

Data Analysis Report

Police

Hayden, Idaho



POLICE OPERATIONS

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I C M A C O N S U L T I N G S E R V I C E S

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Leaders at the Core of Better Communities

ICMA Background

The International City/County Management Association (ICMA) is the premier local government leadership and management organization. Since 1914, ICMA's mission has been to create excellence in local governance by developing and advocating professional local government management worldwide. ICMA provides an information clearinghouse, technical assistance, training, and professional development to more than 9,000 city, town, and county experts and other individuals throughout the world.

ICMA Consulting Services

The ICMA Consulting Services team helps communities solve critical problems by providing management consulting support to local governments. One of ICMA Consulting Services' areas of expertise is public safety services, which encompasses the following areas and beyond: organizational development, leadership and ethics, training, assessment of calls for service workload, staffing requirements analysis, designing standards and hiring guidelines for police and fire chief recruitment, police/fire consolidation, community-oriented policing, and city/county/regional mergers.

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I. Introduction

This is the preliminary report on police operations managed by the Kootenai County sheriff's office for Hayden, Idaho, conducted by ICMA Consulting Services. This report focuses its analysis on three main areas: workload, deployment, and response times. These three areas are almost exclusively related to patrol operations, which constitute a significant portion of the sheriff's office's personnel committed to Hayden.

All information in this preliminary report was developed directly from data recorded in the county's dispatch center. The purposes of this report are to provide the city with our preliminary findings and to allow the sheriff's office to review and bring to our attention any dispatch information that may be inconsistent with other internal records of the agency.

The first section of the report, concluding with Table 8, uses the call and activity data for the entire year. For the detailed workload analysis and the response-time analysis, we used two eight-week sample periods. The first period was the months of January and February (January 5, 2008, to February 29, 2008), or *winter*, and the second period was the months of July and August (July 6, 2008, to August 30, 2008), or *summer*.

We make no recommendations in this preliminary report; our purpose here is to share information that we have developed from the source data to confirm its accuracy.

II. Workload Analysis

Data management and accuracy are crucial and always need to be reviewed with regular systems. As we have experienced in similar cases around the country, we encountered a number of issues when analyzing the data supplied by the sheriff's office. We made assumptions and decisions to address them. We describe these issues, assumptions, and decisions below.

- A small but significant percentage of calls (10.6 percent) involving patrol units had zero time on-scene.
- The computer software generated a large number of call codes. This led to 159 different call descriptions, which we reduced to 14 categories for our tables and 9 categories for our figures.
- In addition, 308 calls (5.9 percent) had no call descriptions. We categorized these calls as *missing*.
- A large proportion of calls (21 percent, or approximately 1,092 calls for the year) were missing arrival times. For these, we could not calculate a valid response time or on-scene time.
- The database does not assign priorities to calls. This prevented us from comparing general response times against response times for high-priority calls.
- There were records for instances in which a unit arrived without ever being dispatched. When possible, we used the time that a unit radioed as *en route* in lieu of dispatch times. However, there were still situations in which neither was available or dispatch times were actually after the initial arrival time.
- In many situations, the database recorded multiple dispatches, multiple arrivals, or multiple clear times for the same unit. This points to a problem with either the recording process or an unusual dispatching practice. We used the earliest dispatch, earliest arrival, and latest clear time in our calculations.

Our study team has often worked with many of these problems with call-for-service data in previous studies. To identify calls that were canceled en

route, we assumed zero time on-scene to account for a significant portion of them. Any call with an on-scene time of less than 30 seconds was labeled *zero on-scene*. We also used the information stored within the dispatch records' source field to distinguish between patrol-initiated and other-initiated calls.

Before describing the workload analysis, we briefly review the data received. In the period from September 1, 2007, to August 30, 2008, there were approximately 6,200 calls for service (with accompanying unit information). Of the total, approximately 5,200 included a patrol unit as either the primary responder or a secondary unit. When focusing on our eight-week periods, we analyzed 747 (patrol-related) calls in winter 2008 and 972 calls in summer 2008. In addition, when analyzing workloads and response times, we ignored calls with incorrect or missing time data. The inaccuracies included elapsed times that either were negative or exceeded 8 hours. For the entire year, this excluded fewer than 110 calls (2.1 percent) from our analysis.

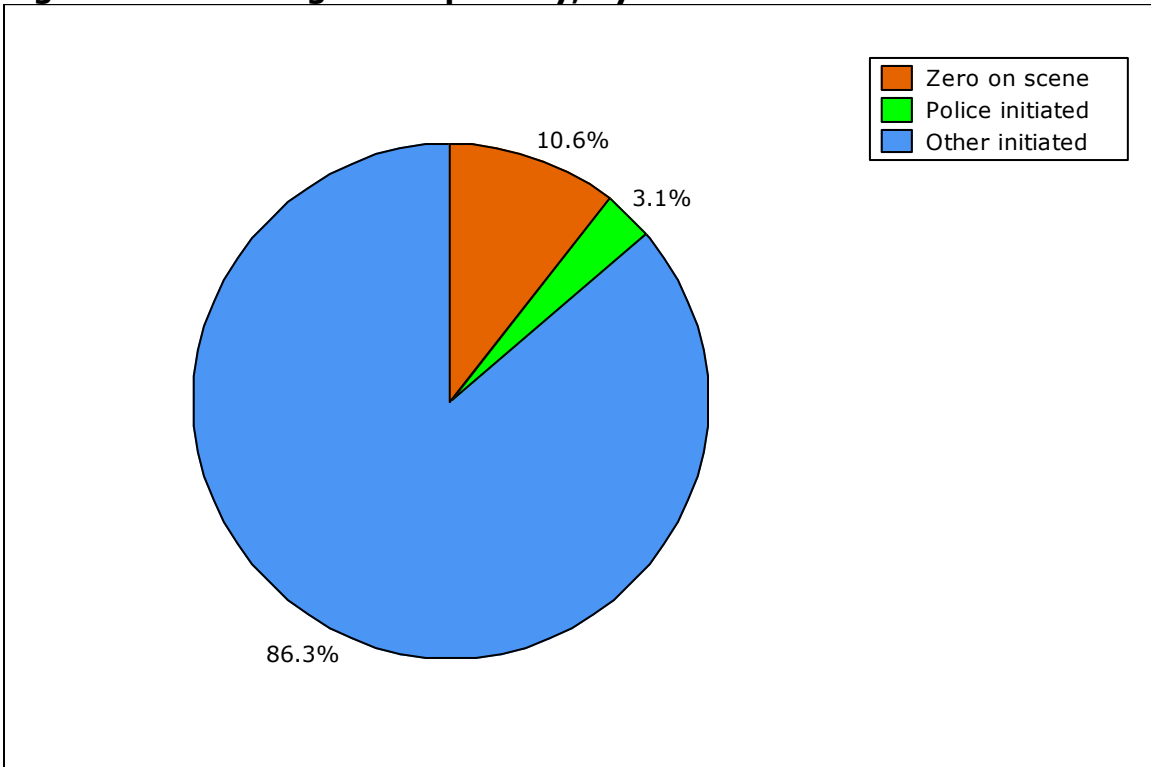
In 2008, the sheriff's office reported 14.2 calls for service per day. As previously mentioned, about 10.6 percent of these calls (1.5 per day) showed no deputy time spent on the call.

In the following pages, we show two types of data: activity and workload. The activity levels are measured by the average number of calls per day, broken down by the type and origin of the calls and categorized by the nature of the calls (e.g., crime, traffic). Workloads are measured in average work-hours per day.

We show our categories chart on the next page. The chart shows that we typically use up to 17 categories for our tables and 10 categories for our charts. Some of these categories were not used in this specific analysis because no data was available, leaving us with 14 categories for tables and 9 for charts. They are *italicized*.

Table Categories	Figure Categories
Accidents	Traffic
Traffic enforcement	
Alarm	Investigations
Check/investigation	
Animal calls	General noncriminal
Miscellaneous	
Assist other agency	Assist other agency
Crime—persons	Crime
Crime—property	
Directed patrol	Directed patrol
Disturbance	Suspicious incident
Suspicious person/vehicle	
Juvenile	Juvenile
<i>Out of service—administrative</i>	<i>Out of service</i>
<i>Out of service—personal</i>	
Prisoner—arrest	Arrest
<i>Prisoner—transport</i>	

Figure 1. Percentage Calls per Day, by Initiator



Note: Percentages are based on a total of 5,195 calls.

Table 1. Calls per Day, by Initiator

Initiator	Total Calls	Calls Per Day
Zero on-scene	552	1.5
Police-initiated	160	0.4
Other-initiated	4,483	12.3
Total	5,195	14.2

Note: Table excludes 4 calls with missing time data.

Observations:

- About 11 percent of the calls involved zero-on-scene time and are included in these numbers as well as the next figure and table. Later, we will exclude calls with zero-on-scene time.
- The data records include few police-initiated activities: 0.4 per day, or about 3 percent of all activities.
- There was a total of 14.2 calls per day, or 0.6 per hour.

