

Impact Evaluation of the AmeriCorps Urban Safety Program

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Introduction

The AmeriCorps Urban Safety program (AMUS) was awarded funding from the Corporation for National and Community Services (CNCS) to implement a community-based intervention focused on reducing crime throughout various areas throughout the city of Detroit. The AMUS program began in the Midtown region of the city in 2009 and was subsequently expanded to include more areas in 2013, 2014, and 2016. Expansion was based on previous evidence of the AMUS program areas having significant reductions in the crime.

This evaluation was formulated under the direction of the AMUS program director and the Director of the Center for Urban Studies, as well as with consultation with NORC.

Program Background and Problem Definition

Wayne State University's Center for Urban Studies (CUS), AMUS, and Community CompStat programs pursue permanent crime reductions through the use of real-time crime mapping analyses and collaborative problem-solving processes. Once AMUS was introduced into each target area, total annual Major Part I crimes decreased.

Detroit accounts for approximately 7% of Michigan's population but only 0.25% of the state's geographic area. While both Detroit and Michigan have experienced decreases in annual violent and property crime totals since 2008, Detroit's crime totals remain disproportionately high. According to the 2014 Michigan State Police "Uniform Crime Data and Statistics", Detroit comprised approximately 18% of Michigan's total reported Part I property crimes (burglary, vehicle theft, larceny, and arson) and approximately 40% of the Part I violent crimes (homicide, robbery, sexual assault, and aggravated assault).

In addition, the city has a substantial number of vacant and open houses, properties frequently associated with crime. The 2014 Motor City Parcel Mapping Survey indicated there are 27,485 structures throughout Detroit with an open point-of-entry (e.g., a broken or missing window or unsecured door). Of these structures, surveyors believe 93% are unoccupied. Recent research finds vacant structures to be the strongest predictor of assault risk when compared to nearly a dozen other risk indicators (Branas et al., 2012). This finding supports the "broken window theory" that further disorder is encouraged by outward signs of property abandonment. Once a property becomes vacant, the risk of violent crime within 250 feet is 15% higher than the rate of crime further away.

Sadly, public safety issues can adversely impact Detroit's youth. Children who reside in low-income urban areas are significantly more like to be victims and witnesses of community violence. Within this context, children may be more prone to exhibit antisocial behavior, be socially withdrawn, abuse illicit substances, and have academic problems (Copeland-Linder, 2010). The Social Science Research Council estimates that 17.4% of Detroit youth aged 16-24 are disconnected (neither working nor in school) from their community, which is the second highest percentage among the 25 largest metro areas in the country. This disconnect may be related to Detroit's alarmingly low rate of high school graduates (77.6%) and the small percentage of residents (only 12.7%) earning a bachelor's degree (American Community Survey). Furthermore, Wayne County recorded over 3,000 juvenile arrests in 2013--nearly twice as many as any other county in Michigan (Michigan Statewide Juvenile Arrest Analysis Report, 2008-2013). If the future of these at-risk and disconnected youth did not seem uncertain enough,

homicide is the leading cause of death for children between the age of 1 and 18 in Detroit (Detroit News, 2010).

Most residents look to the Detroit Police Department (DPD) for assistance addressing the city's crime troubles. However, the number of police officers currently patrolling Detroit has not been this low since the 1920s. In fact, it has been estimated that Detroit has lost nearly half its patrol officers between 2000 and 2015 (Detroit News, July 9, 2015). Center researchers found that little public safety infrastructure exists for residents beyond DPD patrols. Center staff have held a series of informal discussions with DPD representatives and Detroit residents to elicit qualitative data concerning community involvement with community policing. The staff found that in a city of almost 143 square miles, there were only 12 community policing organizations registered to work with the DPD (6 of which were established by AMUS in the past 3 years). Detroit and other large, urban cities need a cost-effective, replicable model to improve community safety.

Past Research and Existing Evidence

Program Theory, Logic Model and Outcomes of Interest

The CompStat and AMUS model pairs community engagement to impact crime on the individual, neighborhood, and city levels. The model employed stems from one found in "The Co-implementation of CompStat and Community Policing" (Willis et al. 2010). These researchers used a mixed-mode, cross-sectional analysis of 7 U.S. police departments that merged the reforms of community policing with CompStat analysis. More specifically, the researchers used surveys, secondary data analysis, fieldwork, focus groups, and interviews to structure an inductive study of crime reduction. Their results suggest that 1) the police departments felt they could respond to a broader set of goals and engage in a wider variety of tasks by combining these reforms and 2) the two reforms had an "additive effect"—i.e., one reform compensated for the limitations of the other in helping departments to respond comprehensively to the diverse demands of their environments (p. 977).

The AMUS intervention model contains six main components directly connected to the Compstat process that emphasize:

- 1) the identification of crime problems and trends;
- 2) streamlining communication among researchers, community members, and police precincts in order to facilitate timely and efficient responses to crime trends.
- 3) the use of CompStat to identify the few repeat and frequent offenders who are responsible for the large amounts of crime;
- 4) identification of strategic actions to minimize the impact of high impact offenders. This includes identifying new and habitual high-impact offenders at CompStat meetings, while informing attendees of these individuals;
- 5) encouraging community organizing so that residents are able to better police themselves and efficiently utilize resources to reduce crime; and
- 6) communicating directly with offenders to instill community messages against offending, provide notice of legal consequences to crime, and offer help.

The applied theory of change framework links 68 MSY AmeriCorps member activities to meet each community's need. The defined a theory of "layered deterrence" underpins every intervention in the

AMUS program. At every level, from the individual to the precinct, AMUS builds a network of deterrence meant to dissuade criminals from committing crime. At the individual level, the program educates residents about protective behaviors and provides devices and strategies to prevent home entry and slow down criminals. At the community level, block clubs and neighborhood patrols put “eyes on the street”, increasing the likelihood that criminal activity will be reported. Police-directed patrols put “cops on the dots”, i.e., deploys police in the locations where incidents have occurred. Also, corrections officers visit criminals at their homes to directly impart the message that their actions are being closely monitored. Overall, these layers serve as a “blanket of deterrence” and act as a network of screens that increase the cost and difficulty associated with criminal activity.

Research questions evaluated:

This evaluation assessed the AMUS program’s impact on key crime reduction outcomes by describing how the crime reports in AMUS target areas (police precincts) changed over the course of the fiscal year, as well as the associated cost savings related the level of crime reduction. In addition, an analysis of the impact the AMUS program on annual crime rates was evaluated. More specifically, the following impact and economic research questions were investigated:

Program Impact questions

- 1) Did the trend in targeted crime rates significantly decrease in AMUS target areas compared to non-AMUS areas?
- 2) Once implemented, do AMUS target areas experience significantly lower crime rates than non-AMUS areas?

Economic impact questions

- 3) What are the monetary costs associated with crime in AMUS target areas?
- 4) Given the reductions in crime, what is the total amount of imputed cost savings?

Evaluation Components

Research Design and Rationale

Areas targeted to receive the intervention were selected during a conference between the State of Michigan and the City of Detroit Mayor’s office. In 2013, four police precincts were selected (precincts 4, 7, 9 & 12), with an additional two precincts added in 2014 (precincts 5 & 6) and another two in 2016 (precincts 8 & 1). This evaluation’s focus is on the impact of the AMUS program within these areas.

Since AMUS intervention areas were not randomly selected, the evaluation will use two different quasi-experimental designs to assess program impact (Shadish, Cook, and Campbell, 2002). First, an interrupted time series with comparison group design (ITS-CG) was utilized. Annual crime rates, before and after the point of intervention implementation were tracked and analyzed. The time interval between each crime measurement was equal for areas exposed to the AMUS program (treatment), as well as, non-targeted areas (comparison). At this time, there were only two police precincts that have never been exposed to the program (precincts 2 & 11). Therefore, to include as many data points as possible before and after program implementation, for a given year, comparison cases were derived from average crime rates for those precincts that had not received the AMUS program. More precisely, for years 2009 through 2012, no precinct included in this evaluation had received treatment. Therefore, the average number of crime reports were derived for these areas to serve as comparison cases for each

year. Once program implementation began for a precinct, it was removed from the average calculation of crime reports for the comparison groups.

If, after exposure to the program, crime rate trends significantly decrease, there is supporting evidence for program effectiveness. Since non-random assignment was used, estimate of program effectiveness within treatment areas was susceptible to selection bias. Therefore, efforts were made to match comparison areas with similar characteristics to the AMUS target areas. Among the covariates available, baseline equivalency tests were conducted between comparison and treatment sites and can be found in Appendix B. Though several differences were noted between treatment conditions, a strength of the ITS-CG design is that the built-in differences-in-differences comparison of the outcome at the baseline, as well as the comparative change in trend between the treatment and comparison group, nets out differences more directly than other adjustment strategies (Juras, Comfort, & Bein, 2016).

In the case where more recent AMUS areas (precincts 8 and 10) were targeted, post treatment measurements were limited to a single year, which prohibited the ability to assess the impact with the ITS-CG design. Furthermore, sample sizes for treatment and comparison areas will vary due to the staggered implementation of the program to police precincts. For example, two precincts were added in 2016 and served as treatment groups (from 2016 forward) and comparison cases decreased over time as the AMUS program expanded. However, the use of average crime reports for non-participating AMUS areas somewhat mitigates this variation. For all inferential ITS-CG analyses, 2017 data were not included due to one month of data missing (December 2017).

The regression point displacement design (RPD) was also applied to AMUS data. The RPD design is particularly useful for community-based research when units are aggregated and treatment groups are limited (Trochim and Campbell, 2017). RPD design requires the use of pretest and posttest data points for comparison cases to generate a pre-post regression line. In our case, the pre-post regression line was generated from paired, annual crime data for the non-AMUS target areas during time period closest to when AMUS target areas began the program. Within the RPD design, once the comparison condition line has been established, the treatment case(s) can be analyzed to determine if there has been a significant vertical displacement from the fit line generated by the comparison cases. If treatment case(s) are significantly displaced below the comparison regression line there is evidence of a treatment effect (i.e. a significant reduction in crimes reported). As with the ITS-CG design, covariates were incorporated into the analytic plan to adjust for potential selection issues. Available covariates included area demographic and neighborhood level variables (e.g., percent of families living in poverty, percent of citizens with less than a high school education, racial diversity, and rate of abandoned/boarded houses). Beyond typical law enforcement activities, there were no known intervention programs that may substantially compromise the evaluation's impact assessment.

Sampling Methods, Measurement Tools, and Data Collection

Available crime data spans from 2009 through the current program year (November 2017) for Detroit's police precincts. These data were drawn from the Detroit Police Department's (DPD) crime database and verified by CUS staff. In addition, CUS and AMUS staff provided qualitative, in-depth knowledge of program features that supported this evaluation. Data for the cost-effectiveness evaluation were also collected by local police and available to the CUS on a real-time basis. These data were aggregated across types of crime, police precinct, and annual time periods.

