appropriate

to examine addresses that experience high volumes of crime events within a street segment that is also highly concentrated with crime. One address might be the catalyst for the crime problem at the street level, but the problem could extend beyond that location and the street segment could contain other characteristics (e.g., crime generators, crime attractors) that contribute to crime there. Conversely, using multiple hot spot identification techniques can help narrow the geographic focus for problem-solving efforts. For instance, if the problem calls for targeting an issue that is unique to one or two neighborhoods, further examination of the incident concentrations at smaller places (isoline maps), street segments (line maps), or specific addresses (point or graduated symbol maps) can help demonstrate, with more precision, the locations that are generating most of the problem. This information is invaluable for narrowing the focus for additional analysis as well as identifying the appropriate problem-specific response.

**FIGURE 3 – DISTRIBUTION OF DRUG CRIME INCIDENTS IN SEATTLE, WASHINGTON, 2004**



Note: Map originally presented by Hibdon and Groff (2014).

# HOT SPOT ANALYSIS: WHY ARE CRIME AND DISORDER PROBLEMS CONCENTRATED?

Once hot spots are identified, they must be analyzed to understand the issues that contribute to incident concentrations. This will help police departments select the best responses to the underlying problems contributing to each hot spot. Hot spot analysis is often done in two phases: a preliminary analysis and a more extensive problem-specific analysis.

## PRELIMINARY HOT SPOT ANALYSIS: WHAT SEEMS TO BE THE PROBLEM?

The preliminary analysis of a hot spot should give the department an understanding of what is going on there. This consists of a very basic, fact-finding approach to identifying relevant features of the hot spot. Specifically, it involves detecting basic trends in incident patterns as well as an initial investigation of the physical and social features that contribute to the hot spot. This stage should end with a clear identification of the nature and extent of the problems at each identified hot spot.<sup>g</sup>

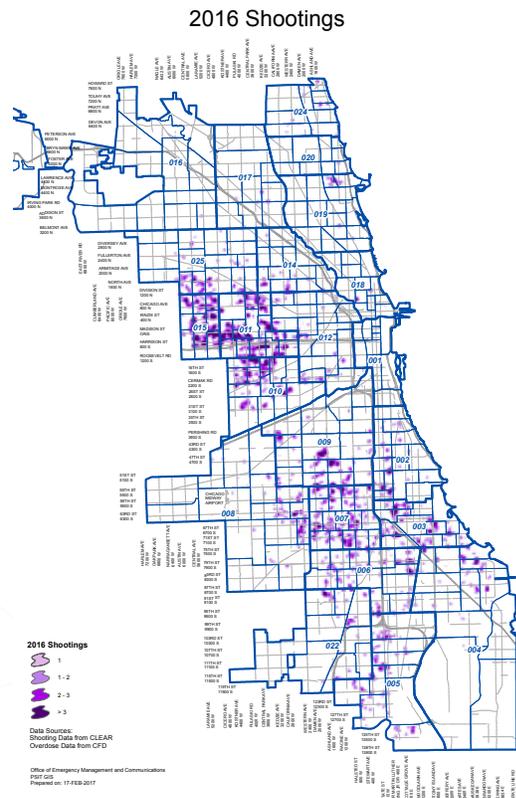
First, it is worth looking at incident trends within hot spots. Doing so can help inform and guide hypotheses surrounding the causes of concentration. Calls for service, incident reports, arrest reports, anonymous drug complaints, and the like can all yield valuable descriptive information about the nature of the hot spots under examination. These data should be carefully examined for commonalities and trends. For instance, a basic analysis of the day and time of events might show that the majority of incidents within the hot spots occur after 3 pm but before 7 pm on weekdays, with few to no events captured at other times or on other days. The timing may suggest that there are activities or conditions associated with businesses, schools, or public spaces (e.g., parks) that might be leading to the troublesome activity within the hot spots.

Second, preliminary analysis often consists of answering basic questions pertaining to physical and social features of the environment. These features can often contribute to crime. Often, places can operate as a crime attractor, crime generator, or crime enabler. This relationship is largely driven by the nature of the place.<sup>h</sup> Common factors explored include land use type (e.g., commercial, residential, mixed), the existence of public spaces or

areas (e.g., parks, public parking lots), and other physical features that might be relevant (e.g., bus stops, lighting, fencing). Some types of facilities, by their very nature, create higher risks for unlawful or disorderly conduct at or near them.<sup>i</sup>

Often factors commonly associated with hot spots are not recorded within the same datasets that are used to locate them. However, there are a number of meaningful data sources that can help uncover the underlying factors contributing to these hot spots. As an illustration, Chicago police correlated a hot spot map of shootings, derived from police data (Figure 4), with a hot spot map of administrations of the heroin-treatment drug Narcan, derived from fire department data (Figure 5), to improve their understanding of the causes of the rise in

**FIGURE 4 – HOT SPOT MAP OF SHOOTINGS IN CHICAGO IN 2016**

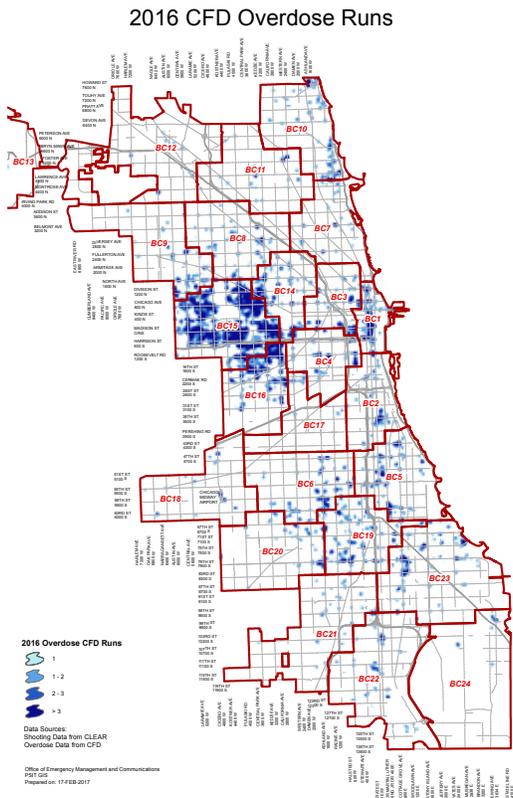


<sup>g</sup> For more on identifying problems, see Identifying and Defining Policing Problems (Problem-Solving Tools Series, No. 13).

<sup>h</sup> A more detailed discussion of these concepts and their role in crime hot spot development can be found in *Crime Analysis for Problem Solvers in 60 Small Steps* (Step 17) on the Center for Problem-Oriented Policing website at [www.popcenter.org](http://www.popcenter.org).