Figure 2. Percentage Calls per Day, by Category

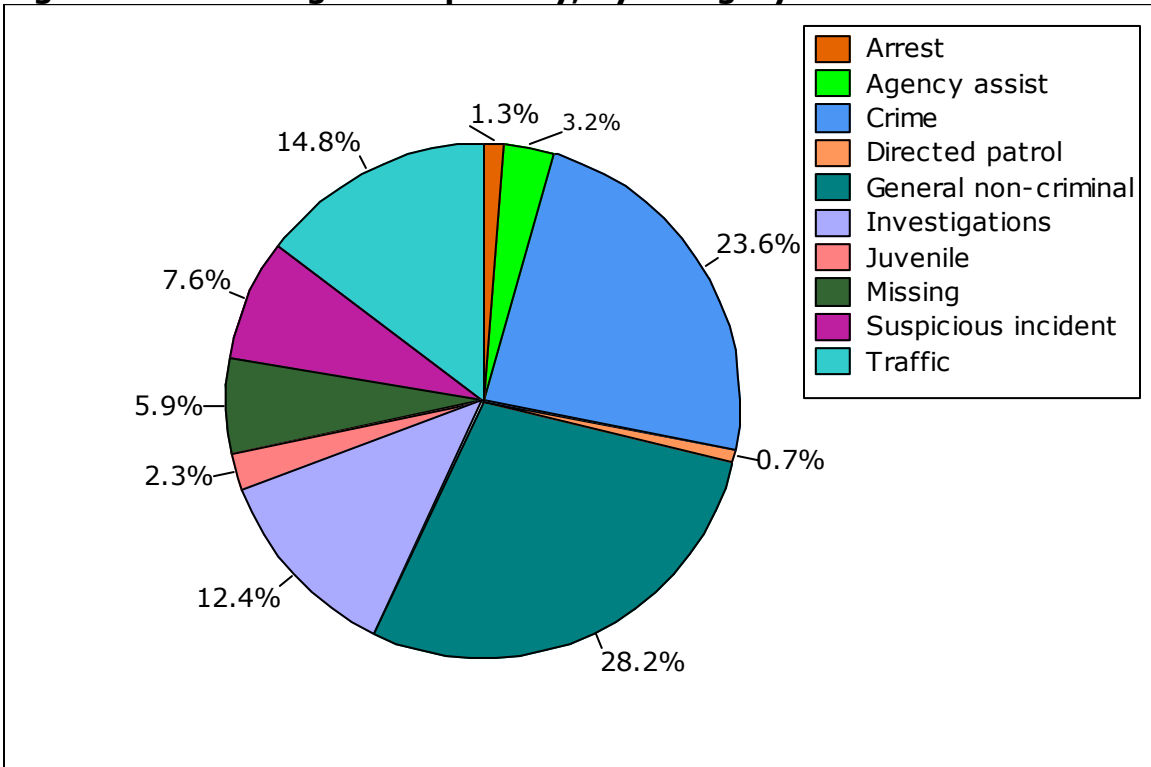


Table 2. Calls per Day, by Category

Category	Total Calls	Calls Per Day
Accidents	222	0.6
Alarm	212	0.6
Animal calls	692	1.9
Assist other agency	166	0.5
Check/investigation	433	1.2
Crime—persons	629	1.7
Crime—property	599	1.6
Directed patrol	36	0.1
Disturbance	159	0.4
Juvenile	117	0.3
Miscellaneous	774	2.1
Missing	308	0.8
Prisoner—arrest	66	0.2
Suspicious person/vehicle	237	0.6
Traffic enforcement	545	1.5
Total	5,195	14.2

Observations:

- Four categories in the figure (general noncriminal, crime, traffic, and investigations) accounted for 79 percent of activities.
- 28 percent of calls were general noncriminal incidents.
- 15 percent of calls were traffic-related.
- 24 percent of calls involved crimes.
- 12 percent were investigations.

Figure 3. Percentage Nonzero Calls per Day, by Category

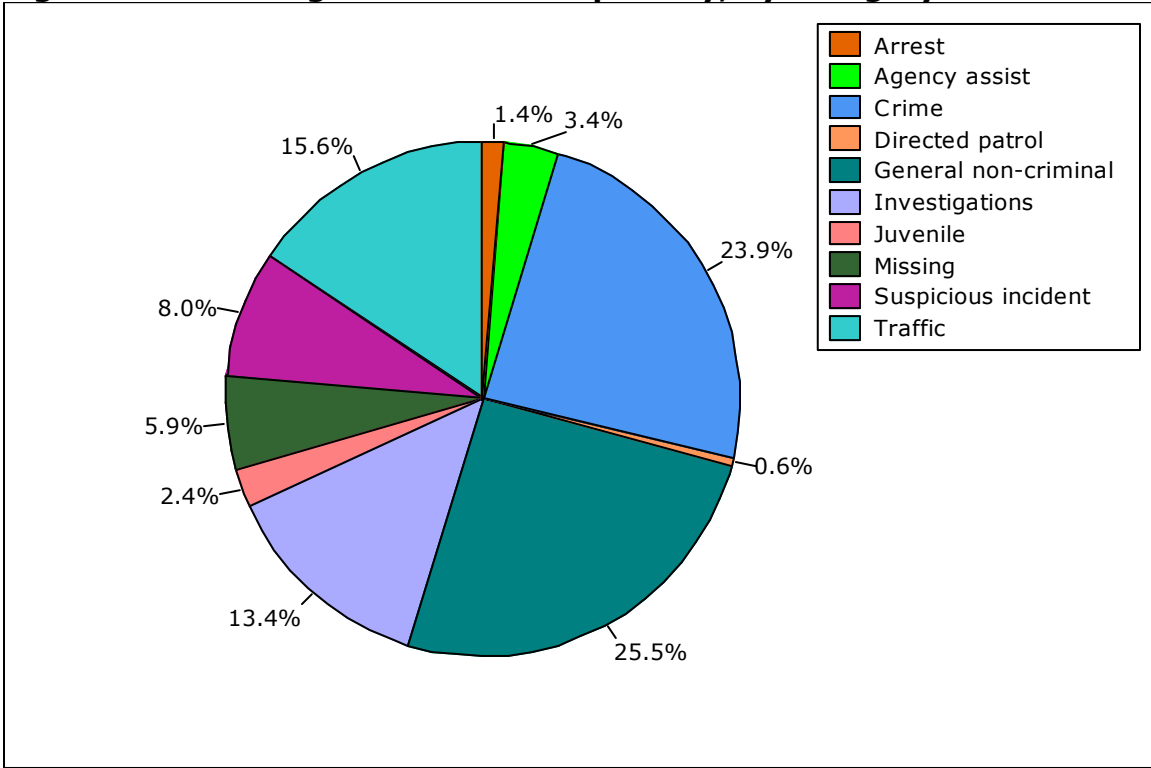


Table 3. Nonzero Calls per Day, by Category

Category	Total Calls	Calls Per Day
Accidents	213	0.6
Alarm	206	0.6
Animal calls	586	1.6
Assist other agency	158	0.4
Check/investigation	416	1.1
Crime—persons	576	1.6
Crime—property	533	1.5
Directed patrol	27	0.1
Disturbance	152	0.4
Juvenile	111	0.3
Miscellaneous	598	1.6
Missing	272	0.7
Prisoner—arrest	63	0.2
Suspicious person/vehicle	221	0.6
Traffic enforcement	511	1.4
Total	4,643	12.7

Observations:

- When zero-on-scene calls were excluded, there were 12.7 calls per day, or 0.5 per hour.
- The same four categories were 78 percent of total calls.
- The percentages assigned to each of these categories changed only slightly.