Analytic Approach

Program impact

To analyze quantitative data, Detroit Police data were used to identify crime report trends and other readily available demographic data. Specifically, crime report trend comparisons between treatment and comparison areas was also conducted.

To assess the impact of the program on AMUS treatment areas, the ITS-CG analysis used the following segmented regression model:

$$Y = \beta_0 + \beta_1T + \beta_2X_t + \beta_3TX_t + \beta_4level + \beta_5trend + \beta_6level(X_t) + \beta_7trend(X_t) + e_i$$

where β_0 represents the baseline level at $T = 0$ for the control group, β_1 is interpreted as the change in outcome associated with a time unit increase (representing the underlying pre-intervention trend) for the control group, β_2 is the baseline difference between the intervention precinct and control precincts, and β_3 indicates difference in trend between the groups during the pre-treatment period, β_4 is the change in crime level in the control group upon treatment implementation, β_5 the trend change following the intervention for the control group, β_6 is the difference in level change between the intervention and control group, and β_7 represents the change in trend between the intervention and control group during the intervention period. Models were assessed for possible nonlinear relationships and it was found that the inclusion of higher order polynomial terms was not warranted.

The basic RPD model is as follows:

$$Y = \beta_0 + \beta_1X_i + \beta_2Z_i + e_i$$

where Y is the outcome variable (crimes reported), β_0 is the intercept, Z_i is the dichotomous assignment variable (1 = treatment, 0 = comparison), β_1 is the pretest coefficient, β_2 is the estimated treatment effect, and e_i is the random error term. The main treatment effect is identified by a statistically significant p value in the β_2 coefficient. In the case when the treatment unit had multiple years of intervention, additional binary assignment variables were added to the model for each extra year, analyzed separately, and added to the RPD figures

Economic cost assessment

In addition to assessing program impact, the cost of crime was calculated and compared for AMUS target areas, before and after the program implementation. Descriptive analyses established a cost baseline for the program areas. Then, cost estimation entailed an accounting approach that attempted to capture all costs associated with crime that individuals and society bear and place a dollar value on those costs. For example, robberies result in prevention expenditures (such as installing lighting or buying personal defense products), property loss to victims, expenditures on medical treatment for injuries, pain and suffering of victims and costs for investigating, adjudicating, and incarcerating offenders. This method of crime cost-benefit analysis was based on two studies: (1) McCollister, K.E., French, M.T. and Fang, H (2010), "The cost of crime to society: New crime-specific estimates for policy and program evaluation", *Drug and Alcohol Dependence*, 108, 98-109, and (2) *Victim Costs and Consequences: A New Look* by T. Miller, M. Cohen & B. Wiersema, a NIJ Report (1996).

Results

Description of Crime within AMUS Target Areas

Tables and Figures 1 through 8 provide 2009-2017 crime counts by DPD precinct and intervention condition. Data are presented in chronological order of AMUS implementation. Tables 1-4 include four precincts (4, 7, 9, & 12) that began receiving AMUS in 2013 and Tables 5-6 present data for precincts (5 & 6) that began the intervention in 2014. Tables 7-8 provide data for two precincts (8 & 10) that started AMUS in 2016. Precinct 3 has received long-term exposure to the AMUS program. Since it was part of the initial AMUS pilot program in 2009 and has received treatment throughout the reporting period, precinct 3 was considered an outlier and omitted from this evaluation. Two precincts (2 & 11) never received any intervention. For all tables, years that are shaded indicate the precinct received AMUS, whereas unshaded years are years when the precinct did not receive AMUS. Also, 2017 data are provided but do not include an entire year's worth of data. Therefore, focus was made on 2016 the primary end point.

In Tables 1-4, annual counts of major crime categories, as well as yearly grand totals are given. When compared to the crime total for last pre-intervention year (2012), the four precincts that began AMUS in 2013 had significant decreases in crime across all categories with few exceptions. There is a noticeable acceleration in the decline of crime rate reports after the first year. By 2016, crime in these precincts was reduced by approximately one-quarter.

Those four precincts who began AMUS in 2014 and 2016 also exhibited rather consistent crime reductions from the pre-AMUS years. Though the time span is more limited with these precincts, there was a decrease in crime for all areas during the first program year. For those precincts that started in 2014, crime continued to decline in the second and third year to about 13% by 2016.

Program Impact

- 1) Did the trend in targeted crime rates significantly decrease in AMUS target areas compared to non-AMUS areas?

Figure A displays overall trends of crime reports for each precinct by year of AMUS implementation. Panels A-D report the four precincts (4, 7, 9, & 12) that began the AMUS program in 2013, whereas panels E and F show data for the two precincts that began in 2014.

Results of the segmented regression analyses found no difference in pre-intervention trends in crime reports between the comparison and intervention precincts for any of the six precincts. Precincts 7 and 5 both had significantly lower, and precinct 9 had significantly higher, baseline levels of crime reports when compared to the comparison group. When compared to the comparison group regression line in the treatment period, none of the precincts exhibited significantly different levels of crime reports or a significant difference in trends.

More detailed, crime specific, precinct-level trend data, over the study period, are provided in Figures 1-8.

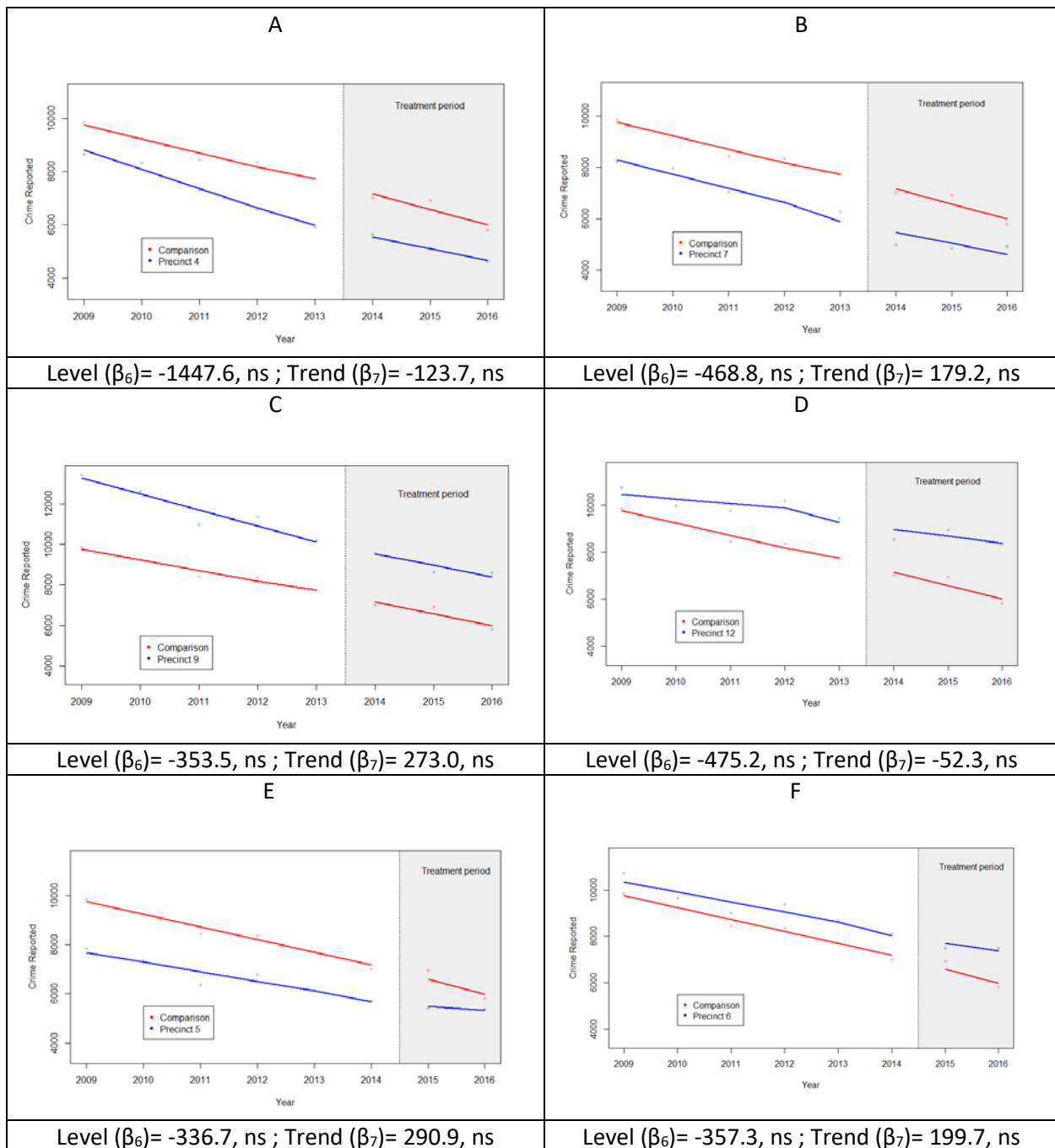


Figure A. Assessment of level and trend change in AMUS intervention areas after program implementation.

- 2) Once implemented, do AMUS target areas experience significantly lower crime rates than non-AMUS areas?

Assessment of program impact for each AMUS targeted precinct was conducted using the RPD regression models outlined above. Data used for comparison areas were identified from the period leading up to implementation of the program. More explicitly, since precincts began receiving the AMUS

program in 2013, the 6 non-AMUS precincts were used for comparison cases. The relationship between 2012 and 2013 crime rates for these 6 precincts served as the counterfactual comparison condition. Then, crime reports for the subsequent years of AMUS-targeted precincts were compared to these comparison cases. Analyses was grouped by year of initial implementation.

Figures 9 through 11 provide a visual presentation of the immediate and latent impact of the AMUS program on targeted precincts. Within each figure, a regression line is fit to the data points generated by the comparisons cases and includes a 95% confidence interval (shaded gray) around the line. AMUS precinct crime rates that fall outside of the shaded area display a significant displacement from the regression line generated by the comparison cases. Within the figure legends, years that are highlighted yellow had crime reduction that was significantly significant at $p < .05$, whereas years highlighted green were significant at $p < .10$. Each analysis was conducted with and without the covariates noted above. There were no difference conclusions made about the absence or presence of a statistically significant displacement of treatment areas compared to the comparison areas. Therefore, only one set of results (those without covariates) are provided.

Almost all precincts that started AMUS in 2013 experienced a delay in program impact on crime rates. Three of the four precincts (7, 9, & 12) reached and maintain a statistically significant reduction in crime reports during the second year (2014). However, it took the remaining precinct (4) three years before exhibiting a significant reduction in crime.

A similar pattern of delayed impact occurred for the two precincts that became involved with AMUS in 2014. Here, one precinct (6) was marginally significant during the first year of implementation but both demonstrated significant reductions in year two (2015), which continued into year three (2016).

Interpretation of the two precincts that began AMUS in 2016 is confounded by the lack of follow-up years available. Neither precinct had significant decreases in crime in 2016. However, preliminary data for 2017 indicates it is likely both areas will experience a significant decline in crime, which is similar to the delayed impact revealed in the six other precincts.