<sup>i</sup> See Problem-Solving Tool Guide No. 6, Understanding Risky Facilities, for further information.

## FIGURE 5 – HOT SPOT MAP OF ADMINISTRATIONS OF HEROIN-TREATMENT DRUG, NARCAN.



shootings in certain areas of the city.<sup>21</sup> The list below provides examples of the sources and types of data that may be available. This list is not exhaustive, but merely provides examples of the different types of data that can be incorporated to assist with preliminary hot spot analysis.

- Street centerline files
- Transportation (e.g., buses, trains) routes and stops
- Traffic counts
- Land use (e.g., commercial, residential, industrial)
- Alcohol-licensed establishments
- Schools (best to have polygons but points can be used)
- Shopping centers and malls
- Parks (best to have polygons but points can be used)
- Census data on population characteristics

Not all agencies have access to these data types. However, in addition to the secondary data sources listed above, there are

several ways to gain information on the nature of hot spots. Many larger cities provide a data portal of city features (e.g., parks, schools, lakes, bike trails, transportation features). It might also be feasible to collect your own data to help understand the nature of crime hot spots. For instance, systematic observations and coding of the physical and social environment of hot spots can yield helpful information, especially if part of the remedy for the hot spot includes other indicators of success, like reduced physical and social disorder. Additionally, interviews and focus groups with key informants, including community members and business owners, can also help validate what quantitative data suggest and provide contextual information on crime hot spots.

## PROBLEM-SPECIFIC ANALYSIS: COLLECTING INFORMATION FOR ACTION

The next step is to engage in problem-specific analysis. The Problem-Oriented Policing Center has published 73 problem-specific guides to help with problem analysis, as well as response options to specific crime problems.<sup>j</sup> These guides will help you think about the problems within a crime hot spot more specifically and provide appropriate questions to aid with additional, detailed analysis and assessments. Each guide includes an “Understanding Your Local Problem” section that will help inform a problem-specific analysis.

As an example, after some preliminary analysis, a police analyst has determined that there are three hot spots that appear to be driving high rates of thefts from vehicles at three large retail shopping parking facilities. The preliminary analysis also reveals that these thefts appear to occur primarily on the weekends and tend to be confined to vehicles parked in garages, not in open lots. From there, a more problem-specific inquiry is needed. The *Thefts of and From Cars in Parking Facilities* guide gives specific, actionable directions on analyzing and responding to auto theft and theft from automobiles in parking facilities.<sup>k</sup> For instance, the guide points to a number of questions on the nature of the events and the conditions leading up to the events to help recognize additional trends. The guide then provides an overview of traditional ways the problem has been addressed and then provides suggestions for problem-specific approaches.

<sup>j</sup> See <https://popcenter.asu.edu/pop-guides>

<sup>k</sup> See *Theft of and From Cars in Parking Facilities* (Problem-Specific Guide No. 10)

# RESPONDING TO HOT SPOTS

Hot spot policing covers a range of responses that focus resources on the locations where policing incidents are highly concentrated.<sup>22</sup> The particular police responses in hot spots vary across initiatives, and also differ in the extent to which they are developed on the basis of a careful analysis of the problems at the hot spots. In initiatives that focus only on increasing police presence, there is some element of analysis in identifying the hot spots but little effort to develop a tailored response. Some hot spot initiatives can be viewed as examples of shallow problem solving, because officers conduct only a preliminary analysis to choose a response. In other initiatives, police conduct a more thorough and detailed problem-specific analysis to develop a response to address the particular conditions contributing to incidents occurring at the hot spot.

A list of studies relying on increased police presence appears in Appendix C. A list of studies using deeper problem analysis appears in Appendix D.<sup>1</sup> The tables include the location of the study, a brief description of the strategy, a summary of the effectiveness, the research design used, and relevant citations for the full report of the study. Only studies that used a randomized experimental or quasi-experimental design are included because these studies are the most reliable for assessing whether a hot spot intervention had an effect on crime and disorder.<sup>m</sup> The tables also are limited to interventions that targeted very small units of geography, such as a single street segment or small group of street segments.<sup>n</sup>

Examples of each type of hot spot initiative are included below. The more thorough the adherence to the SARA model, the more likely the intervention is to be successful in addressing the problem and reducing crime. However, even just increasing presence has shown success in reducing crime; thus, any form of problem solving is preferable to an unfocused approach.<sup>22</sup>

## INCREASING PRESENCE

Simply having officers visit hot spots more often is one method of responding to crime or problems in those locations. *Increasing presence is among the simplest strategies for responding to hot spots, but one that seems to be an effective approach to dealing with high-crime micro places.* Increased presence should not be viewed as the same as zero-tolerance policing. Officers can engage in a number of activities while present in hot spots, and they do not have to spend their time strictly or even primarily on law enforcement. The effect of increased police presence on the community should be considered before initiating such a response (see the “Effects on Perceptions of Legitimacy” section).

The first hot spot policing experiment in Minneapolis increased patrol levels on high-crime street blocks by up to three hours per day.<sup>24</sup> Computerized mapping of crime calls identified 110 hot spots of roughly street-block length. Police doubled the average patrol for the experimental sites over a 10-month period. Officers in Minneapolis were not given specific instructions on what activities to engage in while present in hot spots. They simply were told to increase patrol time in the treatment hot spots. The intervention hot spots, as compared with the control hot spots, experienced statistically significant reductions in crime calls and observed disorder.

Other interventions have increased presence through using teams of officers on foot patrol in hot spot areas.<sup>25</sup> Officers can be assigned to work one or a small group of hot spots during their shift. This type of intervention may be especially useful in small, high-density urban hot spots, where officers can easily patrol an area on foot. These focused foot-patrol efforts have been effective in reducing crime in high-violence locations.

<sup>1</sup> See <http://cebcp.org/evidence-based-policing/the-matrix/matrix-demonstration-project/hot-spots-lab/> for more on different types of hot spot interventions. Additionally, most of the studies reviewed here and in Appendixes C and D are included in the Evidence-Based Policing Matrix. Visit <http://www.policingmatrix.org> and click on the “micro places” tab. More detailed information on each study is also available in the reports and articles included in the references section. See also the IACA white paper “Effective Responses: High Crime and Disorder Areas” at [http://www.iaca.net/Publications/Whitepapers/iacawp\\_2015\\_01\\_high\\_crime\\_areas\\_solutions.pdf](http://www.iaca.net/Publications/Whitepapers/iacawp_2015_01_high_crime_areas_solutions.pdf)

<sup>m</sup> The studies in Appendix D are not a comprehensive list of problem-oriented hot spot interventions, but represent the most methodologically rigorous published studies. Additional examples of hot spot interventions using problem-oriented policing can be found by searching the Center for Problem-Oriented Policing’s Situational Crime Prevention database and Goldstein and Tilley Award online databases.