Figure 4. Calls per Day, by Initiator and Months

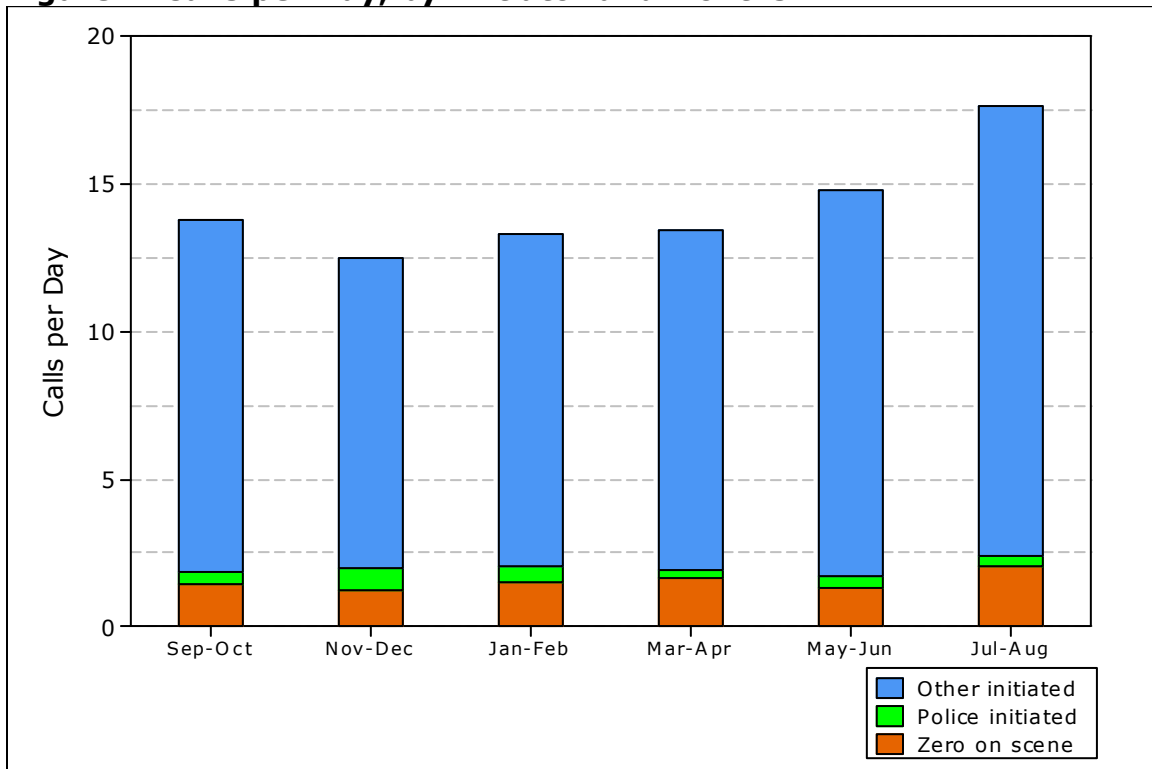


Table 4. Calls per Day, by Initiator and Months

Initiator	Sept.- Oct.	Nov.- Dec.	Jan.- Feb.	March- April	May- June	July- Aug.
Zero on-scene	1.4	1.2	1.5	1.6	1.3	2.0
Police-initiated	0.4	0.7	0.5	0.3	0.4	0.3
Other-initiated	11.9	10.5	11.3	11.6	13.1	15.3
Total	13.8	12.5	13.3	13.4	14.8	17.6

Observations:

- The number of calls was largest from July to August, or summer.
- The number of calls was smallest from November to December.
- The largest months had 41 percent more calls than the smallest months.

Figure 5. Calls per Day, by Category and Months

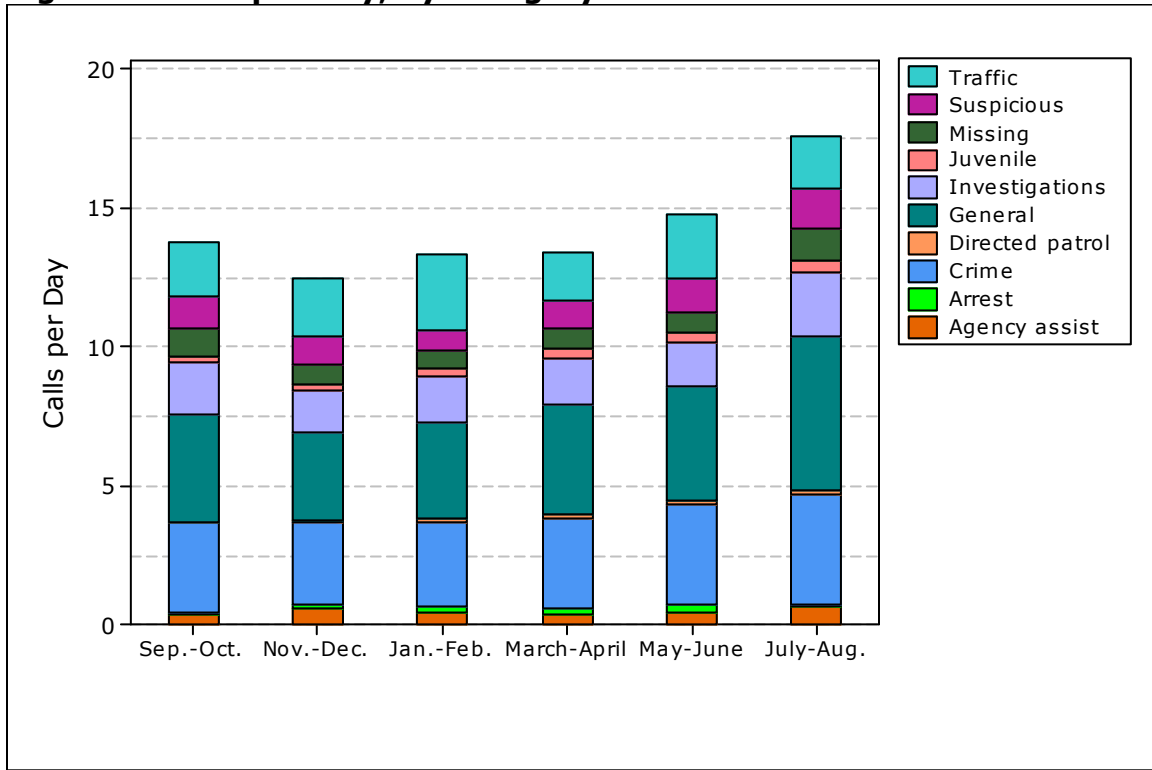


Table 5. Calls per Day, by Category and Months

Category	Sept.-Oct.	Nov.-Dec.	Jan.-Feb.	March-April	May-June	July-Aug.
Accidents	0.6	0.8	0.9	0.3	0.5	0.6
Alarm	0.7	0.5	0.5	0.5	0.5	0.7
Animal calls	1.8	1.3	1.5	2.1	1.8	2.8
Assist other agency	0.4	0.6	0.4	0.3	0.4	0.6
Check/investigation	1.1	1.0	1.1	1.1	1.1	1.6
Crime—persons	1.8	1.5	1.5	1.7	2.0	1.8
Crime—property	1.5	1.4	1.6	1.6	1.6	2.1
Directed patrol	0.0	0.0	0.1	0.1	0.2	0.1
Disturbance	0.5	0.3	0.2	0.3	0.6	0.7
Juvenile	0.2	0.2	0.3	0.4	0.3	0.5
Miscellaneous	2.1	1.9	1.9	1.9	2.2	2.7
Missing	1.0	0.8	0.7	0.8	0.7	1.1
Prisoner—arrest	0.0	0.2	0.2	0.2	0.3	0.1
Suspicious person/vehicle	0.7	0.7	0.5	0.7	0.6	0.7
Traffic enforcement	1.3	1.2	1.8	1.4	1.8	1.3
Total	13.8	12.5	13.3	13.4	14.8	17.6

Observations:

- General noncriminal calls, followed by crimes, were the most common types of calls throughout the year.
- General noncriminal calls averaged between 3.2 and 5.5 per day.
- Crimes averaged between 3 and 4 calls per day. This was between 23 and 25 percent of total calls
- Traffic-related calls (enforcement and accidents) in general averaged between 1.8 and 2.7 per day throughout the year.
- The top two categories (general noncriminal and crime) were between 49 and 54 percent of total calls.
- The top four categories (including investigations and traffic calls) varied between 78 and 82 percent of total calls.