Economic Impact

3) What are the monetary costs associated with crime in AMUS target areas?

Using figures provided by McCollister et al. (2010), estimates of the “cost per type of crime” are provided in Table A. These researchers’ estimates consider four dimensions of costs associated with crime (victim, criminal justice, crime career, and other intangible costs) that, when aggregated, reflect a monetary value. Omitted from the economic analyses were homicide and sexual assault counts due to either unstable cost estimators or missing data.

Table A. Estimated cost of crime by year.

Crime	2009 Cost per Crime	2010 Cost per Crime	2011 Cost per Crime	2012 Cost per Crime	2013 Cost per Crime	2014 Cost per Crime	2015 Cost per Crime	2016 Cost per Crime	2017 Cost per Crime
Aggravated assault	106,639	108,338	111,810	114,124	115,795	116,702	117,759	120,318	122,106
Arson	21,028	21,373	22,047	22,504	22,833	23,012	23,231	23,730	24,083
Assault	13,950	14,179	14,627	14,929	15,148	15,267	15,412	15,743	15,977
Burglary	6,439	6,545	6,751	6,891	6,992	7,047	7,114	7,267	7,375
Damage to property	4,843	4,922	5,078	5,183	5,259	5,300	5,350	5,465	5,547
Larceny	3,519	3,577	3,690	3,766	3,822	3,852	3,888	3,972	4,031
Robbery	42,159	42,851	44,204	45,118	45,779	46,138	46,577	47,577	48,285
Stolen vehicle	10,734	10,910	11,254	11,487	11,655	11,747	11,859	12,113	12,294

Source:

McCollister, K. E., French, M. T., & Fang, H. (2010). The cost of crime to society: New crime-specific estimates for policy and program evaluation. *Drug and Alcohol Dependence*, 108(1), 98-109.

4) Given the reductions in crime, what is the total amount of imputed cost savings?

To calculate the economic impact, the difference between the frequency of crimes within each category between a given year and the preceding year determined if there was an increase or decrease in crime. This difference was then multiplied by the corresponding cost by crime and year found within Table A. For each precinct that received AMUS, the baseline comparison the year immediately prior to program implementation. More specifically, the four precincts had a baseline of 2012 (4, 7, 9, 12), two precincts had a baseline of 2013 (5 & 6), and two had a baseline of 2015 (8 & 10).

Table B displays the estimated savings after each precinct began the AMUS program. It is estimated that the crime reduced crime all eight precincts saved approximately 378 million dollars. Detailed results for each precinct by year and crime category can be found in Appendix B.

Table B. Estimated economic impact of AMUS by precinct

Initial AMUS Year	Precinct	Estimated Savings
2013	4	\$ (72,953,663)
	7	\$ (45,068,617)
	9	\$ (52,390,511)
	12	\$ (79,944,632)
2014	5	\$ (31,121,721)
	6	\$ (39,673,658)
2016	8	\$ (35,977,010)
	10	\$ (21,104,354)
Grand total		\$ (378,234,167)

Summary Points

Crime Patterns

- Across major crime categories, crime reports within precincts served by AMUS have declined.
- Crime reduction at the end of the first year AMUS implementation was smaller than in subsequent years, which suggests a phased-in impact period.
- A consistent pattern emerged where reduction in subsequent crime rates were more than twice that of the implementation year.

Program Impact

- In almost all areas AMUS served, there was a significant reduction in the frequency of crime reported.
- Trend analyses did not demonstrate significant level or trend differences between comparison and intervention precincts.
- When compared to the period immediately preceding AMUS implementation, crime reports were significantly reduced and sustained after the first program year.

Economic Impact

- All precincts participating in the AMUS program experienced a positive economic impact from reduced crime reports.
- With the amount of crime reported reduced in AMUS areas, an estimated \$378 million was saved by alleviating crime-related activities.

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Description of Crime with AMUS Target Areas

Table 1											
Precinct 4											
Year	AGGRAVATED ASSAULT	ARSON	ASSAULT	BURGLARY	DAMAGE TO PROPERTY	HOMICIDE	LARCENY	ROBBERY	STOLEN VEHICLE	Grand Total	
2009	889	163	1462	1886	1106	37	1286	538	1294	8661	
2010	795	230	1512	1590	1172	24	1443	536	1034	8336	
2011	821	129	1355	1180	1016	24	1340	472	996	7333	
2012	728	98	1370	966	896	27	1134	484	876	6579	
2013	666	79	1271	832	717	34	1227	332	767	5925	
	-8.5%	-19.4%	-7.2%	-13.9%	-20.0%	25.9%	8.2%	-31.4%	-12.4%	-9.9%	
2014	626	120	1256	662	700	16	1053	334	857	5624	
	-14.0%	22.4%	-8.3%	-31.5%	-21.9%	-40.7%	-7.1%	-31.0%	-2.2%	-14.5%	
2015	584	123	1325	475	743	16	1068	266	521	5121	
	-19.8%	25.5%	-3.3%	-50.8%	-17.1%	-40.7%	-5.8%	-45.0%	-40.5%	-22.2%	
2016	501	94	1275	483	669	29	938	265	371	4625	
	-31.2%	-4.1%	-6.9%	-50.0%	-25.3%	7.4%	-17.3%	-45.2%	-57.6%	-29.7%	
2017	430	73	730	407	587	26	678	183	434	3548	
	-40.9%	-25.5%	-46.7%	-57.9%	-34.5%	-3.7%	-40.2%	-62.2%	-50.5%	-46.1%	
Grand Total	6040	1109	11556	8481	7606	233	10167	3410	7150	55752	

Note: Shaded year indicates AMUS intervention provided.

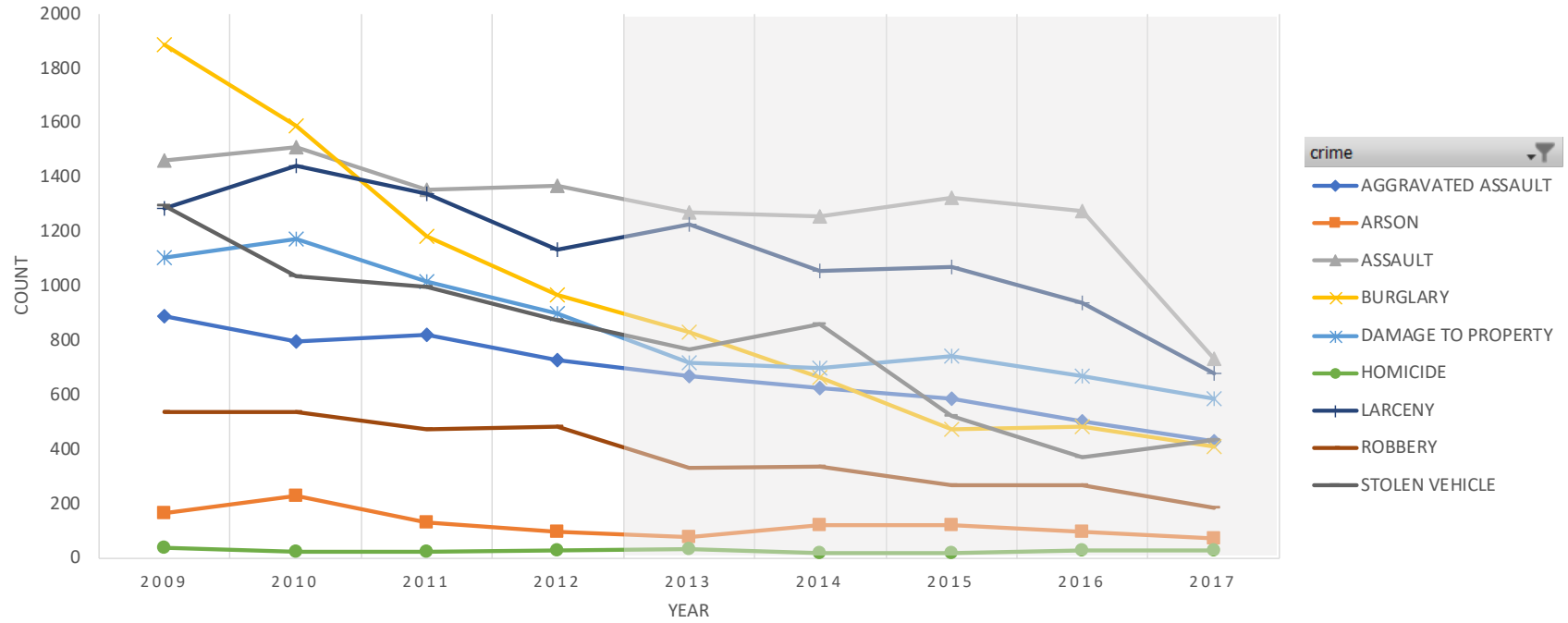


Figure 1. Crime trend lines for Precinct 4.

Notes: AMUS intervention period includes the time period within the shaded area. The reader should use caution when interpreting 2017 data since these specific crime rates do not include the month of December.

Table 2		Precinct 7									
Row Labels	AGGRAVATED ASSAULT	ARSON	ASSAULT	BURGLARY	DAMAGE TO PROPERTY	HOMICIDE	LARCENY	ROBBERY	STOLEN VEHICLE	Grand Total	
2009	780	68	1393	1158	1117	36	1934	473	1238	8197	
2010	725	81	1416	999	1144	26	2004	422	1158	7975	
2011	642	55	1278	768	964	26	1914	375	1038	7060	
2012	570	45	1197	648	959	24	1825	361	1032	6661	
2013	531	28	1098	637	793	21	1906	347	938	6299	
	-6.8%	-37.8%	-8.3%	-1.7%	-17.3%	-12.5%	4.4%	-3.9%	-9.1%	-5.4%	
2014	527	39	1003	412	660	23	1312	250	757	4983	
	-7.5%	-13.3%	-16.2%	-36.4%	-31.2%	-4.2%	-28.1%	-30.7%	-26.6%	-25.2%	
2015	493	40	1008	364	716	25	1403	236	566	4851	
	-13.5%	-11.1%	-15.8%	-43.8%	-25.3%	4.2%	-23.1%	-34.6%	-45.2%	-27.2%	
2016	502	71	1059	342	728	21	1414	199	588	4924	
	-11.9%	57.8%	-11.5%	-47.2%	-24.1%	-12.5%	-22.5%	-44.9%	-43.0%	-26.1%	
2017	439	48	616	408	591	12	1127	189	525	3955	
	-23.0%	6.7%	-48.5%	-37.0%	-38.4%	-50.0%	-38.2%	-47.6%	-49.1%	-40.6%	
Grand Total	5209	475	10068	5736	7672	214	14839	2852	7840	54905	