<sup>n</sup> A number of SPI-funded studies incorporate problem solving and a place-based focus. Some, including projects in New Haven, Connecticut; Los Angeles; and the third SPI project in Philadelphia, are not included in this report because they focus on larger units of geography, such as neighborhoods or police districts. See more about SPI-funded projects at [www.strategiesforpolicinginnovation.com/spi-sites](http://www.strategiesforpolicinginnovation.com/spi-sites).

## Example: Increasing presence in hot spots in Sacramento, California

The Sacramento Police Department conducted a 90-day hot spot experiment in 2011, emphasizing an increase in officer presence.<sup>26</sup> The department chose 42 hot spots, each a single street-block long, based on an examination of high-call and high-incident streets in the previous 3 years. These hot spots were paired based on similar crime levels and then randomly assigned to an intervention group or a control group. In the intervention group, patrol officers were assigned between 1 and 6 hot spots each day to visit during their down time between 911 calls. They were told to spend 12 to 16 minutes in each assigned hot spot, ideally visiting all their assigned hot spots once every 2 hours during their shift. Each day, they were given a randomly assigned order in which to visit each hot spot. They were not told specifically what to do while present, but were given a list of proactive activities (such as traffic stops and talking to residents or business owners) that they could engage in.

The intervention was guided by findings from the Minneapolis study, which found that approximately 15-minute stops were ideal for maximizing crime deterrence.<sup>27</sup> Stops longer than 15 minutes did not increase the amount of disorder-free time after police left the scene, while stops less than 15 minutes were not long enough to deter activity once officers left the scene.

The idea to use medium-length stops in Sacramento, conducted in a random order, was also guided by research on best practices in police crackdowns.<sup>28,°</sup> The random order helped make the times police would be present less predictable to offenders, which maximized the deterrence effect. In Sacramento, the approach was successful, as treatment-group hot spots had significantly fewer calls for service and Part I crime incidents than control-group hot spots when comparing the experiment period in 2011 with the same period in 2010.

## PROBLEM-ORIENTED RESPONSES FROM PRELIMINARY ANALYSIS

The specific responses used in problem-oriented initiatives are guided by analysis. There are, however, some common responses that are often used in initiatives guided only by a preliminary analysis. These interventions typically rely on some combination of situational crime prevention, increased enforcement, and community-building work.

First, situational crime prevention has been commonly used to address underlying opportunities for crime in hot spots. The exact techniques used vary by study, but they all incorporate some combination of the 25 techniques of situational crime prevention, typically with a focus on increasing the effort for crime, increasing the risks for crime, and reducing the rewards for crime.<sup>p</sup> Common strategies include working with businesses

to harden targets and reduce the risk of theft, cleaning up graffiti to deny benefits to offenders, and improving street lighting to assist natural surveillance.

Second, problem-oriented hot spot initiatives often use increased enforcement as a tool to target offenders operating in high-crime areas. Enforcement activity can target disorderly activity in general (i.e., aggressive order maintenance) or target particular gangs or groups known to be involved in criminal activity in the area. Additionally, civil remedies, such as nuisance abatement, can be a useful tool for addressing problem properties.<sup>q</sup> While these enforcement efforts can reduce crime and disorder, the department should be cognizant of the effects an aggressive enforcement-oriented approach may have on citizen views about police actions.<sup>29</sup>

Third, responses often involve community building and engagement. These kinds of interventions use community policing principles and often focus on efforts to build informal social control and increase the participation of residents, business owners, faith leaders, and community groups in crime prevention programs. Ongoing work with the SPI-funded project in Brooklyn Park, Minnesota, focuses on increasing presence but without an enforcement orientation. Instead, officers work to build informal social control in hot spots by building closer relationships with residents and business owners and using these relationships to encourage groups to take the lead in reducing crime.<sup>30</sup>

Problem-oriented policing thus offers a flexible framework for efforts to bring about long-term crime reduction in chronic hot spots.<sup>31</sup> Prior studies suggest situational programs may be especially effective at addressing underlying contributors to crime opportunities, and may therefore help reduce crime in the long term more effectively than increasing presence alone.<sup>32</sup>

## Example: Problem-oriented policing with preliminary analysis in hot spots in Boston

An example of a problem-oriented hot spot policing intervention with a preliminary analysis comes from an SPI-funded study of the Safe Streets Team program in Boston, Massachusetts.<sup>33</sup> The analysis demonstrated remarkable concentration among gun crime micro hot spots. From 1980 to 2008, 88.5 percent of the street units in the city did not experience a single shooting event. However, just 65 street units experienced 10 or more shooting events. The Safe Streets Team program involved 6 officers and a sergeant assigned to 13 of the micro hot spots. These officers received additional training and were required to use problem-oriented policing to guide response development and delivery.

<sup>°</sup> For more on crackdowns, see *The Benefits and Consequences of Police Crackdowns* (Response Guide No. 1).

<sup>p</sup> See more about the 25 techniques of situational crime prevention at <http://www.popcenter.org/25techniques/>

<sup>q</sup> Civil remedies rely on civil law rather than criminal law. For more on civil actions, see *Using Civil Actions Against Property to Control Crime Problems* (Response Guide No. 11).

The teams developed 396 problem-solving activities (some used multiple times) across the 13 treatment areas. These responses were tailored to the specific problems at each hot spot. The most common responses are described in Table 1. In all hot spots, there was a combination of situational or environmental responses designed to change conditions that contributed to crime opportunities, enforcement activity concentrated on high-rate offenders contributing to problems in each location, and community outreach activities designed to both increase community involvement in crime prevention and provide activities for youth.

The intervention was associated with a reduction in aggravated assaults (more than 15 percent), violent crime (more than 17 percent), and robberies (more than 19 percent) relative to comparison areas that were as similar as possible to the intervention sites.

## PROBLEM-ORIENTED RESPONSES FROM PROBLEM-SPECIFIC ANALYSIS

The responses reviewed above should not be viewed as the only ways to develop problem-oriented hot spot responses. Indeed, the appropriate response can be determined only after a detailed, problem-specific analysis. The response should be tailored specifically to address the underlying problem or problems and the conditions contributing to them at each hot spot.