Figure 6. Average Busy Times, by Category and Initiator

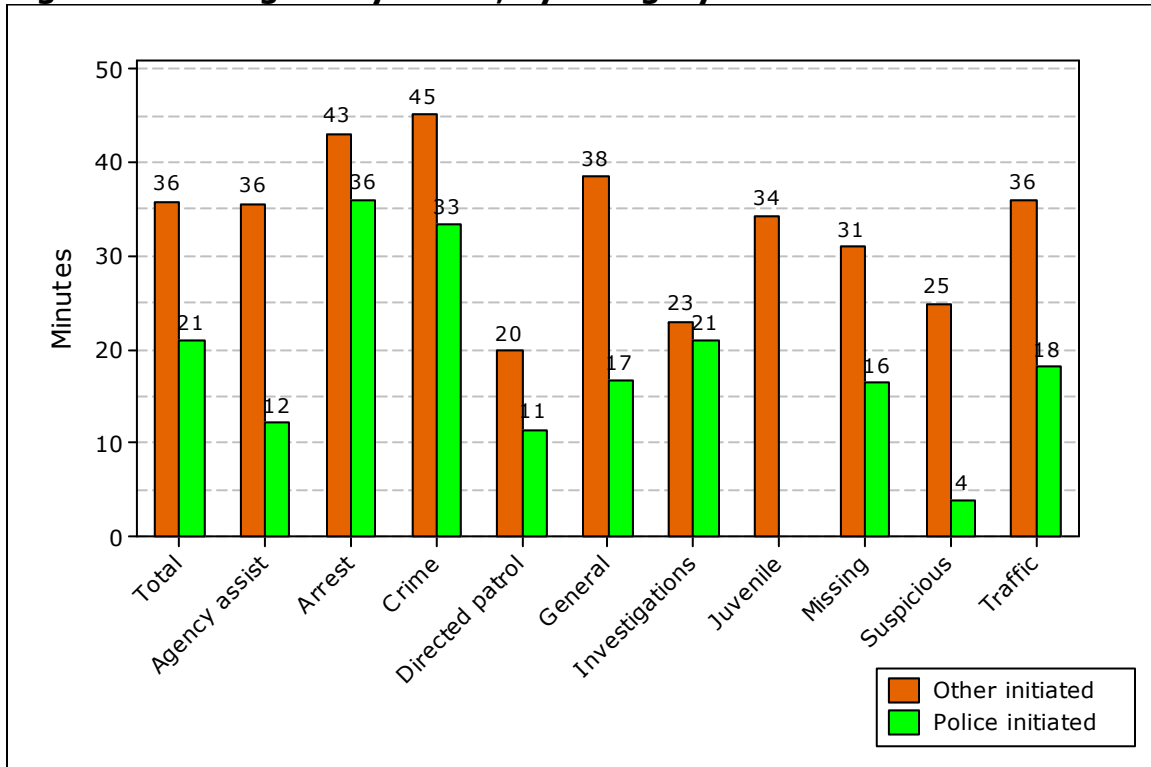


Table 6. Primary Unit's Average Busy Times Per Call, by Category and Initiator

Category	Police-Initiated		Other-Initiated	
	Total Calls	Minutes	Total Calls	Minutes
Accidents	4	32.9	209	45.6
Alarm	1	3.6	205	16.1
Animal calls	5	26.7	577	44.4
Assist other agency	3	12.2	154	35.6
Check/investigation	2	29.5	414	26.2
Crime—persons	6	18.5	570	46.2
Crime—property	18	38.3	515	43.8
Directed patrol	19	11.4	8	19.8
Disturbance	0	N/A	152	24.7
Juvenile	0	N/A	111	34.2
Miscellaneous	4	4.0	594	32.6
Missing	24	16.4	248	31.0
Prisoner—arrest	17	36.0	46	43.1
Suspicious person/vehicle	2	3.9	219	24.9
Traffic enforcement	55	17.1	454	31.6
Total	160	20.9	4,476	35.8

Note: Figure 6 and Table 6 exclude zero-on-scene calls.

Observations:

- A unit's busy time is measured as the time from when it is dispatched until it becomes available.
- The times shown above are the average busy times per call for the primary unit, rather than the total busy time for all units assigned to a call.
- If we ignore the police-initiated calls for most categories, as most samples were quite small, the other-initiated busy times ranged from 16 to 46 minutes overall.
- The longest average times spent were on person crimes, followed by accidents and property crimes.
- Police-initiated traffic-related calls (enforcement and accidents) averaged 18 minutes per call, while other-initiated traffic calls averaged 36 minutes.
- Crime calls averaged 33 minutes for police-initiated calls and 45 minutes for other-initiated calls.

Figure 7. Number of Responding Units, by Initiator and Category

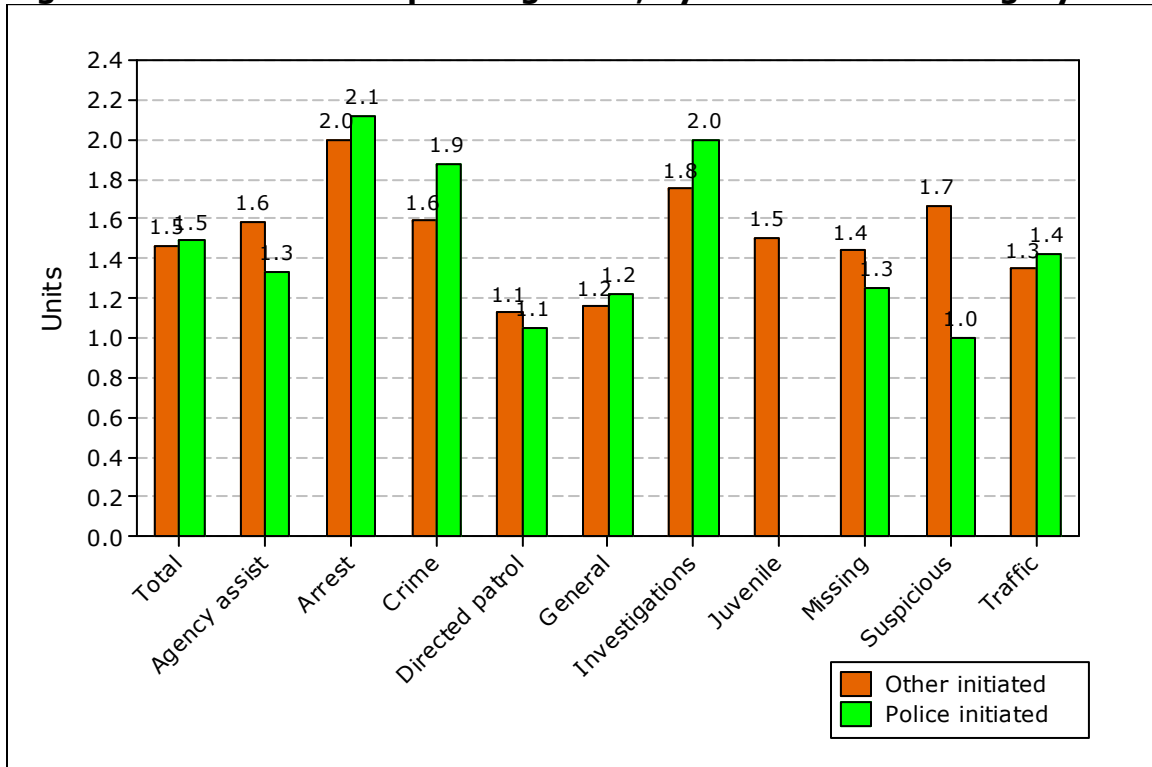


Table 7. Number of Responding Units, by Initiator and Category

Category	Police-Initiated		Other-Initiated	
	Average	Total Calls	Average	Total Calls
Accidents	2.0	4	1.5	209
Alarm	2.0	1	1.9	205
Animal calls	1.4	5	1.1	581
Assist other agency	1.3	3	1.6	155
Check/investigation	2.0	2	1.7	414
Crime—persons	2.0	6	1.7	570
Crime—property	1.8	18	1.4	515
Directed patrol	1.1	19	1.1	8
Disturbance	N/A	0	1.7	152
Juvenile	N/A	0	1.5	111
Miscellaneous	1.0	4	1.2	594
Missing	1.3	24	1.4	248
Prisoner—arrest	2.1	17	2.0	46
Suspicious person/vehicle	1.0	2	1.6	219
Traffic enforcement	1.4	55	1.3	456
Total	1.5	160	1.5	4,483