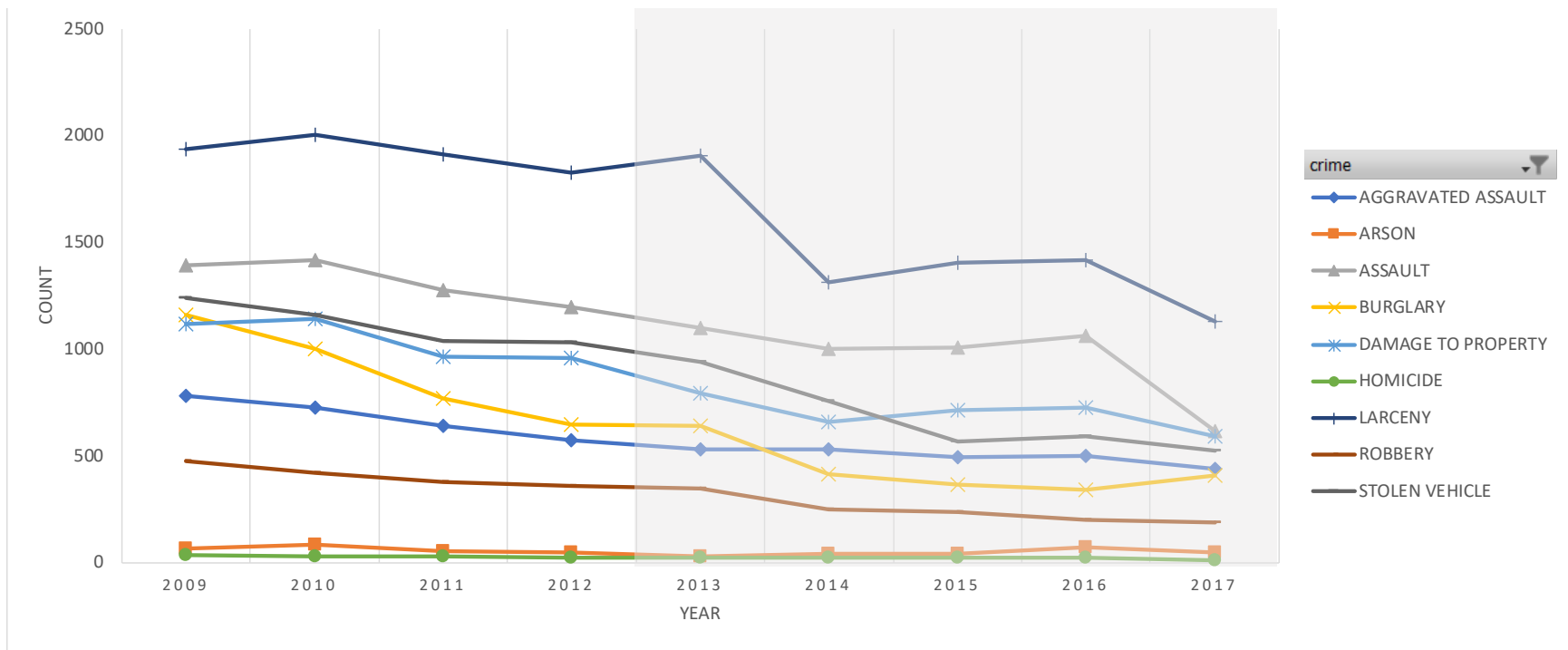


Figure 2. Crime trend lines for Precinct 7.

Notes: AMUS intervention period includes the time period within the shaded area. The reader should use caution when interpreting 2017 data since these specific crime rates do not include the month of December.

Table 3		Precinct 9								
Year	AGGRAVATED ASSAULT	ARSON	ASSAULT	BURGLARY	DAMAGE TO PROPERTY	HOMICIDE	LARCENY	ROBBERY	STOLEN VEHICLE	Grand Total
2009	1472	149	2543	2552	1737	42	1848	892	2216	13451
2010	1444	201	2523	2542	1646	45	1571	708	1950	12630
2011	1248	175	2296	2382	1431	58	1347	589	1444	10970
2012	1263	128	2279	2222	1532	52	1494	601	1775	11346
2013	1218	119	2126	1865	1210	44	1454	504	1680	10220
	-3.6%	-7.0%	-6.7%	-16.1%	-21.0%	-15.4%	-2.7%	-16.1%	-5.4%	-9.9%
2014	1350	131	2265	1656	1212	46	1128	559	1223	9570
	6.9%	2.3%	-0.6%	-25.5%	-20.9%	-11.5%	-24.5%	-7.0%	-31.1%	-15.7%
2015	1311	175	2065	1279	1078	45	1203	486	999	8641
	3.8%	36.7%	-9.4%	-42.4%	-29.6%	-13.5%	-19.5%	-19.1%	-43.7%	-23.8%
2016	1407	194	1978	1292	1187	46	1204	411	882	8601
	11.4%	51.6%	-13.2%	-41.9%	-22.5%	-11.5%	-19.4%	-31.6%	-50.3%	-24.2%
2017	1267	181	1245	1139	1008	24	986	318	806	6974
	0.3%	41.4%	-45.4%	-48.7%	-34.2%	-53.8%	-34.0%	-47.1%	-54.6%	-38.5%
Grand Total	11980	1453	19320	16929	12041	402	12235	5068	12975	92403

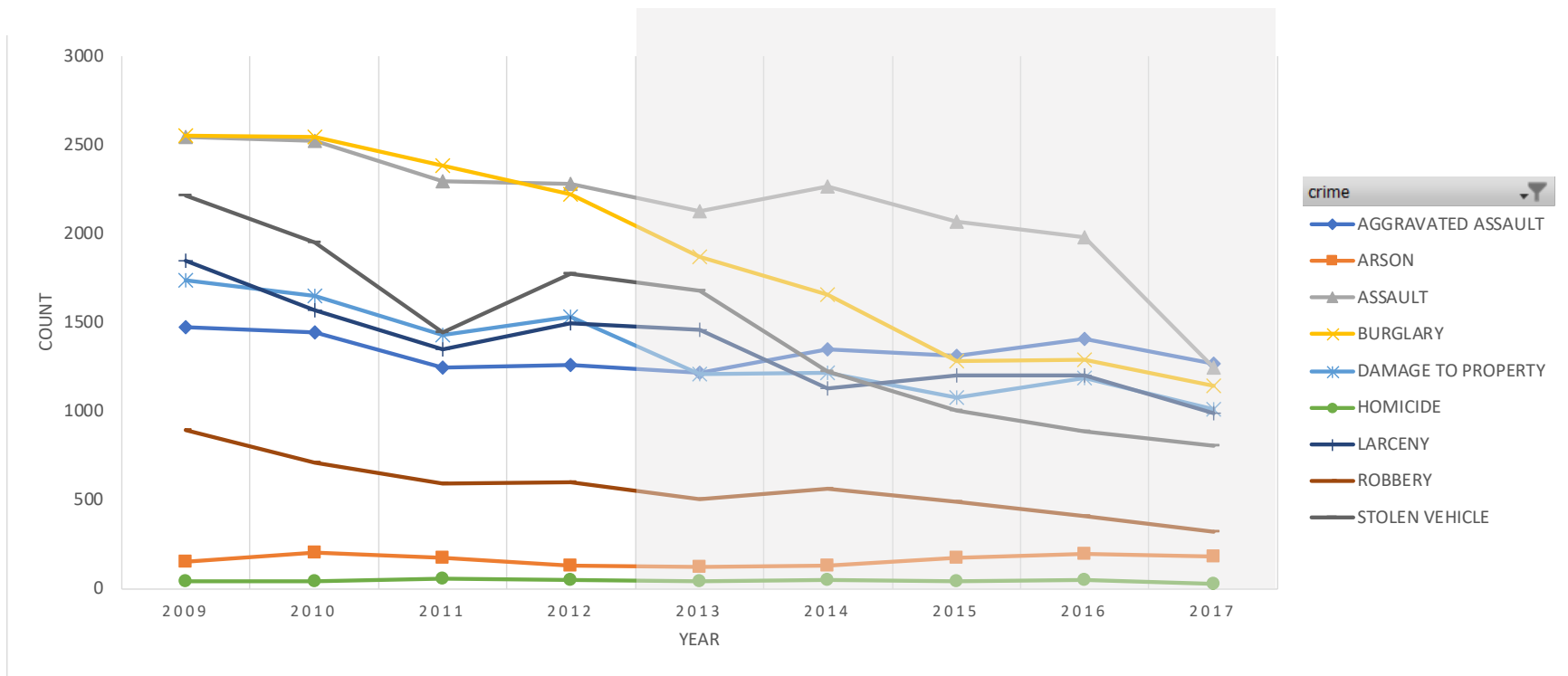


Figure 3. Crime trend lines for Precinct 9.

Notes: AMUS intervention period includes the time period within the shaded area. The reader should use caution when interpreting 2017 data since these specific crime rates do not include the month of December.

Table 4		Precinct 12									
Year	AGGRAVATED ASSAULT	ARSON	ASSAULT	BURGLARY	DAMAGE TO PROPERTY	HOMICIDE	LARCENY	ROBBERY	STOLEN VEHICLE	Grand Total	
2009	949	100	1852	2232	1396	27	2114	693	1383	10746	
2010	960	97	1830	1942	1312	19	1988	655	1173	9976	
2011	908	89	1746	1998	1449	34	1729	677	1140	9770	
2012	972	56	1965	1819	1471	31	1778	707	1380	10179	
2013	843	48	1860	1426	1217	25	1984	658	1406	9467	
	-13.3%	-14.3%	-5.3%	-21.6%	-17.3%	-19.4%	11.6%	-6.9%	1.9%	-7.0%	
2014	927	34	1828	1164	1124	36	1675	438	1304	8530	
	-4.6%	-39.3%	-7.0%	-36.0%	-23.6%	16.1%	-5.8%	-38.0%	-5.5%	-16.2%	
2015	1031	60	1978	1104	1351	30	1946	379	1058	8937	
	6.1%	7.1%	0.7%	-39.3%	-8.2%	-3.2%	9.4%	-46.4%	-23.3%	-12.2%	
2016	1000	101	1906	873	1221	34	1622	359	1229	8345	
	2.9%	80.4%	-3.0%	-52.0%	-17.0%	9.7%	-8.8%	-49.2%	-10.9%	-18.0%	
2017	754	66	1008	867	862	29	1262	251	979	6078	
	-22.4%	17.9%	-48.7%	-52.3%	-41.4%	-6.5%	-29.0%	-64.5%	-29.1%	-40.3%	
Grand Total	8344	651	15973	13425	11403	265	16098	4817	11052	82028	