The most successful hot spot interventions thus consider and address not just the clustering of crime in a particular small geographic area, but also the type of behavior (e.g., the crime types most common in the hot spot), the time of day incidents are most likely to occur, and the people involved in these incidents (offenders or victims).<sup>†</sup>

**TABLE 1: EXAMPLES OF RESPONSES FROM SAFE STREETS TEAM IN BOSTON**

INTERVENTION	CATEGORY	NUMBER OF TIMES USED
Removed graffiti	Situational/environmental	29
Removed trash from street/park	Situational/environmental	27
Secured/razed abandoned building	Situational/environmental	23
Added/fixed lighting	Situational/environmental	15
Inspection/regulatory action on bar or liquor store	Situational/environmental	15
Focused enforcement in drug market area	Enforcement	38
Order maintenance to reduce social disorder	Enforcement	13
Focused enforcement on gang	Enforcement	12
Focused enforcement on robbery crew	Enforcement	7
Focused enforcement on burglars	Enforcement	6
Planned and held a community event	Community outreach/social service	72
Recreational opportunities for youth	Community outreach/social service	12
Street outreach to homeless	Community outreach/social service	5
Provided school supplies/toys to children	Community outreach/social service	4

<sup>†</sup> See <https://popcenter.asu.edu/content/problem-analysis-triangle-0>

The Center for Problem-Oriented Policing has a number of resources for conducting a problem-oriented hot spot intervention, including the Tool Guides, the Problem-Specific Guides, and the Response Guides. These all provide additional guidance on responses that may be appropriate based on the dynamics of a particular problem.<sup>5</sup>

### Example: Problem-oriented policing with problem-specific analysis in convenience stores in Glendale, Arizona

An SPI-funded intervention in Glendale, Arizona, used a problem-oriented approach to address convenience store crime and disorder.<sup>34</sup> After identifying convenience store crime as a major citywide problem, officers trained in problem-oriented policing conducted a detailed analysis of the problem. Their preliminary analysis suggested that convenience store incidents were highly concentrated at a small number of Circle K convenience stores (Figure 6). The analysis suggested that those store locations also tended to have more crime than other nearby convenience stores. Property crime was especially common at these locations.

A more detailed analysis included crime prevention through environmental design (CPTED) assessments to assess how the environment at these hot spot convenience store locations might contribute to crime opportunities. Officers also conducted surveillance to better understand the dynamics at these locations. The CPTED assessments suggested that

issues both inside the stores (e.g., inadequate staffing, placing attractive items near the door) and outside the stores (e.g., poor lighting, failure to address disorderly activity) likely contributed to the high problem levels.

Based on this analysis, the Glendale team developed a three-pronged response: providing CPTED-based recommendations to the corporate management, developing a crime prevention publicity campaign aimed at reducing youth beer thefts, and increased enforcement and surveillance at high-crime locations during high risk times of day.

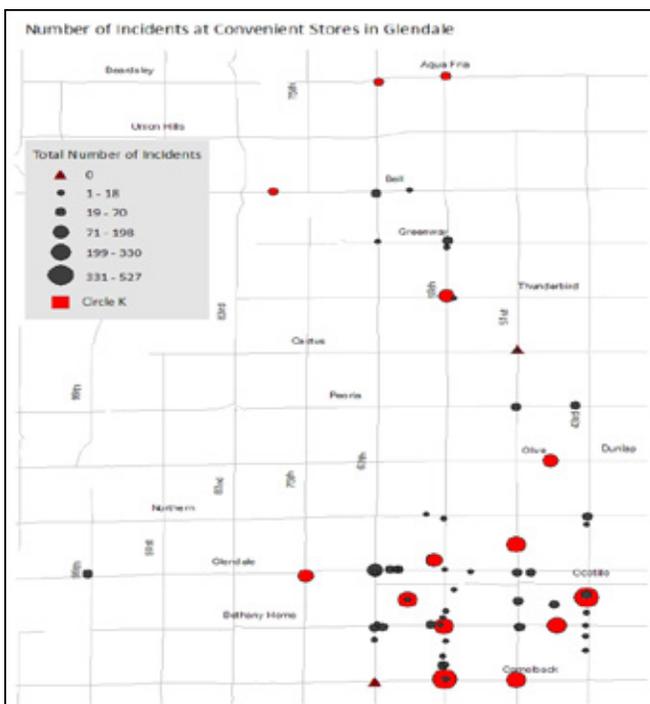
The intervention was associated with a 42 percent decline in calls for service at targeted stores, which was larger than the drop in nontargeted convenience stores.

### Example: Offender-focused hot spot policing in Philadelphia

The initial SPI-funded initiative in Philadelphia, Pennsylvania, directly compared three different hot spot interventions: foot patrol, problem-oriented policing, and an offender-focused program in a randomized experiment.<sup>35</sup> Each intervention group contained 20 hot spots, with seven hot spots serving as control locations for each intervention type. Results suggested the offender-focused program had the greatest effect on reducing violent crime.

While the offender-focused intervention did not fully follow the SARA model, it incorporated analysis and an emphasis on the people contributing to crime problems in hot spots, as well as a strong evaluation component. The intervention involved close collaboration between district-level teams that worked to apprehend chronic offenders and intelligence analysts, who helped identify high-rate offenders contributing to problems in each hot spot. The offender-focused team surveilled the offenders and worked with patrol officers to monitor their activities. Offenders who committed crimes were served with a warrant and arrested. This focus on “hot people” in high-crime places seemed to be successful in reducing crime in these locations and may be an especially efficient way for police to focus enforcement activities in hot spots.

**FIGURE 6 – NUMBER OF HIGHLY CONCENTRATED CIRCLE K CRIME LOCATIONS**



<sup>5</sup> See <https://popcenter.asu.edu/pop-guides>

# ASSESSING RESPONSES TO HOT SPOTS

A large body of evidence from rigorous evaluations suggests that hot spot policing can be an effective way for police to address crime and disorder. Rigorous studies use methods which maximize the confidence that a hot spot intervention was associated with a decline in the targeted problem. The highest level of confidence comes from studies that randomly allocate hot spots into an intervention (treatment) group and a comparison (control) group. The outcomes in the two groups can then be compared to assess the effect of the intervention. Several of the studies cited in the previous section used a randomized design. Others used a quasi-experimental design with a comparison group. Quasi-experimental studies do not randomly allocate treatment, but do use comparison sites that are similar to the intervention sites.

Having comparison hot spots in evaluation designs is extremely important because they provide information on trends in the problem in the absence of the intervention. In other words, if the problem declines in the intervention hot spots, we want to know if this decline was greater than any decline observed in the comparison sites (or if the trend was in the opposite direction). If not, then even a decline in the intervention hot spots might not indicate the intervention was effective. It could just reflect larger declines in crime and disorder across the entire jurisdiction. If the decline is larger, or if the problem declines in the treatment hot spots while increasing in the comparison sites, for example, there is stronger evidence that the hot spot intervention had the desired effect on the problem.