Figure 8. Number of Units Responding, by Category

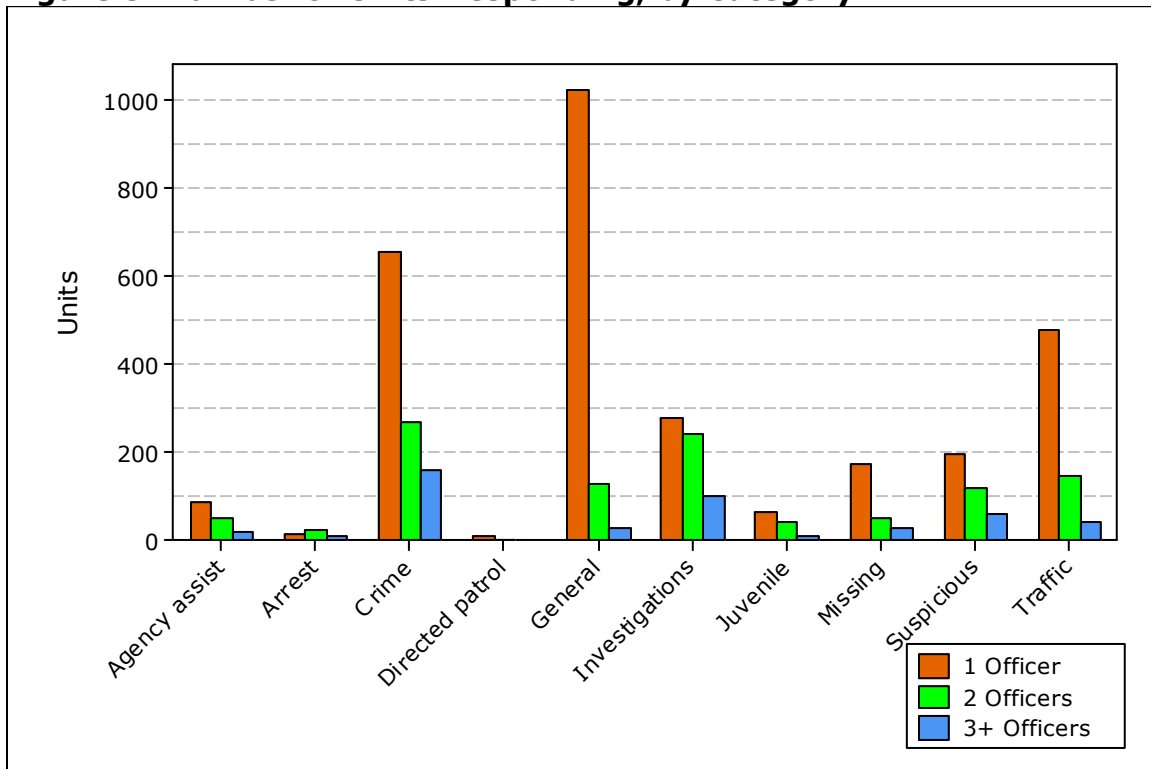


Table 8. Number of Units Responding, by Category

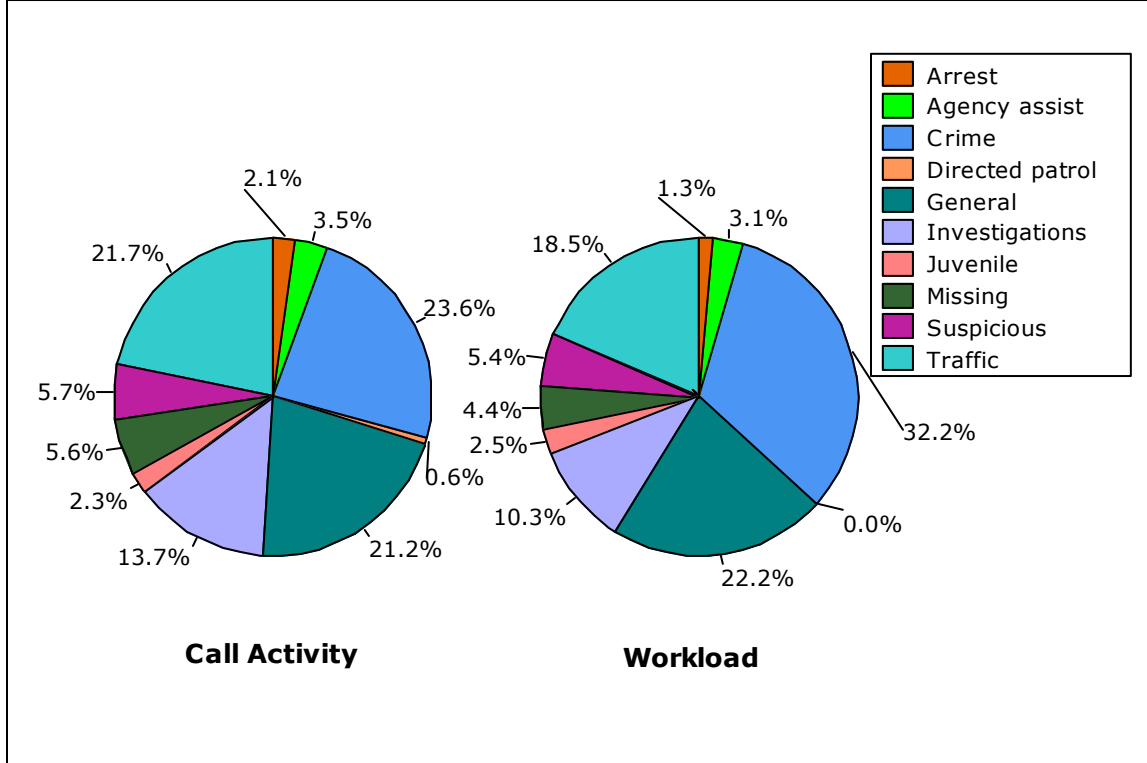
Category	Responding Units		
	One	Two	Three or More
Accidents	129	61	19
Alarm	68	101	36
Animal calls	521	52	8
Assist other agency	87	51	17
Check/investigation	210	140	64
Crime—persons	304	157	109
Crime—property	353	112	50
Directed patrol	7	1	0
Disturbance	69	58	25
Juvenile	64	39	8
Miscellaneous	501	74	19
Missing	171	51	26
Prisoner—arrest	14	21	11
Suspicious person/vehicle	125	60	34
Traffic enforcement	350	85	21
Total	2,973	1,063	447

Note: Figure 8 and Table 8 include other-initiated calls.

Observations:

- The overall mean number of responding units was 1.5 for both police-initiated and other-initiated calls.
- For other-initiated calls, the mean number of responding units was a maximum of 2 for prisoner transports and 1.9 for alarm calls.
- Most other-initiated calls involved one responding unit (66 percent).
- 10 percent of all calls involved three or more units.
- The largest group of calls with three or more responding units involved crimes.

Figure 9. Percentage Calls and Work-Hours, by Category, in Winter 2008



Note: Calculations include only nonzero-on-scene calls.

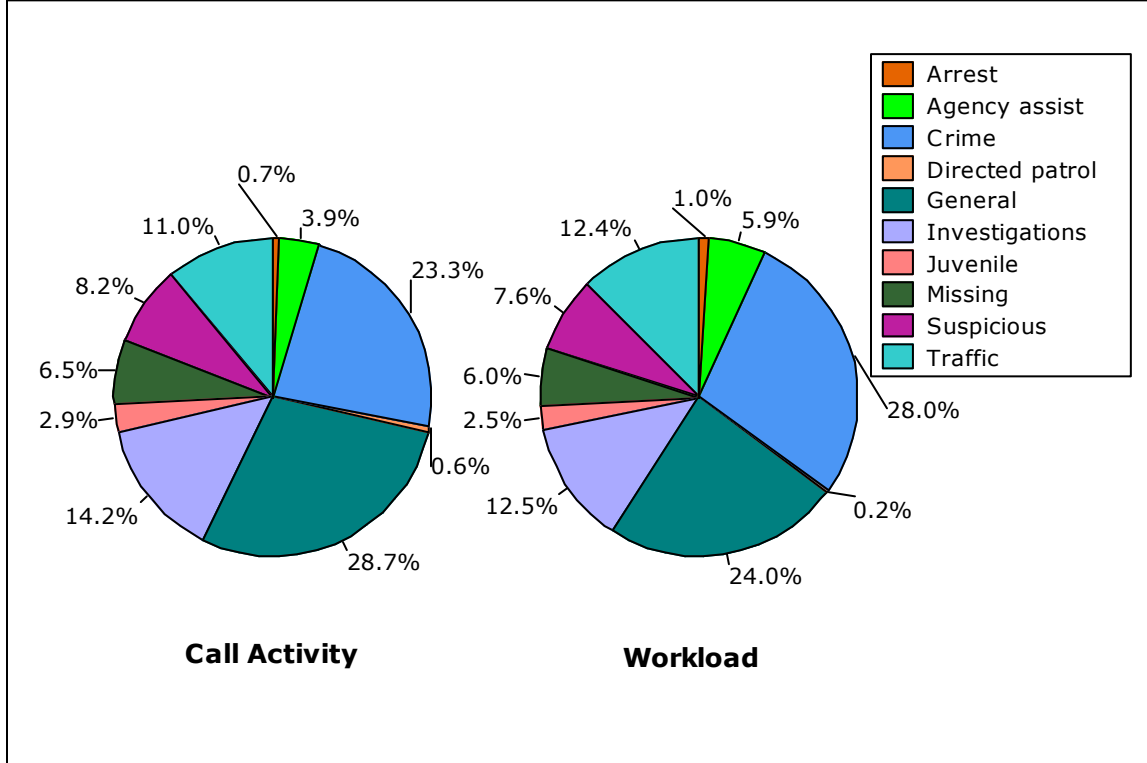
Table 9. Calls and Work-Hours per Day, by Category, in Winter 2008

Category	Per Day	
	Calls	Work-Hours
Arrest	0.3	0.1
Assist other agency	0.4	0.3
Crime	2.8	3.2
Directed patrol	0.1	0.0
General noncriminal	2.5	2.2
Investigations	1.6	1.0
Juvenile	0.3	0.2
Missing	0.7	0.4
Suspicious incident	0.7	0.5
Traffic	2.6	1.8
Total	11.9	10.0

Observations:

- Total calls were 11.9 per day, or 0.5 per hour.
- Total workload was 10 work-hours per day. This means that an average of 0.4 personnel per hour were busy responding to calls.
- Crimes constituted 24 percent of calls and 32 percent of workload.
- General noncriminal calls constituted 21 percent of calls and 22 percent of workload.
- Traffic-related calls constituted 22 percent of calls and 19 percent of workload.

Figure 10. Percentage Calls and Work-Hours, by Category, in Summer 2008



Note: Calculations include only nonzero-on-scene calls.

Table 10. Calls and Work-Hours per Day, by Category, in Summer 2008

Category	Per Day	
	Calls	Work-Hours
Arrest	0.1	0.1
Assist other agency	0.6	0.6
Crime	3.6	3.0
Directed patrol	0.1	0.0
General noncriminal	4.4	2.6
Investigations	2.2	1.3
Juvenile	0.4	0.3
Missing	1.0	0.6
Suspicious incident	1.3	0.8
Traffic	1.7	1.3
Total	15.4	10.7

Observations:

- In summer, the total calls were higher than they were in winter.
- Total calls were 15.4 per day, or 0.6 per hour. This was 30 percent higher than in winter.
- Total workload was 10.7 work-hours per day, or 0.4 personnel per hour. This was 7 percent higher than in winter.
- General noncriminal activities were 29 percent of calls and 24 percent of workload.
- Crimes were 23 percent of calls and 28 percent of workload.
- Traffic-related activities dropped to 11 percent of calls and 12 percent of workload.

In this portion of the report, we describe a detailed analysis of the sheriff's office's patrol workload within the city. We show the variation by hour of day. We also compare and contrast winter with summer. In addition, we separate weekdays from weekends, as they can have different patterns. We hope that this analysis can help to determine proper patrol deployment levels for the city in the future. There was only limited variability in workload by season and between weekends and weekdays. There was significant variability by time of day.