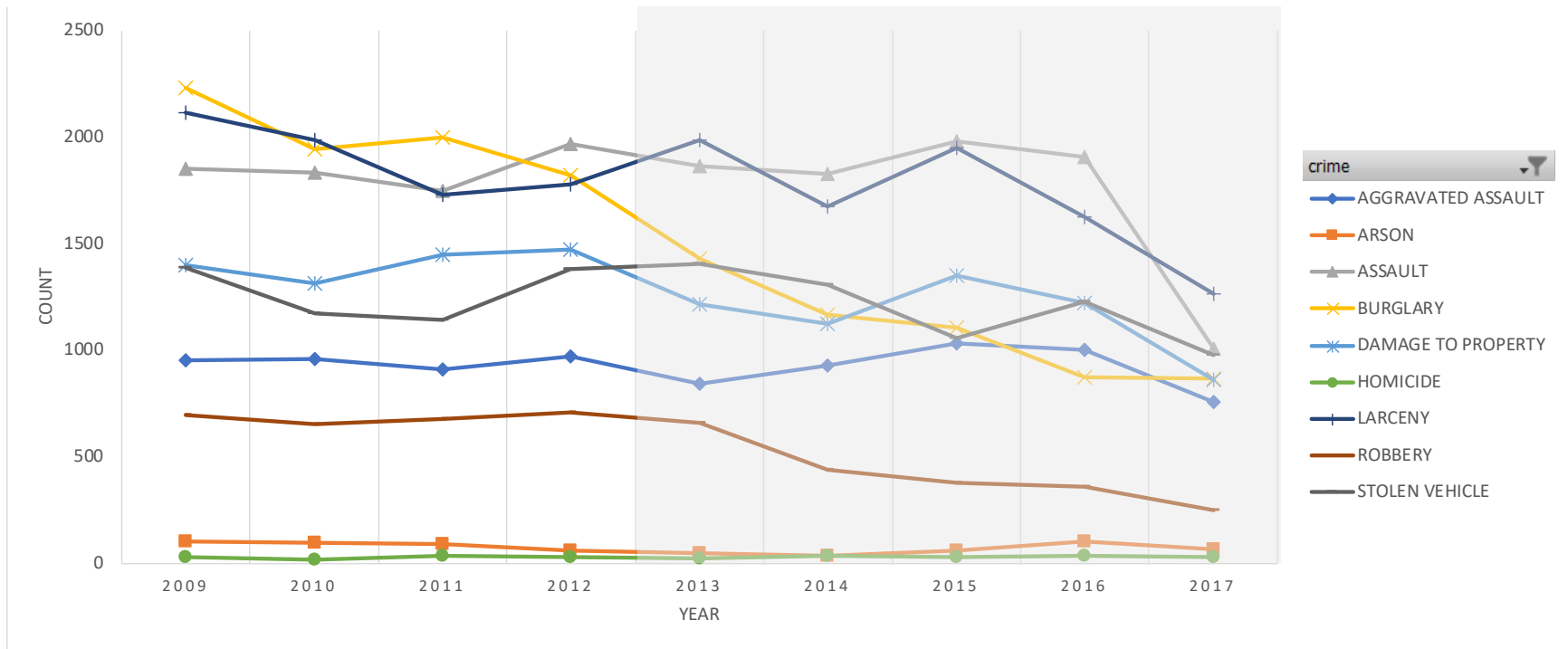


Figure 4. Crime trend lines for Precinct 12.

Notes: AMUS intervention period includes the time period within the shaded area. The reader should use caution when interpreting 2017 data since these specific crime rates do not include the month of December.

Table 5		Precinct 5									
Year	AGGRAVATED ASSAULT	ARSON	ASSAULT	BURGLARY	DAMAGE TO PROPERTY	HOMICIDE	LARCENY	ROBBERY	STOLEN VEHICLE	Grand Total	
2009	784	85	1453	1527	953	29	1446	477	1085	7839	
2010	809	95	1405	1394	876	12	1335	340	1077	7343	
2011	682	93	1256	1247	823	33	1141	307	771	6353	
2012	723	58	1294	1245	961	37	1227	313	922	6780	
2013	615	56	1132	1006	740	29	1371	323	903	6175	
2014	716	51	1200	861	775	20	1077	316	712	5728	
	16.4%	-8.9%	6.0%	-14.4%	4.7%	-31.0%	-21.4%	-2.2%	-21.2%	-7.2%	
2015	700	71	1318	734	672	12	1097	240	575	5419	
	13.8%	26.8%	16.4%	-27.0%	-9.2%	-58.6%	-20.0%	-25.7%	-36.3%	-12.2%	
2016	684	81	1263	868	681	20	999	203	561	5360	
	11.2%	44.6%	11.6%	-13.7%	-8.0%	-31.0%	-27.1%	-37.2%	-37.9%	-13.2%	
2017	565	61	771	645	622	12	881	148	453	4158	
	-8.1%	8.9%	-31.9%	-35.9%	-15.9%	-58.6%	-35.7%	-54.2%	-49.8%	-32.7%	
Grand Total	6278	651	11092	9527	7103	204	10574	2667	7059	55155	

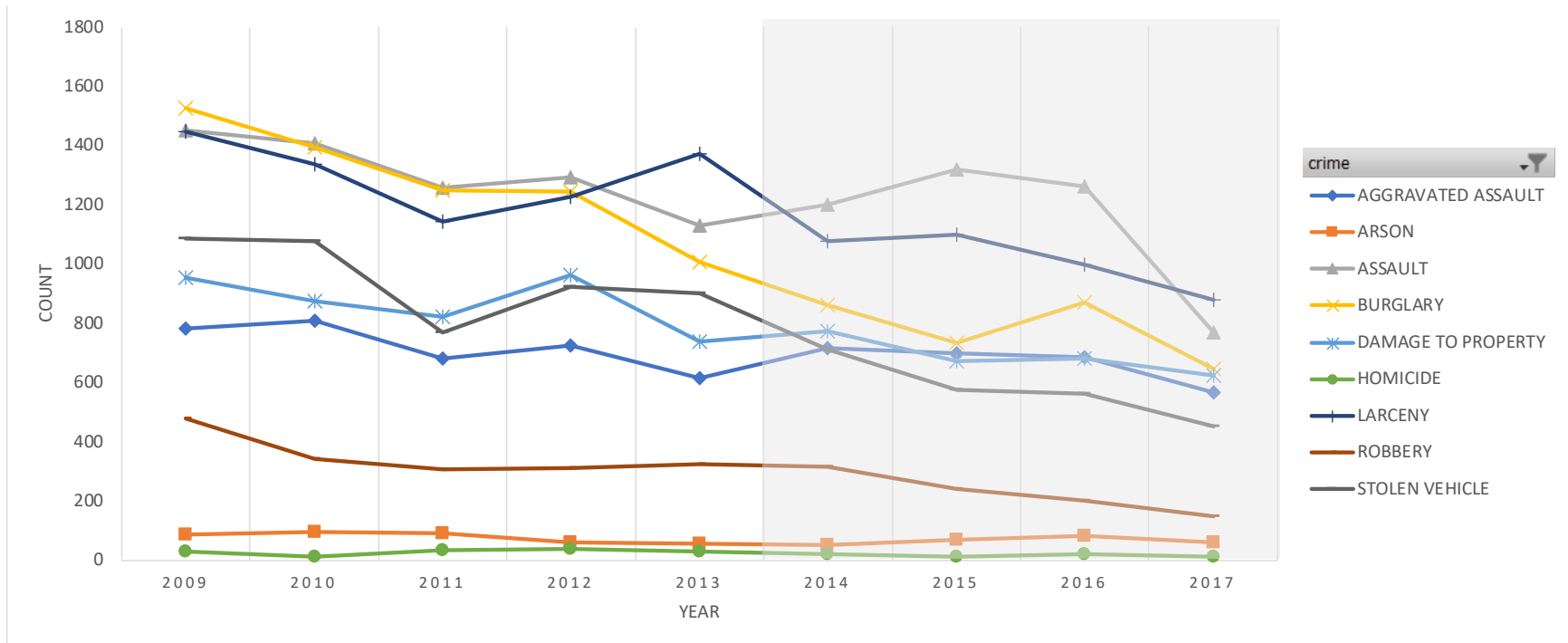


Figure 5. Crime trend lines for Precinct 5.

Notes: AMUS intervention period includes the time period within the shaded area. The reader should use caution when interpreting 2017 data since these specific crime rates do not include the month of December.

Table 6		Precinct 6									
Year	AGGRAVATED ASSAULT	ARSON	ASSAULT	BURGLARY	DAMAGE TO PROPERTY	HOMICIDE	LARCENY	ROBBERY	STOLEN VEHICLE	Grand Total	
2009	1158	120	2185	2578	1435	47	1282	593	1322	10720	
2010	1020	133	2080	2137	1359	34	1299	482	1105	9649	
2011	951	92	1786	2243	1254	18	1139	394	1128	9005	
2012	972	66	2046	1944	1279	35	1362	475	1196	9375	
2013	903	73	2118	1453	1093	33	1403	466	1133	8675	
2014	926	81	2235	1288	1081	39	1196	358	918	8122	
	2.5%	11.0%	5.5%	-11.4%	-1.1%	18.2%	-14.8%	-23.2%	-19.0%	-6.4%	
2015	827	109	2280	1059	1015	38	1149	327	688	7492	
	-8.4%	49.3%	7.6%	-27.1%	-7.1%	15.2%	-18.1%	-29.8%	-39.3%	-13.6%	
2016	920	121	2204	1063	1075	26	1101	260	706	7476	
	1.9%	65.8%	4.1%	-26.8%	-1.6%	-21.2%	-21.5%	-44.2%	-37.7%	-13.8%	
2017	895	79	1300	869	999	18	937	192	599	5888	
	-0.9%	8.2%	-38.6%	-40.2%	-8.6%	-45.5%	-33.2%	-58.8%	-47.1%	-32.1%	
Grand Total	8572	874	18234	14634	10590	288	10868	3547	8795	76402	