While randomized experiments are often viewed as the best way to maximize confidence about whether a hot spot intervention (or any policing intervention) *caused* a change in crime, they are not always the best or most realistic approach. For example, random assignment requires a fairly large number of hot spots to reasonably assume that the treatment and comparison groups are similar after randomization occurs. Thus, it may not be feasible or appropriate in studies focusing on only a small number of target hot spots.

When evaluating a problem-oriented hot spot intervention, it is especially important to assess the extent to which the problem has declined. That is, while examining trends in the overall number of policing incidents in the targeted sites relative to comparison areas gives some general information about the effectiveness of the response, it is equally important to know whether the problem targeted by the intervention has become

less serious and less harmful. The assessment should address the aspects of the problem identified during the analysis. Have these aspects been successfully addressed by the response? If so, what can be done to ensure the problem does not reappear? If not, the assessment should feed into additional analysis and a new response.

Agencies often benefit from partnering with a researcher from a local university. The SPI-funded interventions described in the Responding to Hot Spots section all included police-researcher partnerships. For more on rigorous evaluation, see *Assessing Responses to Problems* (Problem-Solving Tools Guide No. 1).<sup>†</sup>

## SUMMARY OF RESULTS FROM PREVIOUS STUDIES

Among policing strategies, hot spot policing has shown some of the strongest evidence of effectiveness. A systematic review of all experimental and quasi-experimental hot spot policing studies completed between 1989 and 2011 found a significant effect of hot spot policing on crime. This review looked at 25 comparisons of hot spot policing with comparison sites from 19 published studies. Of these 25 tests, 20 reported significant declines in crime as a result of a hot spot intervention.

The review also directly compared the findings from studies that used increased police presence as the primary hot spots strategy with those from studies that used a problem-oriented framework to choose a more focused response. *The review found that, overall, problem-oriented hot spot policing tended to lead to greater crime-control benefits, although there was support for using either type of strategy to reduce crime.* In other words, just sending police officers to spend time at known hot spots can be somewhat effective, but sending them there to take specific actions tailored to the problems' causes is more effective.

## Displacement

A common concern with place-based approaches such as hot spot policing is that they will not actually reduce crime and disorder, but instead just push or displace the activity to places nearby (so-called spatial displacement). A number of literature reviews, however, suggest that immediate spatial displacement is uncommon in place-based interventions. In the hot spots systematic review, just 1 of the 19 studies found evidence of significant displacement, and there the amount of crime displaced was less than the crime prevented in the target area.<sup>36</sup>

<sup>†</sup> <https://popcenter.asu.edu/content/assessing-responses-problems-did-it-work>

A separate systematic review of displacement in policing interventions found little evidence of displacement and some evidence of diffusion of crime-control benefits.<sup>37</sup> A diffusion of crime-control benefits refers to situations in which areas surrounding a targeted hot spot also show improvement, despite not receiving the intervention.<sup>38</sup> These positive spillover effects of hot spot interventions make place-based interventions even more efficient and can be explained, in part, by offenders overestimating the size of target areas. That is, they think crime prevention strategies are being implemented where they are not. Additionally, the same opportunities for offending may not be present in the areas surrounding the hot spot site, which also decreases the likelihood of immediate spatial displacement.<sup>39</sup>

For more on displacement, see *Analyzing Crime Displacement and Diffusion* (Tool Guide No. 10).<sup>40</sup>

## EFFECTS ON PERCEPTIONS OF LEGITIMACY

The President's Task Force on 21st Century Policing recently warned that strategies that are effective in reducing crime could still have negative effects on how citizens view the police.<sup>40</sup> This concern has been raised about hot spot policing, since it can involve a sizable increase in police presence and may involve an increase in enforcement levels in small geographic areas. Concerns have been raised about whether this will negatively affect citizens' perceptions of police legitimacy.<sup>41</sup>

Legitimacy here refers to the public belief that there is a responsibility and obligation to voluntarily accept and defer to the decisions made by authorities. The police need the support and cooperation of the public to effectively combat crime and maintain social order in public spaces. Hot spot policing, especially when the response involves increased enforcement or aggressive order-maintenance policing, runs the risk of weakening police-community relations, which could have negative effects on how citizens view the police and on crime-control effectiveness. When individuals view the police as less legitimate, they may also be less likely to obey the law.<sup>42</sup>

Limited research on this issue suggests that citizens living in targeted areas either welcome the increased police presence or do not notice the intervention. A study in three cities in San Bernardino County, California, for example, found that a broken windows style intervention in street segments had no effect on resident perceptions of police legitimacy.<sup>43</sup> Another study in St. Louis County, Missouri, found no long-term negative effects of hot spot policing on citizen perceptions of police legitimacy.<sup>44</sup>

Police-community relations are an important topic and needs further study. Perceptions of police legitimacy clearly remain very low in many communities, particularly majority-minority communities, and so police should consider the views of residents when developing and implementing hot spot policing efforts. Police can use existing data to examine areas where citizen distrust of police may be especially high. Examining the geographic overlap between crime and citizen complaints, for example, could inform the development of hot spot interventions focused on building legitimacy in areas where complaint levels are also high. The planning process for any hot spot project should incorporate perspectives from residents, business owners, faith leaders, and community groups to ensure the final intervention maximizes both fairness and effectiveness. This process could include surveying residents or conducting focus groups to solicit community input during problem analysis and meeting with community groups to inform them of the response before the intervention.<sup>45</sup>

<sup>40</sup> <https://popcenter.asu.edu/content/analyzing-crime-displacement-and-diffusion>

# CONCLUSION

This guide reviewed research showing that crime and disorder problems are highly concentrated at a small number of micro places, commonly referred to as hot spots, and that these hot spots tend to remain hot over a rather long period of time if not properly addressed. This suggests a police focus on these locations could reduce crime problems across an entire jurisdiction. Analyzing hot spots beyond simply identifying high-crime places is critical to problem solving in these locations and selecting the most effective responses.