It is important to keep in mind that this workload refers only to the sheriff's patrol force. It does not include divisions such as detectives. It also excludes all units from other agencies, even patrol officers from neighboring municipalities. However, we did include community service officers, traffic deputies, and animal control officers.

We were able to review the monthly reports submitted by the sheriff's office to the city. For comparison, we simply took the information for January and February 2008 and for July and August 2008, removed the hours assigned to the detectives as investigations, and converted it to an hourly value.

Figure 11. Hourly Workload—Weekdays, Winter 2008

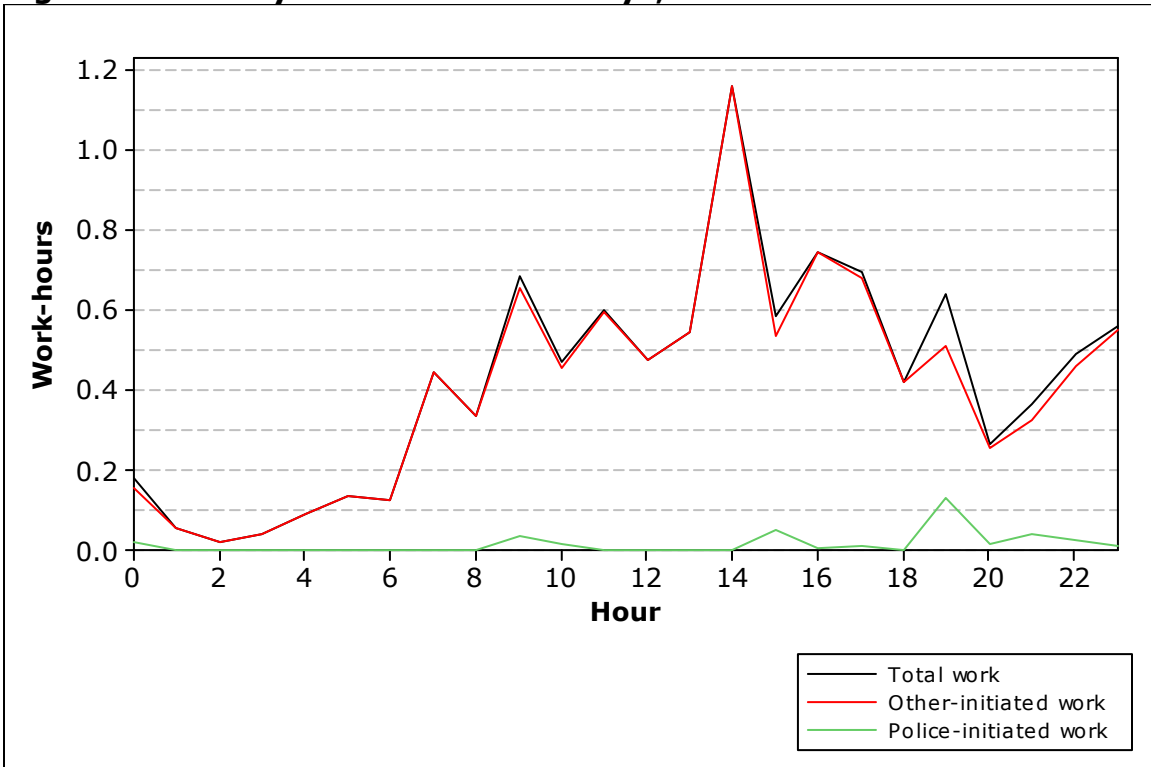
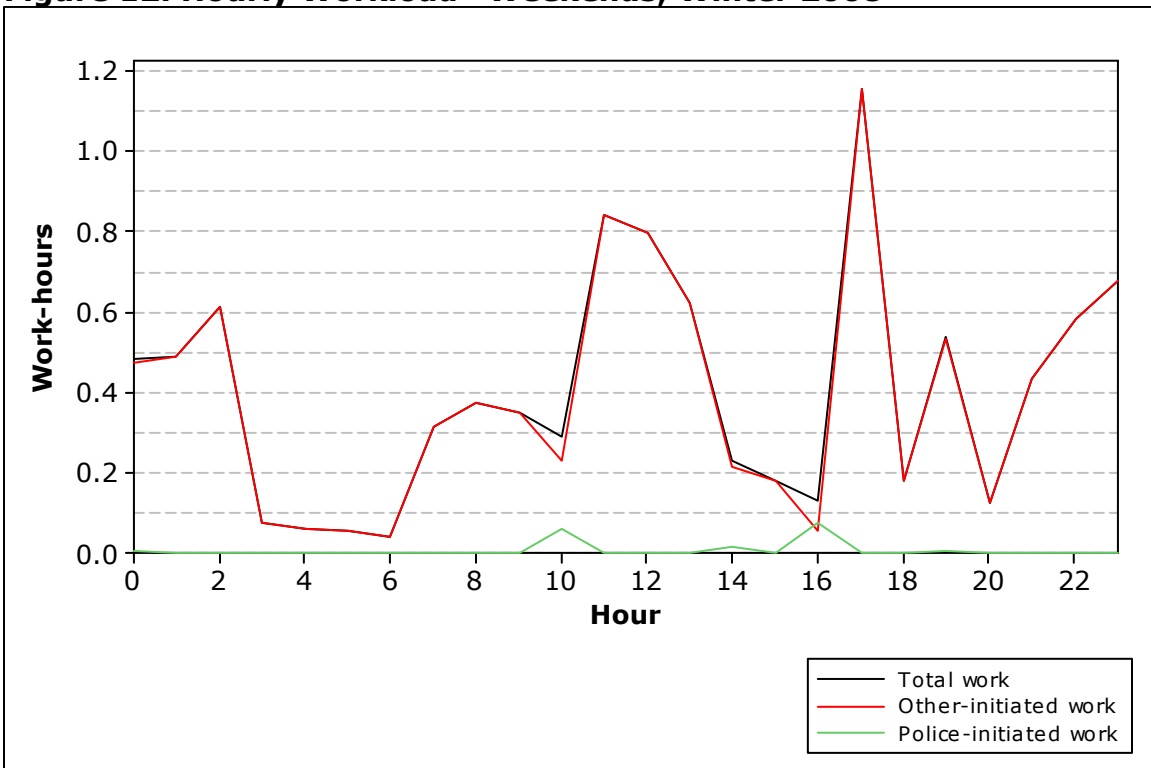


Figure 12. Hourly Workload—Weekends, Winter 2008



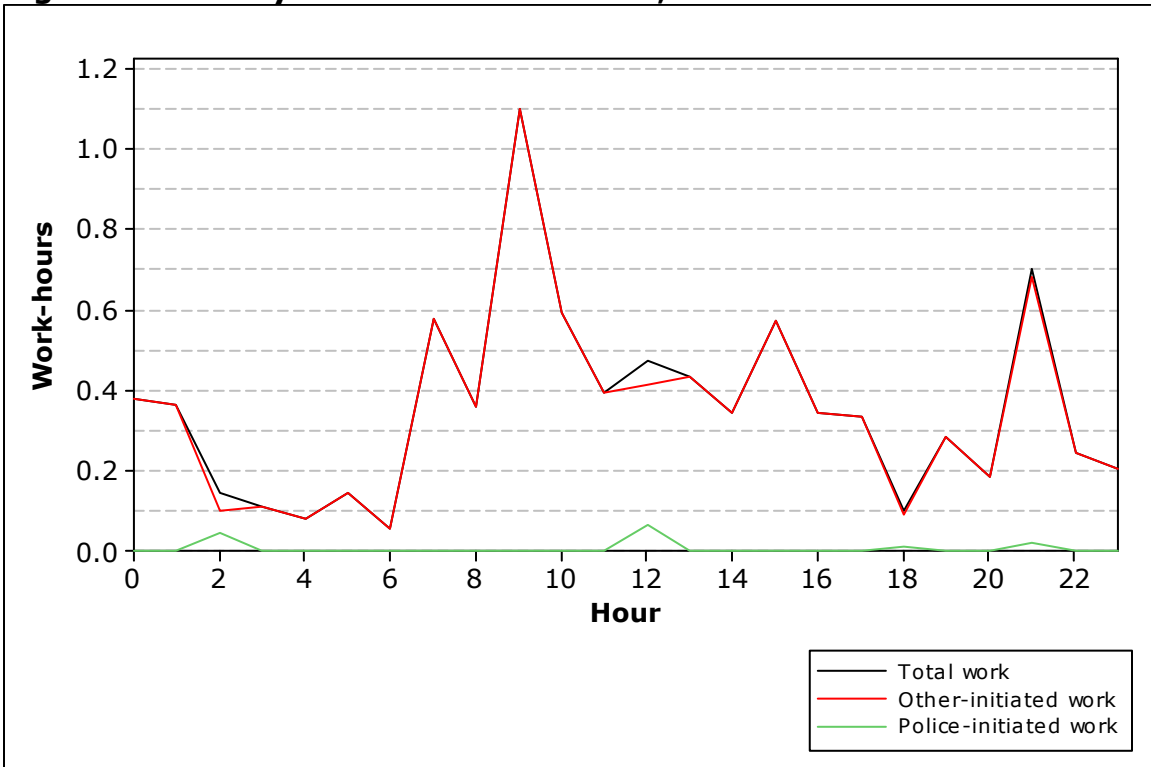
Observations:

- During the week, patrol workload averaged 0.42 personnel per hour.
- During the week, patrol workload dropped as low as 0.02 work-hours between 2 a.m. and 3 a.m. It was as high as 1.16 work-hours between 2 p.m. and 3 p.m.
- On weekends, patrol workload averaged 0.4 personnel per hour.
- On weekends, patrol workload dropped as low as 0.04 work-hours between 6 a.m. and 7 a.m. and rose as high as 1.15 work-hours between 5 p.m. and 6 p.m.
- During January and February, the sheriff's recorded 1,571 total patrol hours, averaging 26.2 work-hours per day and 1.09 personnel per hour.