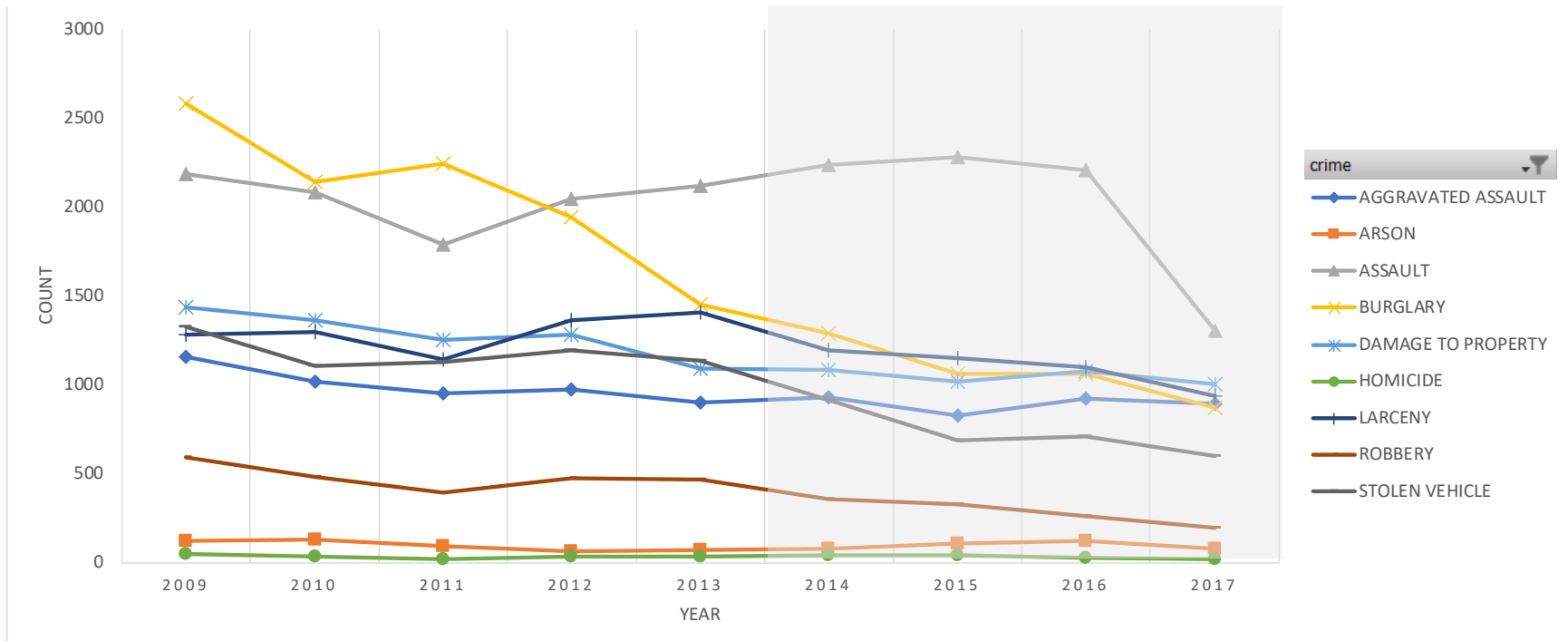


Figure 6. Crime trend lines for Precinct 6.

Notes: AMUS intervention period includes the time period within the shaded area. The reader should use caution when interpreting 2017 data since these specific crime rates do not include the month of December.

Table 7										
Precinct 8										
Year	AGGRAVATED ASSAULT	ARSON	ASSAULT	BURGLARY	DAMAGE TO PROPERTY	HOMICIDE	LARCENY	ROBBERY	STOLEN VEHICLE	Grand Total
2009	1115	101	2084	2759	1655	30	2168	711	1730	12353
2010	1069	112	2160	2282	1552	31	2045	598	1466	11315
2011	1002	84	1922	2362	1355	28	1714	599	1527	10593
2012	949	58	1980	2111	1421	39	1829	652	1529	10568
2013	990	54	2025	1860	1385	37	2015	704	1524	10594
2014	1067	61	2143	1414	1258	30	1761	484	1429	9647
2015	1031	90	2160	1411	1250	30	1868	428	1121	9389
2016	890	92	2333	1174	1355	44	1615	290	1226	9019
	-13.7%	2.2%	8.0%	-16.8%	8.4%	46.7%	-13.5%	-32.2%	9.4%	-3.9%
2017	950	93	1303	1273	1137	24	1399	257	1040	7476
	-7.9%	3.3%	-39.7%	-9.8%	-9.0%	-20.0%	-25.1%	-40.0%	-7.2%	-20.4%
Grand Total	9063	745	18110	16646	12368	293	16414	4723	12592	90954

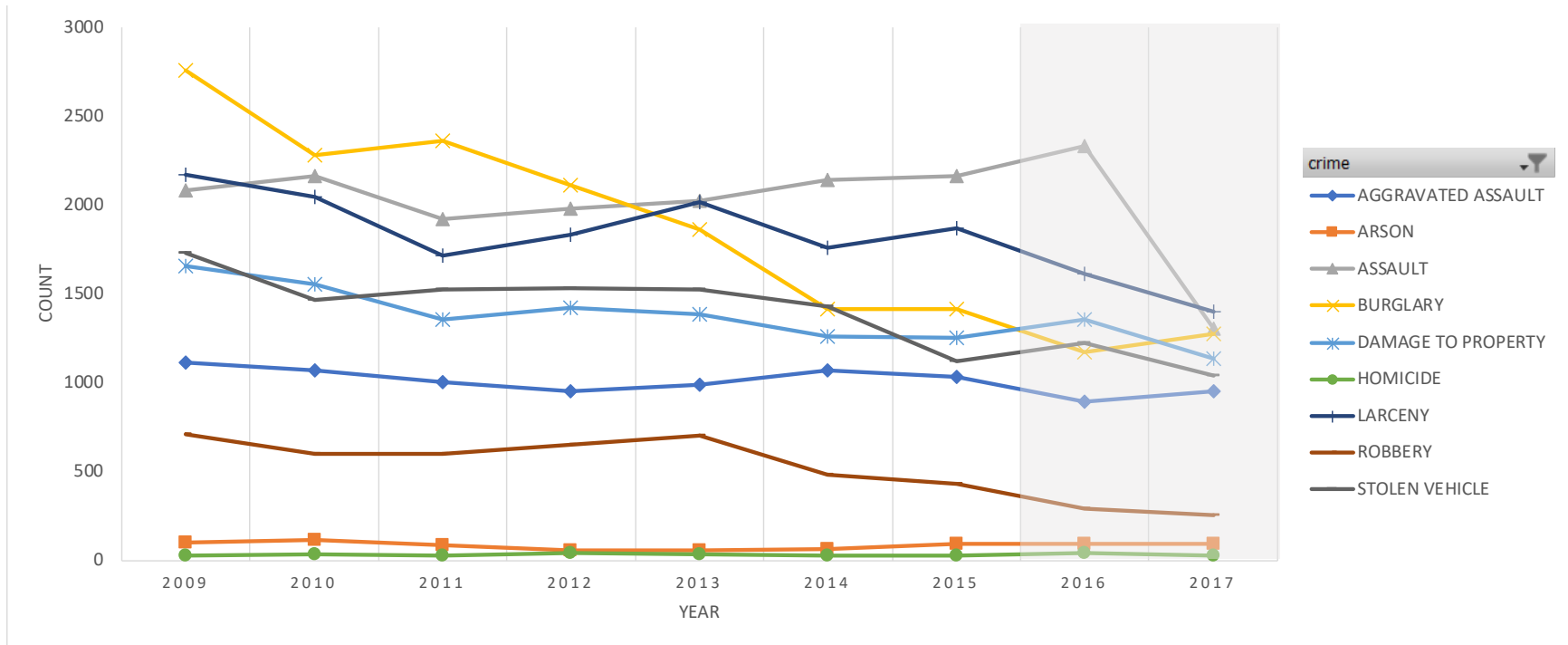


Figure 7. Crime trend lines for Precinct 8.

Notes: AMUS intervention period includes the time period within the shaded area. The reader should use caution when interpreting 2017 data since these specific crime rates do not include the month of December.

Table 8		Precinct 10								
Year	AGGRAVATED ASSAULT	ARSON	ASSAULT	BURGLARY	DAMAGE TO PROPERTY	HOMICIDE	LARCENY	ROBBERY	STOLEN VEHICLE	Grand Total
2009	1109	97	2029	1501	1205	47	1399	726	1061	9174
2010	981	80	1786	1454	1237	30	1317	619	889	8393
2011	909	95	1607	1413	1101	27	1266	561	818	7797
2012	905	53	1696	1030	1108	46	1373	525	1064	7800
2013	761	66	1688	1110	978	24	1214	527	830	7198
2014	786	62	1545	842	830	34	1017	413	741	6270
2015	657	71	1646	692	882	19	1133	294	621	6015
2016	693	69	1553	621	807	25	1050	248	575	5641
	5.5%	-2.8%	-5.7%	-10.3%	-8.5%	31.6%	-7.3%	-15.6%	-7.4%	-6.2%
2017	629	80	1008	466	775	18	903	200	621	4700
	-4.3%	12.7%	-38.8%	-32.7%	-12.1%	-5.3%	-20.3%	-32.0%	0.0%	-21.9%
Grand Total	7430	673	14558	9129	8923	270	10672	4113	7220	62988

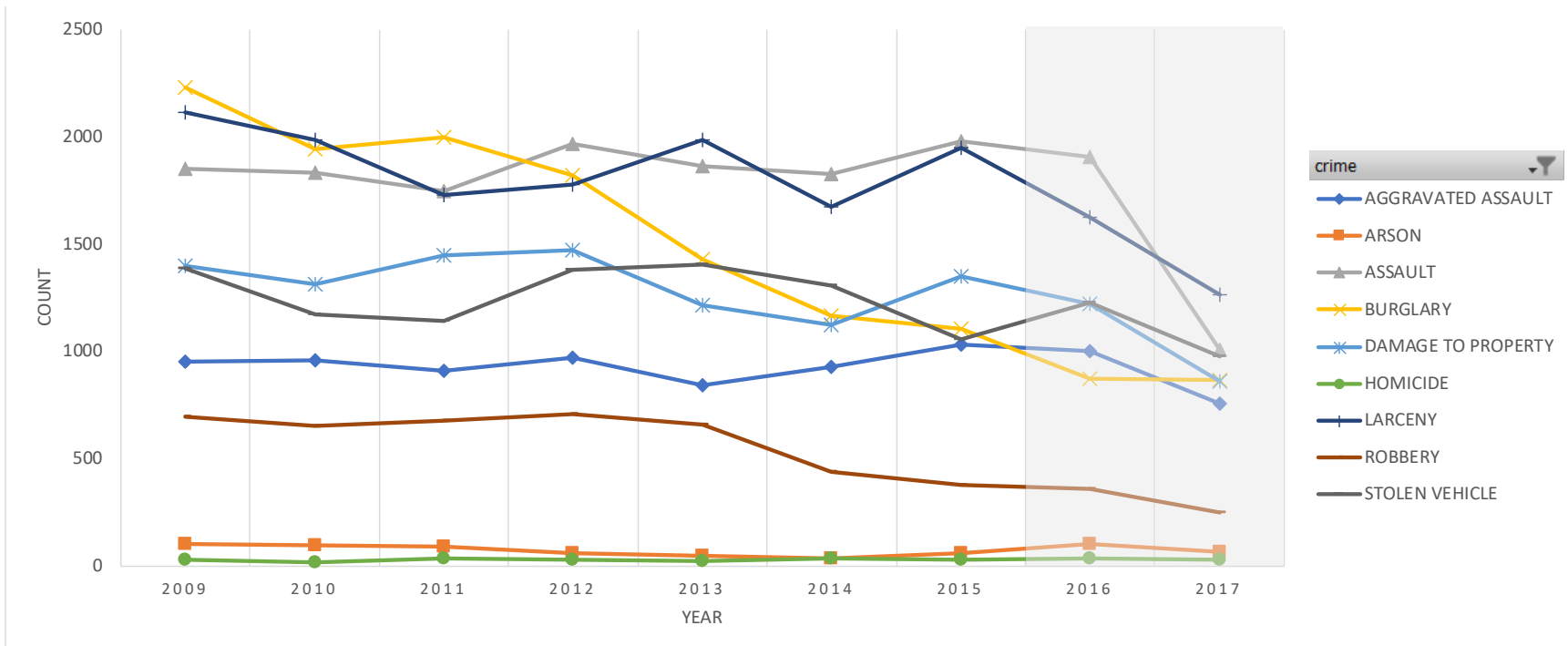


Figure 8. Crime trend lines for Precinct 10.