There is strong evidence that the police can have significant effects on crime and disorder when they focus extra attention on hot spots. The responses vary from intervention to intervention but usually entail some combination of increasing police presence and law enforcement, community building, and dealing with underlying opportunities for crime through situational crime prevention efforts. Hot spot initiatives using a problem-oriented framework seem to be especially effective. There is also strong evidence that hot spot policing does not displace crime to areas nearby or different times in the day. Future research will provide important additional knowledge about the effects of hot spot policing on citizens' perceptions of police legitimacy and the long-term effects of place-based approaches, as well as more guidance on what tactics are most effective for specific types of hot spots. Overall, hot spot policing, carefully practiced, represents an efficient and effective policing strategy.<sup>46</sup>

# APPENDIX A: DATA PREPARATION

## CLEANING THE DATA

Every agency and system—including computer-aided dispatch (CAD) and records management systems (RMS) – differs in terms of whether addresses are geocoded as part of the initial entry. The following section covers data that do not already have x and y coordinates for mapping, as well as datasets that do. You should familiarize yourself with the accuracy of the geocoded data generated by the system (e.g., whether it is using a current street file, whether place names that do not have an address are geocoded).

Before data can be geocoded, they must be adequately cleaned. Cleaning is the process of correcting inaccuracies in the dataset. This may be as simple as filling in gaps or supplementing the data. However, in some cases, it may require addressing duplicate records or records that are not of interest. The data used to diagnose hot spots often consist of thousands of records. Usually, the best way to clean data is to use some form of software built for manipulating and managing databases. There are a number of programs that have this capability. Both Microsoft Access and Microsoft Excel are commonly used because they are included in most versions of the Microsoft Office suite.

The software needs to have the capability to systematically clean certain characteristics of the data that make geocoding difficult. Instead of a step-by-step tutorial, a list of common issues is provided below. Some of the tasks listed are specific to police data. Others are common problems found across datasets and should always be considered prior to using any data file. To ensure data are properly cleaned, it is necessary to first check the structure of the data in use. Data can be written in a number of ways. Below is a list of some examples that often arise in working with police incident data.

- Abbreviations instead of full text for street names and types
- Missing data from the street file, which is used to create the address locator (e.g., address ranges for street segments)
- Missing or omitted numbers from the building number of an address
- Address is listed as a “block” or “block of” (e.g., “700 block Main St.”)
- The inclusion of apartment or unit numbers for addresses that contain multiple housing units (e.g., “704 #2, Main St.”)
- Event type classifications: Many police data systems, such as call for service data, include traffic as well as administrative call types, which may need to be excluded so that only relevant event types (e.g., citizen-initiated calls) are included
- Date and time fields are combined
- Data are missing a unique identifier
- The place of occurrence and the place of reporting are not distinguished or are inaccurately recorded

## MAPPING CRIME AND DISORDER

Geocoding is the process of matching a location (typically an address) to a real place on Earth. Geocoding, across all mapping software, requires a data file with the case information (e.g., event addresses) as well as an address locator file, which is a reference file built from a street network file. It is an index or encyclopedia of addresses that reads the range of addresses for a street and the street name and then matches a point based on the estimated location. While it is likely impossible to perfectly geocode thousands of events in a dataset, 85 percent is generally considered the minimum acceptable rate.<sup>47</sup> That said, because many systems are automated and require complete address information, higher match rates (95 percent and above) are common and should be a goal for most datasets. We recommend, in any instance, reviewing unmatched records to see if there is a common reason they did not match (e.g., out of jurisdiction, new address, alias that is not yet in the street file) before moving forward with the analysis. Common errors can often be addressed in batches, which can substantially improve geocoding rates and hot spot identification.

Departments can also map crime and disorder call data using existing geographic coordinates (e.g., latitude and longitude or x and y coordinates). The process to map these is much simpler in that the GIS software will read the coordinates based on the coordinate system of other area files already in the map (e.g., police jurisdiction areas, city area). Also, most mapping software programs can identify the coordinate of centroid (the center point) for files of larger areas (polygons) or the end and center points of line files (polyline), like streets. This is helpful because a number of hot spot generation techniques (as well as spatial analysis techniques) use point data.

## Joining/associating incident data

Once the data are cleaned and geocoded, it will likely be necessary to perform joins to synthesize all the relevant information in one place. A join is simply a link between two datasets—often between one that is already in a spatial format and one that is not. Joins merge all the data associated with the geographic unit into one place, allowing for different features and characteristics associated with that unit to be analyzed as well.

Two types of joins are especially useful when identifying hot spots. The first type is a spatial join of the data. This type joins data based on some type of spatial association. So, for instance, one approach to identifying hot spots is to obtain a count of policing incident points at each street segment.<sup>48</sup> The counts are obtained for each segment through a spatial join of event points to street lines. Spatial joins are also often used to associate data from larger geographic units (like census block groups or tracts) to smaller features (like streets). However, this should be practiced with caution, as there is a missing level of precision when associating data from larger to smaller geographic units.

The second type of join is an attribute join. This joins two datasets with based on a common attribute or field. This join is often used to associate census statistics with the census area geographic boundaries. This allows for information, like mean household income or population, to be joined with the area in which the data were collected.

# APPENDIX B: HOT SPOT GENERATION

**TABLE 2: TECHNIQUES COMMONLY USED FOR HOT SPOT GENERATION**

TECHNIQUE	DATA NEEDED	SYMBOLGY TYPES	STRENGTHS	LIMITATIONS	EXAMPLE OF USE
Point/Dot Maps	Point	Graduated symbols (points) Graduated color (points)	Specificity and precision	Can lose meaning if used for data with many points	Comparing incident counts at hotels and motels across a city
Line Maps	Polyline	Graduated symbols (lines) Graduated color (lines)	Can cleanly demonstrate incident counts at multiple addresses along a street	Can lose specificity of specific problem locations Events at intersections can create double counts	Streets with high drug activity
Choropleth Maps	Polygon	Graduated color Dot density	Demonstrates the measured variable within areas	Can lose specificity of problem locations	Identifying communities with higher crime rates
Isoline Maps	Point	Surface maps	Links points that share common values to determine areas of interest/risk Areas drawn are not restricted by feasibility of travel/access	Can lose specificity of problem locations Does not account for places that are hard to access (e.g., lakes)	Demonstrating the risk of robberies in a neighborhood