Figure 13. Hourly Workload—Weekdays, Summer 2008



Figure 14. Hourly Workload—Weekends, Summer 2008



Observations:

- When comparing the summer and winter workloads, we noted that from winter to summer, the workload rose during the week by 14 percent and decreased by 10 percent on weekends.
- During the week, patrol workload averaged 0.48 personnel per hour.
- During the week, patrol workload dropped as low as 0.04 work-hours between 5 a.m. and 6 a.m. and rose as high as 0.91 work-hours between 8 a.m. and 9 a.m.
- On weekends, average workload was 0.36 personnel per hour.
- On weekends, patrol workload dropped as low as 0.05 work-hours between 6 a.m. and 7 a.m. and rose as high as 1.12 work-hours between 9 a.m. and 10 a.m.
- During July and August, the sheriff's office recorded 1,394 total patrol hours, averaging 22.5 work-hours per day and 0.94 personnel per hour.

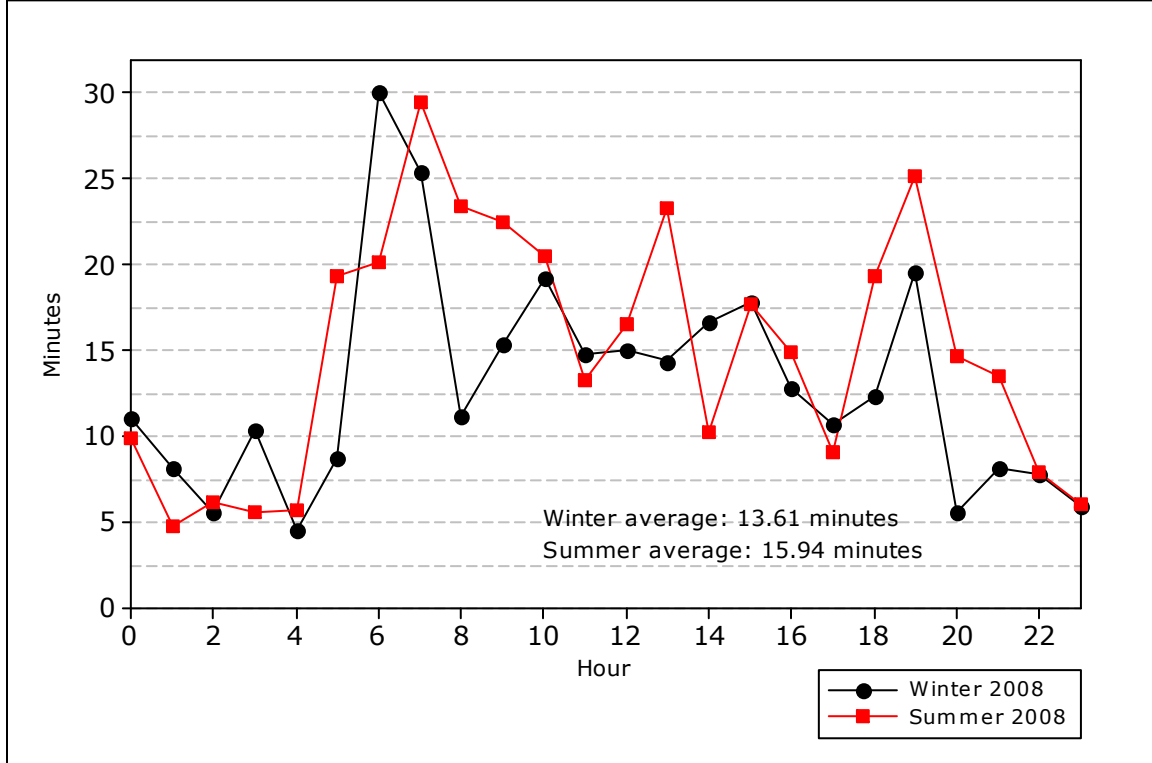
III. Response Times

We analyzed the response times to various types of calls, separating the durations into dispatch and travel times. We begin the discussion with statistics that include all calls combined. We analyzed several types of calls to determine whether response times varied by call type. To better understand the response-time issue, the study team calculated the cumulative distribution function (CDF) for three elapsed times: dispatch delay, travel time, and total response time.

Before presenting the specific figures and tables, we summarize all of the observations. We started with 747 and 972 calls, respectively, for winter 2008 (January to February) and summer 2008 (July to August). We limited our analysis to calls that were other-initiated with nonzero-on-scene times. We also encountered some calls without arrival times that we were forced to exclude from our analysis due to lack of information. This left 503 calls in winter 2008 and 696 calls in summer 2008.

Response time is measured as the difference between when a call is received and when the first unit arrives on scene. It is separated into dispatch delay and travel time. Dispatch delay is the time from when a call is received until a unit is dispatched. Travel time is the time from when a unit is dispatched until a unit arrives.

Figure 15. Average Response Time, by Hour of Day, for Winter and Summer 2008



Observations:

- Average response times varied significantly by hour of day.
- The overall average was higher in summer than in winter.
- In winter, the longest response times were between 6 a.m. and 7 a.m., with an average of 30.1 minutes.
- In winter, the shortest response times were between 4 a.m. and 5 a.m., with an average of 4.5 minutes.
- In summer, the longest response times were between 7 a.m. and 8 a.m., with an average of 29.5 minutes.
- In summer, the shortest response times were between 1 a.m. and 2 a.m., with an average of 4.8 minutes.

Reading the Cumulative Distribution Function (CDF) Chart

The vertical axis is the probability or percentage of calls. The horizontal axis is time of dispatch delay, travel time, or total response time. For example, in the summer, approximately 80 percent of calls experienced a dispatch delay of 5 minutes or less, as the 80-percent line intersects the curve at the 5-minute mark. When comparing different CDF lines, a higher graph represents a larger percentage of low values. Figure 17 shows that the travel times were only a bit longer in summer than they were in winter.