Notes: AMUS intervention period includes the time period within the shaded area. The reader should use caution when interpreting 2017 data since these specific crime rates do not include the month of December.

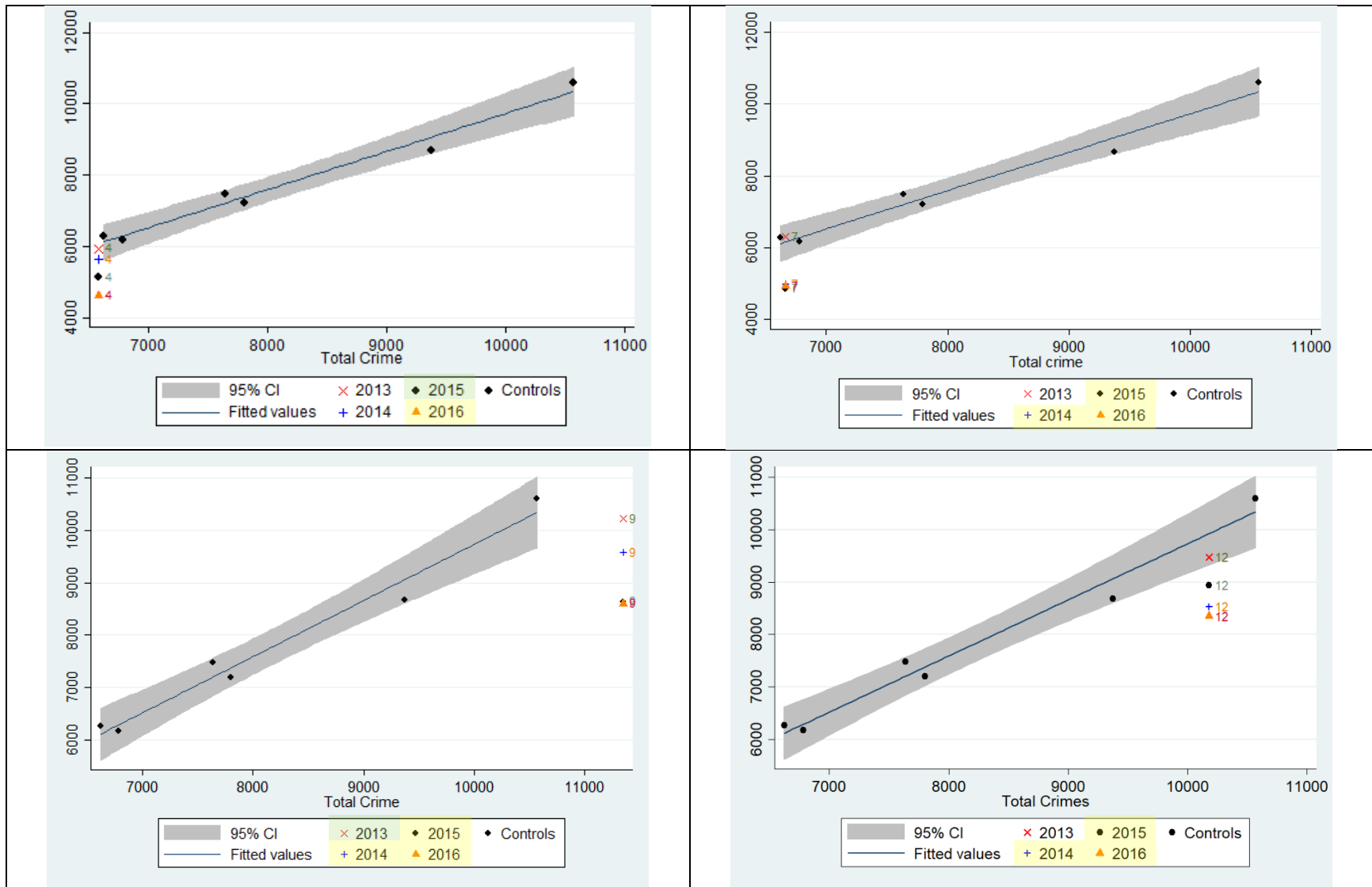


Figure 9. Assessment of program impact for precincts provided AMUS beginning in 2013.

Note: The x-axis contains pretest crime totals, while the y-axis provides crime totals for a given year as indicated in the figure legend. Years highlighted yellow are statistically significant at $p < .05$. Years highlighted green are marginally significant with $p < .10$.

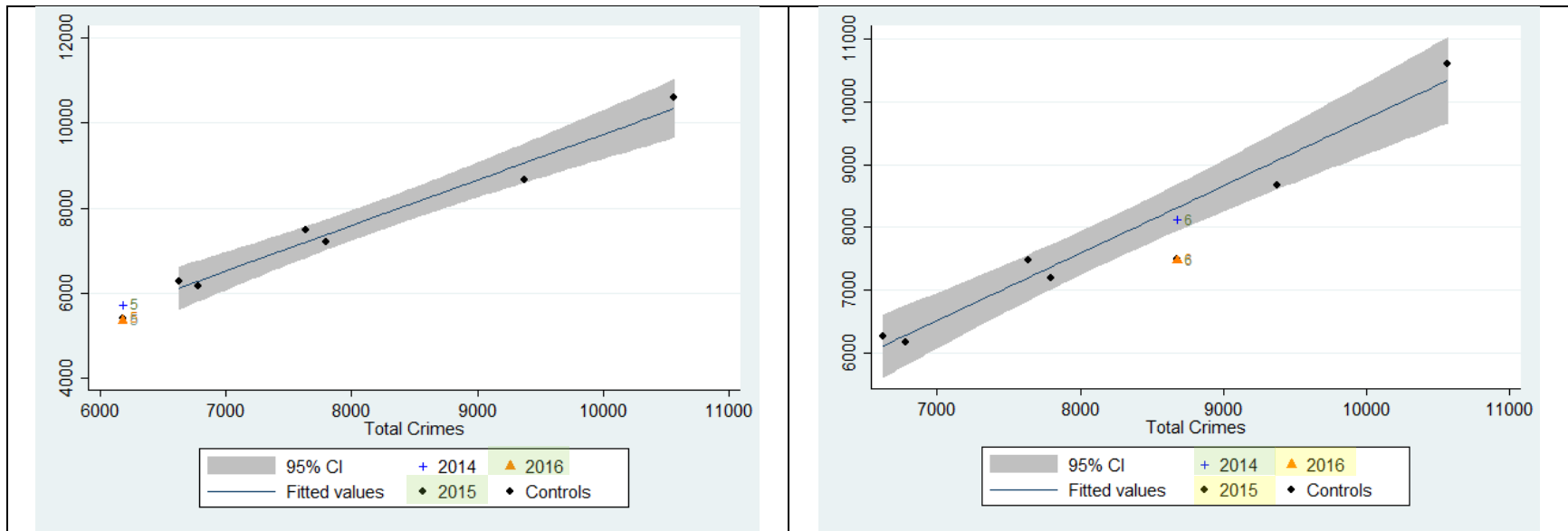


Figure 10. Assessment of program impact for precincts provided AMUS beginning in 2014.

Note: The x-axis contains pretest crime totals, while the y-axis provides crime totals for a given year as indicated in the figure legend. Years highlighted yellow are statistically significant at $p < .05$. Years highlighted green are marginally significant with $p < .10$.

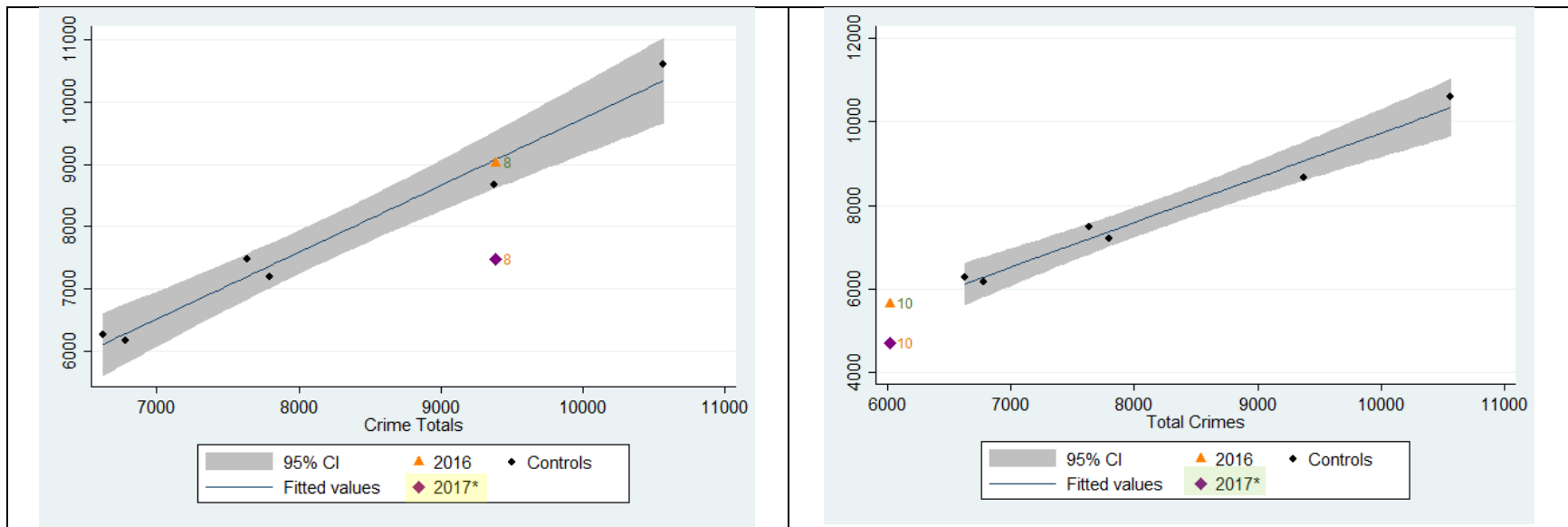


Figure 11. Assessment of program impact for precincts provided AMUS beginning in 2016.

Note: The x-axis contains pretest crime totals, while the y-axis provides crime totals for a given year as indicated in the figure legend. Years highlighted yellow are statistically significant at $p < .05$. Years highlighted green are marginally significant with $p < .10$.

*Data for 2017 does not include crime counts for December.