FIGURE 7. POINT MAP



FIGURE 8. LINE MAP

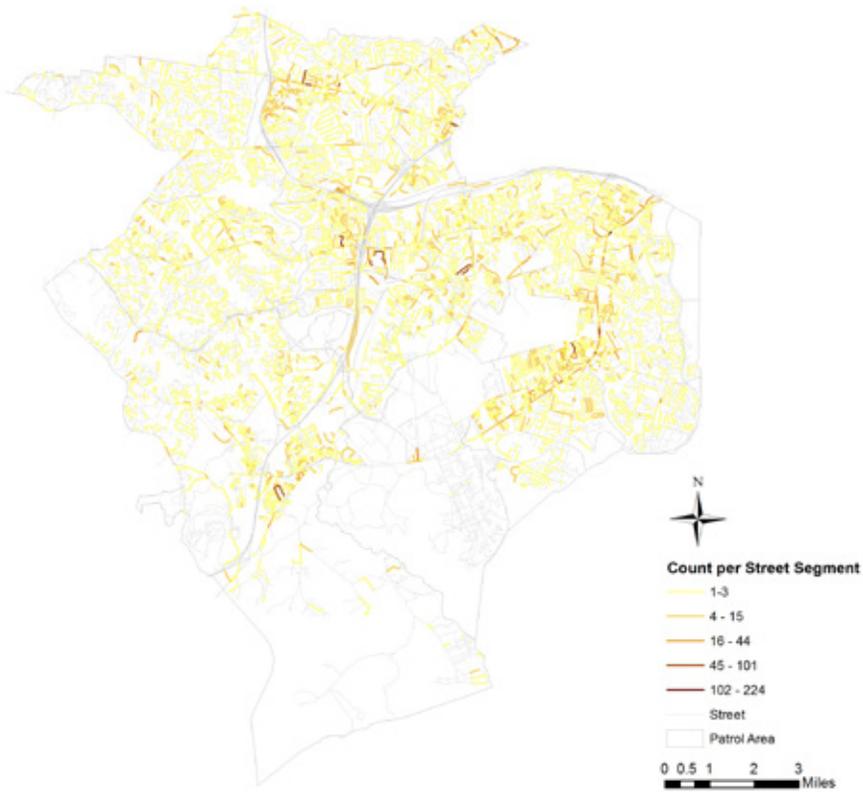


FIGURE 9. CHOROPLETH MAP

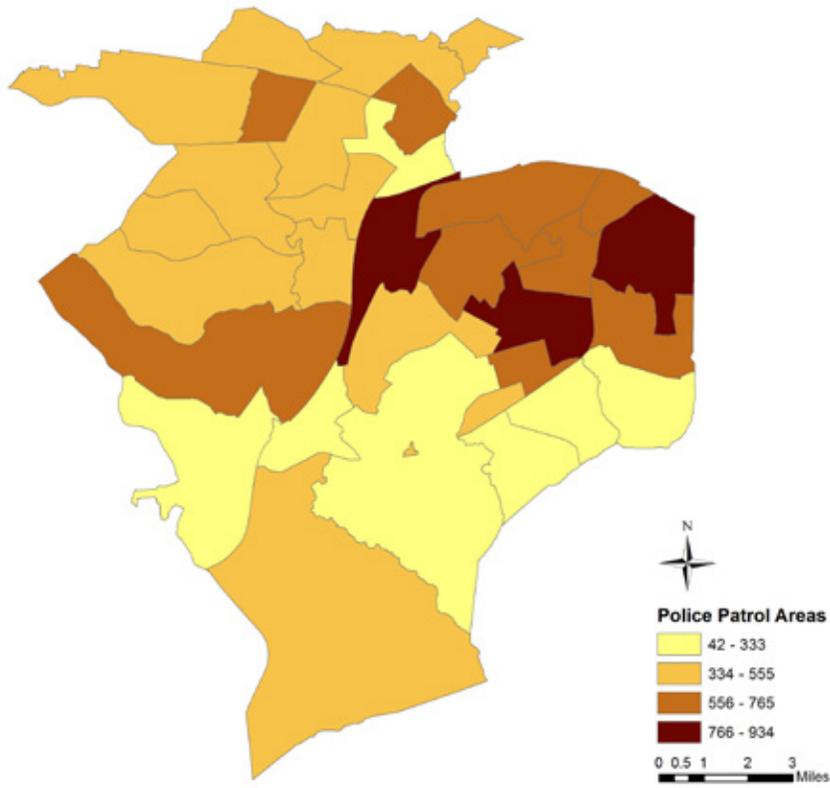
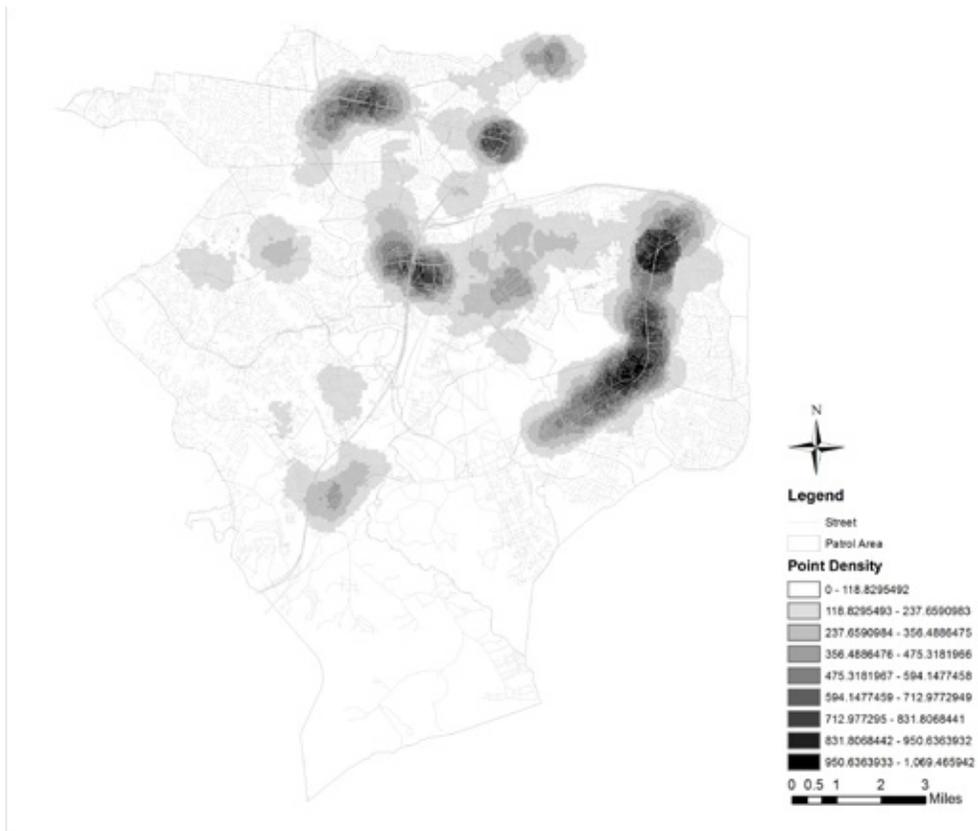


FIGURE 10. ISOLINE MAP



# APPENDIX C: HOT SPOTS STUDIES FOCUSED ON INCREASING OFFICER PRESENCE

The following is a list of published studies of the effect of increased police officer presence at hot spots on reported crime and disorder.