Appendix A: Comparison of treatment and control area characteristics

Precinct and year of AMUS implementation									
	2013				2014		2016		
Variable	4	7	9	12	5	6	8	10	Control
Average number of families	14587	7362	15150	17878	11638	14439	20745	10618	13399
Percent in poverty	40.1*	38.1*	36.7	26.2*	39.3*	40.7*	28.9*	39.5*	35.9
Percent vacant homes	24.5*	24.1*	33.0	25.3*	32.3	29.6*	22.0*	46.7*	32.3
Percent less than high school education	44.3*	20.3	19.9*	14.2*	21.2	20.8	15.3*	24.2*	21.1
Percent African American	80.9*	86.9*	92.3*	92.8*	87.9	78.2*	92.3*	93.7*	88.3

Appendix B: Crime Costs by Precinct and Year

Precinct 4

Crime	Year							Total		
	2009	2010	2011	2012	2013	2014	2015		2016	2017
AGGRAVATED ASSAULT					\$ (7,179,290)	\$ (4,668,080)	\$ (4,945,878)	\$ (9,986,424)	\$ (8,669,535)	\$ (35,449,207)
ARSON					\$ (433,827)	\$ 943,492	\$ 69,693	\$ (688,168)	\$ (505,742)	\$ (614,552)
ASSAULT					\$ (1,499,652)	\$ (229,005)	\$ 1,063,428	\$ (787,159)	\$ (8,707,705)	\$ (10,160,093)
BURGLARY					\$ (936,928)	\$ (1,197,990)	\$ (1,330,318)	\$ 58,135	\$ (560,498)	\$ (3,967,600)
DAMAGE TO PROPERTY					\$ (941,361)	\$ (90,100)	\$ 230,050	\$ (404,434)	\$ (454,825)	\$ (1,660,670)
LARCENY					\$ 355,446	\$ (670,248)	\$ 58,320	\$ (516,346)	\$ (1,048,069)	\$ (1,820,897)
ROBBERY					\$ (6,958,408)	\$ 92,276	\$ (3,167,236)	\$ (47,577)	\$ (3,959,398)	\$ (14,040,344)
STOLEN VEHICLE					\$ (1,270,395)	\$ 1,057,230	\$ (3,984,624)	\$ (1,817,014)	\$ 774,503	\$ (5,240,301)
Grand Total										\$ (72,953,663)

Precinct 7

Crime	Year							Total		
	2009	2010	2011	2012	2013	2014	2015		2016	2017
AGGRAVATED ASSAULT					\$ (4,516,005)	\$ (466,808)	\$ (4,003,806)	\$ 1,082,865	\$ (7,692,686)	\$ (15,596,440)
ARSON					\$ (388,161)	\$ 253,132	\$ 23,231	\$ 735,628	\$ (553,908)	\$ 69,922
ASSAULT					\$ (1,499,652)	\$ (1,450,365)	\$ 77,060	\$ 802,902	\$ (7,078,006)	\$ (9,148,061)
BURGLARY					\$ (76,912)	\$ (1,585,575)	\$ (341,472)	\$ (159,870)	\$ 486,748	\$ (1,677,081)
DAMAGE TO PROPERTY					\$ (872,994)	\$ (704,900)	\$ 299,600	\$ 65,584	\$ (759,890)	\$ (1,972,600)
LARCENY					\$ 309,582	\$ (2,288,088)	\$ 353,808	\$ 43,691	\$ (1,156,907)	\$ (2,737,914)
ROBBERY					\$ (640,906)	\$ (4,475,386)	\$ (652,078)	\$ (1,760,366)	\$ (482,853)	\$ (8,011,590)
STOLEN VEHICLE					\$ (1,095,570)	\$ (2,126,207)	\$ (2,265,069)	\$ 266,495	\$ (774,503)	\$ (5,994,853)
Grand Total										\$ (45,068,617)

Precinct 9

Crime	Year							Total		
	2009	2010	2011	2012	2013	2014	2015		2016	2017
AGGRAVATED ASSAULT					\$ (5,210,775)	\$ 15,404,664	\$ (4,592,601)	\$ 11,550,562	\$(17,094,858)	\$ 56,992
ARSON					\$ (205,497)	\$ 276,144	\$ 1,022,164	\$ 450,869	\$ (313,078)	\$ 1,230,601
ASSAULT					\$ (2,317,644)	\$ 2,122,113	\$ (3,082,400)	\$ (1,369,657)	\$(11,711,464)	\$ (16,359,051)
BURGLARY					\$ (2,496,144)	\$ (1,472,823)	\$ (2,681,978)	\$ 94,469	\$ (1,128,371)	\$ (7,684,848)
DAMAGE TO PROPERTY					\$ (1,693,398)	\$ 10,600	\$ (716,900)	\$ 595,720	\$ (992,849)	\$ (2,796,827)
LARCENY					\$ (152,880)	\$ (1,255,752)	\$ 291,600	\$ 3,972	\$ (878,766)	\$ (1,991,826)
ROBBERY					\$ (4,440,563)	\$ 2,537,590	\$ (3,400,121)	\$ (3,568,310)	\$ (4,490,537)	\$ (13,361,941)
STOLEN VEHICLE					\$ (1,107,225)	\$ (5,368,379)	\$ (2,656,416)	\$ (1,417,271)	\$ (934,320)	\$ (11,483,612)
Grand Total										\$ (52,390,511)

Precinct 12

Crime	Year							Total		
	2009	2010	2011	2012	2013	2014	2015		2016	2017
AGGRAVATED ASSAULT					\$(14,937,555)	\$ 9,802,968	\$ 12,246,936	\$ (3,729,869)	\$(30,038,108)	\$ (26,655,628)
ARSON					\$ (182,664)	\$ (322,168)	\$ 604,006	\$ 972,927	\$ (842,903)	\$ 229,198
ASSAULT					\$ (1,590,540)	\$ (488,544)	\$ 2,311,800	\$ (1,133,509)	\$(14,347,742)	\$ (15,248,534)
BURGLARY					\$ (2,747,856)	\$ (1,846,314)	\$ (426,840)	\$ (1,678,636)	\$ (44,250)	\$ (6,743,896)
DAMAGE TO PROPERTY					\$ (1,335,786)	\$ (492,900)	\$ 1,214,450	\$ (710,492)	\$ (1,991,245)	\$ (3,315,973)
LARCENY					\$ 787,332	\$ (1,190,268)	\$ 1,053,648	\$ (1,286,893)	\$ (1,451,173)	\$ (2,087,354)
ROBBERY					\$ (2,243,171)	\$(10,150,360)	\$ (2,748,043)	\$ (951,549)	\$ (5,214,817)	\$ (21,307,941)
STOLEN VEHICLE					\$ 303,030	\$ (1,198,194)	\$ (2,917,314)	\$ 2,071,396	\$ (3,073,423)	\$ (4,814,504)
Grand Total										\$ (79,944,632)

Precinct 5

Crime	Year							Total	
	2009	2010	2011	2012	2013	2014	2015		2016
AGGRAVATED ASSAULT					\$ 11,786,902	\$ (1,884,144)	\$ (1,925,094)	\$(14,530,630)	\$ (6,552,965)
ARSON					\$ (115,060)	\$ 464,620	\$ 237,299	\$ (481,659)	\$ 105,200
ASSAULT					\$ 1,038,156	\$ 1,818,616	\$ (865,875)	\$ (7,860,901)	\$ (5,870,004)
BURGLARY					\$ (1,021,815)	\$ (903,478)	\$ 973,754	\$ (1,644,620)	\$ (2,596,159)
DAMAGE TO PROPERTY					\$ 185,500	\$ (551,050)	\$ 49,188	\$ (327,252)	\$ (643,614)
LARCENY					\$ (1,132,488)	\$ 77,760	\$ (389,246)	\$ (475,662)	\$ (1,919,636)
ROBBERY					\$ (322,966)	\$ (3,539,852)	\$ (1,760,366)	\$ (2,655,694)	\$ (8,278,878)
STOLEN VEHICLE					\$ (2,243,677)	\$ (1,624,683)	\$ (169,588)	\$ (1,327,719)	\$ (5,365,667)
Grand Total									\$ (31,121,721)

Precinct 6

Crime	Year							Total	
	2009	2010	2011	2012	2013	2014	2015		2016
AGGRAVATED ASSAULT					\$ 2,684,146	\$(11,658,141)	\$ 11,189,607	\$ (3,052,653)	\$ (837,041)
ARSON					\$ 184,096	\$ 650,468	\$ 284,759	\$ (1,011,484)	\$ 107,840
ASSAULT					\$ 1,786,239	\$ 693,540	\$ (1,196,482)	\$(14,443,606)	\$ (13,160,309)
BURGLARY					\$ (1,162,755)	\$ (1,629,106)	\$ 29,067	\$ (1,430,745)	\$ (4,193,539)
DAMAGE TO PROPERTY					\$ (63,600)	\$ (353,100)	\$ 327,919	\$ (421,545)	\$ (510,326)
LARCENY					\$ (797,364)	\$ (182,736)	\$ (190,651)	\$ (661,090)	\$ (1,831,841)
ROBBERY					\$ (4,982,904)	\$ (1,443,887)	\$ (3,187,690)	\$ (3,283,403)	\$ (12,897,885)
STOLEN VEHICLE					\$ (2,525,605)	\$ (2,727,570)	\$ 218,042	\$ (1,315,425)	\$ (6,350,558)
Grand Total									\$ (39,673,658)

Precinct 8

Crime	Year									
	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
AGGRAVATED ASSAULT								\$ (16,964,888)	\$ 7,326,368	\$ (9,638,520)
ARSON								\$ 47,460	\$ 24,083	\$ 71,543
ASSAULT								\$ 2,723,570	\$ (16,456,764)	\$ (13,733,194)
BURGLARY								\$ (1,722,237)	\$ 730,123	\$ (992,114)
DAMAGE TO PROPERTY								\$ 573,859	\$ (1,209,168)	\$ (635,309)
LARCENY								\$ (1,004,889)	\$ (870,704)	\$ (1,875,593)
ROBBERY								\$ (6,565,690)	\$ (1,593,416)	\$ (8,159,106)
STOLEN VEHICLE								\$ 1,271,910	\$ (2,286,626)	\$ (1,014,716)
Grand Total										\$ (35,977,010)

Precinct 10

Crime	Year									
	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
AGGRAVATED ASSAULT								\$ 4,331,461	\$ (7,814,792)	\$ (3,483,332)
ARSON								\$ (47,460)	\$ 264,912	\$ 217,452
ASSAULT								\$ (1,464,116)	\$ (8,707,705)	\$ (10,171,821)
BURGLARY								\$ (515,944)	\$ (1,143,121)	\$ (1,659,066)
DAMAGE TO PROPERTY								\$ (409,899)	\$ (177,493)	\$ (587,392)
LARCENY								\$ (329,667)	\$ (592,562)	\$ (922,229)
ROBBERY								\$ (2,188,563)	\$ (2,317,697)	\$ (4,506,260)
STOLEN VEHICLE								\$ (557,218)	\$ 565,510	\$ 8,292
Grand Total										\$ (21,104,354)