**TABLE 3. OFFICER PRESENCE HOT SPOTS STUDIES**

JURISDICTION	STRATEGY	EFFECTIVENESS	RESEARCH DESIGN	STUDIES
Alexandria and Fairfax County, Virginia	Brief patrols by cars with license plate reader (LPR) technology	No significant effect on calls or auto theft	Randomized experiment	Lum et al. (2011)
Buenos Aires, Argentina	Around-the-clock presence at high-risk targets following terrorist attack	Decline in car thefts on protected blocks	Quasi-experiment	Di Tella and Schargrodsky (2004)
Colton, Redlands, and Ontario, California	Broken-windows-style disorder enforcement	No significant effect on calls	Randomized experiment	Weisburd et al. (2012)
Kansas City, Missouri	Crackdown at crack cocaine houses	Short-term reduction in crime	Randomized experiment	Sherman and Rogan (1995)
Mesa, Arizona	Use of LPR in auto theft hot spots	Short-term effect of LPR patrols on some call types (e.g., drugs)	Quasi-experiment	Koper et al. (2013)
Minneapolis, Minnesota	Doubling of patrol in high-crime places	Decline in disorder calls and observed disorder	Randomized experiment	Sherman and Weisburd (1995)
Newark, New Jersey	Special unit foot patrol nightly in violent crime area	Decline in overall violence, but evidence of displacement for robbery	Quasi-experiment	Piza and O'Hara (2014)
Philadelphia, Pennsylvania	Around-the-clock presence of two officers on drug corners	Decline in violent and drug crime near intervention corners	Quasi-experiment	Lawton et al. (2005)
Philadelphia, Pennsylvania	16-hour per day foot patrols in violent crime places	Reduction in violent crime; effect dissipated after intervention period	Randomized experiment	Ratcliffe et al. (2011); Sorg et al. (2013)
Portland, Oregon	High visibility intermittent random policing with officers dispatched to hot spots to patrol and build community relationships	Results pending	Randomized experiment	Stewart et al. (2015)
Riley County, Kansas	15-minute visits in high-crime places	Decline in calls and incidents	Randomized experiment	Hegarty et al. (2014)
Sacramento, California	15-minute visits every two hours in high-crime places	Decline in calls and Part I incidents	Randomized experiment	Telep et al. (2014)
St. Louis, Missouri	Directed patrol and enforcement at firearms hot spots	Decline in total firearms violence and firearms assaults, but not robberies	Randomized experiment	Rosenfeld et al. (2014)

# APPENDIX D: HOT SPOTS STUDIES FOCUSED ON PROBLEM-ORIENTED POLICING<sup>v</sup>

The following is a list of published studies of the effect of problem-oriented policing at hot spots on reported crime and disorder.

**TABLE 4. PROBLEM-ORIENTED POLICING HOT SPOT STUDIES**

JURISDICTION	RESPONSE	EFFECTIVENESS	RESEARCH DESIGN	STUDIES
Boston, Massachusetts	Safe Streets Team used situational, enforcement, and social service interventions in violent-crime places	Reduction in violent crime, especially robbery	Quasi-experiment	Braga et al. (2011)
Brooklyn Park, Minnesota	Collective efficacy/informal social control building in hot spots	Evaluation in progress	Randomized experiment	Weisburd et al. (2015)
Chula Vista, California	Regulatory enforcement in nuisance hotels/motels	Decline in calls to motels	Quasi-experiment	Bichler et al. (2013)
Glendale, Arizona	Prevention and suppression measures in convenience stores	Decline in calls at targeted convenience stores	Quasi-experiment	White and Katz (2013)
Jacksonville, Florida	Two different treatments: 1) problem-oriented situational measures, working with business owners, community organizing and 2) crackdowns in violent crime places	Crackdowns associated with a short-term nonsignificant crime reduction; problem-oriented policing associated with a significant reduction in post-intervention violence	Randomized experiment	Taylor et al. (2011)
Jersey City, New Jersey	Crackdown/ maintenance program in drug markets	Relative decline in disorder calls	Randomized experiment	Weisburd and Green (1995)
Jersey City, New Jersey	Order maintenance and situational interventions in violent crime places	Reduction in calls, incidents, and observed disorder	Randomized experiment	Braga et al. (1999)
Lowell, Massachusetts	Situational interventions, order maintenance, social services in high-crime places	Reduction in crime and disorder calls and observed disorder	Randomized experiment	Braga and Bond (2008)
Minneapolis, Minnesota	Problem-oriented policing team analyzed and responded to high-call addresses	No significant decline in calls at residential or business addresses	Randomized experiment	Sherman et al. (1989b)
Oakland, California	Beat Health team used civil remedies at problem properties	Reduction in drug calls for service	Randomized experiment	Mazerolle et al. (2000)
Philadelphia, Pennsylvania	Three different treatments: 1) 8-hours/day foot patrol, 2) Problem-oriented policing (variety of responses), 3) intelligence-based offender monitoring	Offender-focused intervention associated with drop in violent crime, other two treatments no significant effect	Randomized experiment	Groff et al. (2015)
San Diego, California	Two different treatments: 1) Problem rental properties received follow-up letter from police, 2) property owners had to meet with nuisance-abatement detective	Meeting with police/threat of nuisance abatement associated with crime decline	Randomized experiment	Eck and Wartell (1998)

<sup>v</sup> Some of the studies in this table include comparisons of problem-oriented policing to other interventions (e.g., to crackdowns in the Jacksonville study).

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Julie Hibdon is an associate professor in the Department of Criminology and Criminal Justice at Southern Illinois University Carbondale. Her research interests include crime and place, cognitions of crime places and dangerous places, fear of crime, and policing. She has worked and collaborated on a number of research projects examining the effectiveness of police practices and crime prevention approaches. Her latest work examines the nature and stability of hot spots of drug activity using both police and emergency medical services data. She recently completed an evaluation of a community-led crime hot spot intervention with Cody Telep. She received her PhD in Criminology, Law, and Society from George Mason University in 2011.

# ENDNOTES

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- <sup>3</sup> Sherman and Weisburd (1995); Sherman et al. (1989a); Weisburd et al. (2006).
- <sup>4</sup> Weisburd (2015); Weisburd et al. (2012).
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- <sup>6</sup> Andresen et al. (2017); Steenbeek and Weisburd (2016); Wheeler et al. (2016).
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- <sup>26</sup> Mitchell (2013); Telep et al. (2014).
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- <sup>28</sup> Sherman (1990).
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- <sup>43</sup> Weisburd et al. (2011).
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