Figure 16. Dispatch Delay Cumulative Distribution Function

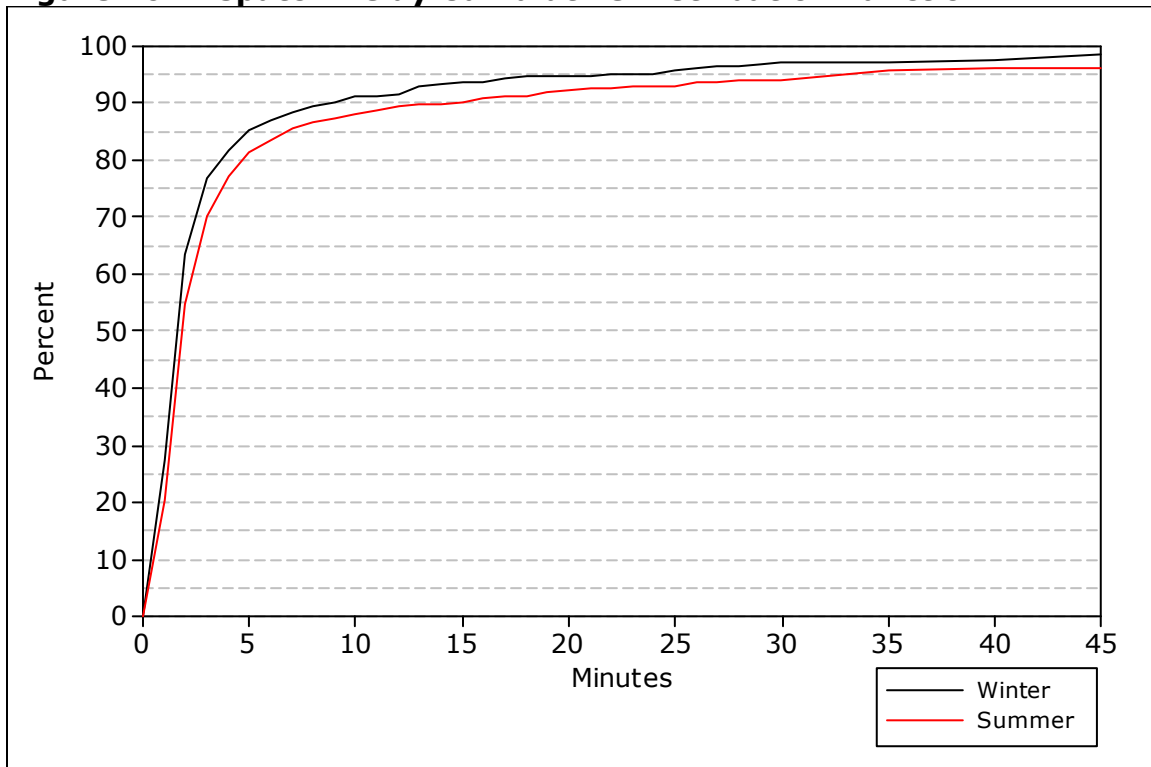


Figure 17. Travel Time Cumulative Distribution Function

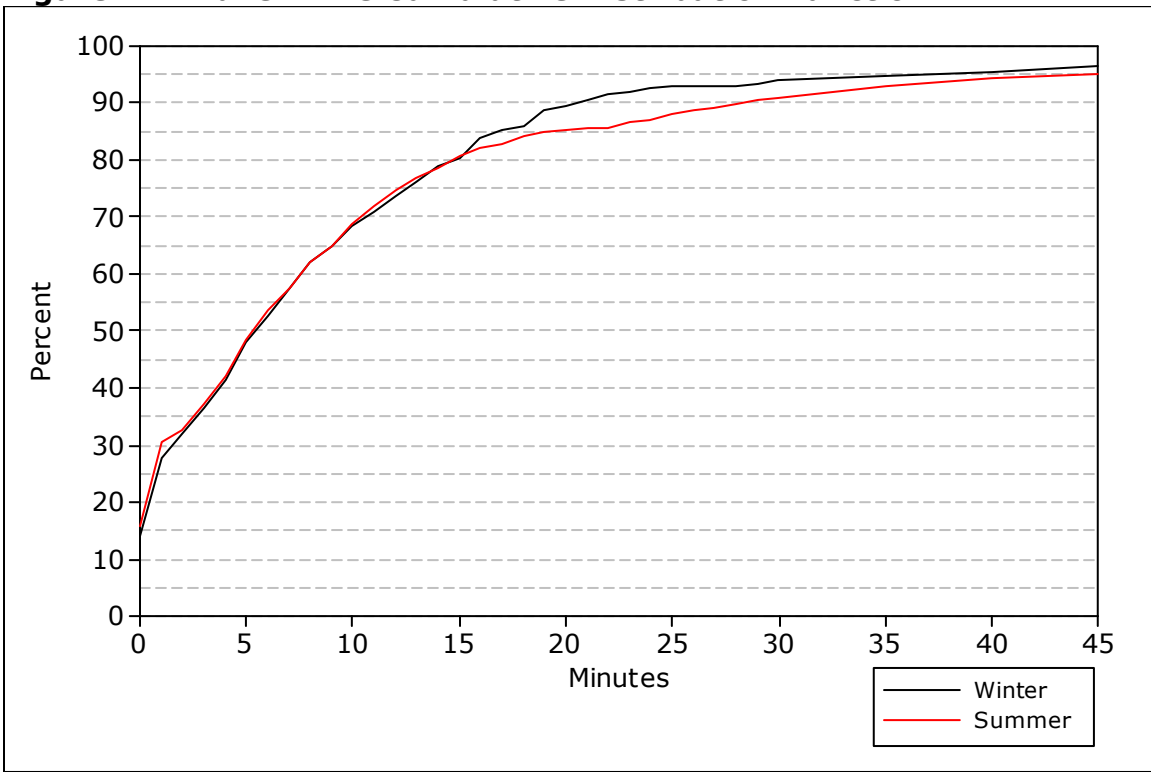


Figure 18. Response Time Cumulative Distribution Function

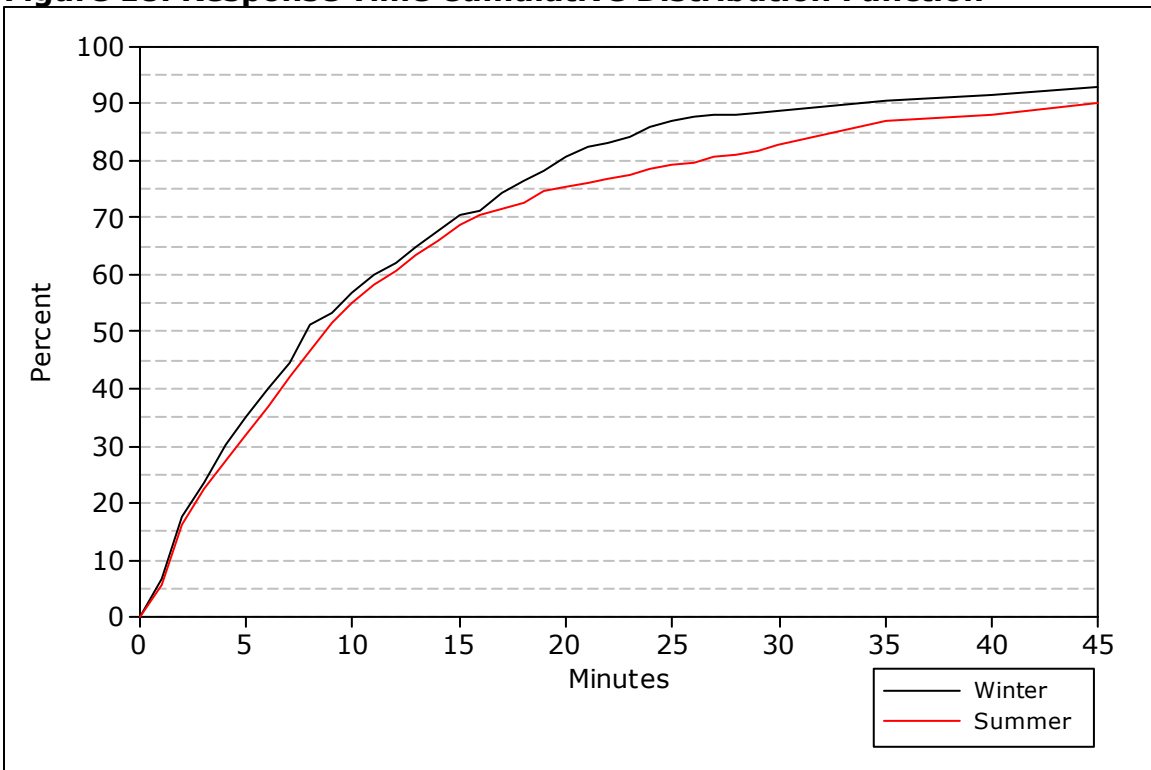


Figure 19. Average Response Times in Winter 2008

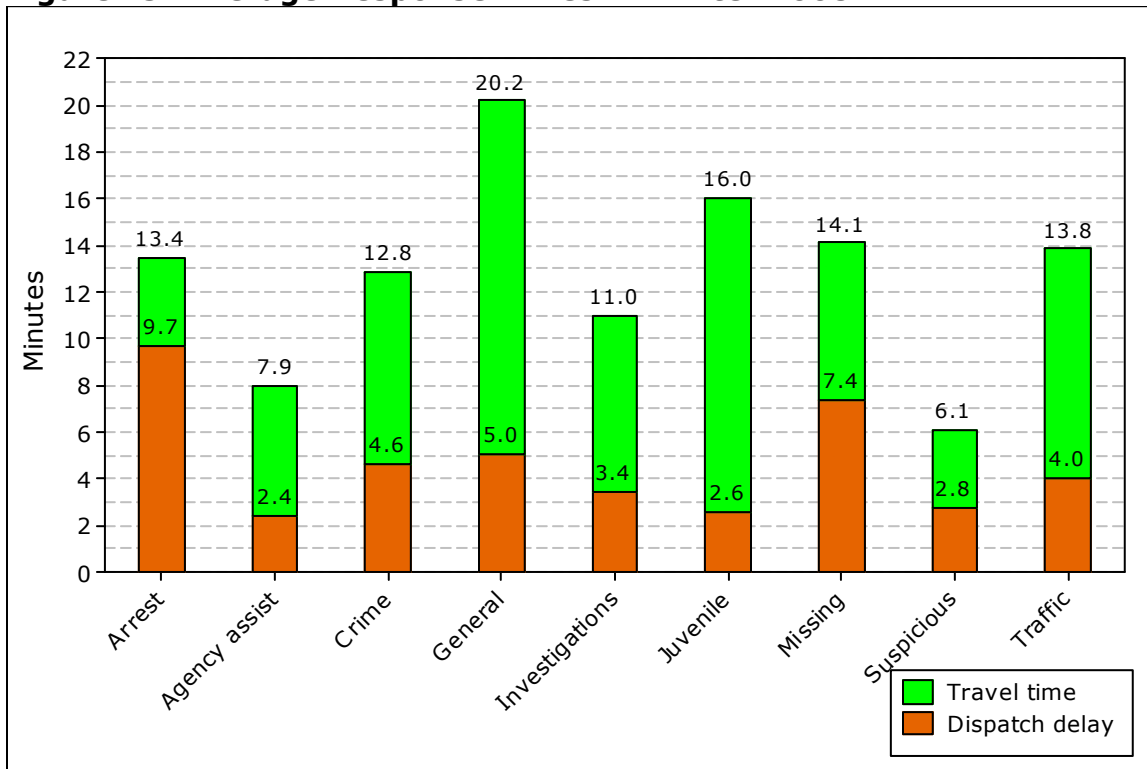


Figure 20. Average Response Times in Summer 2008

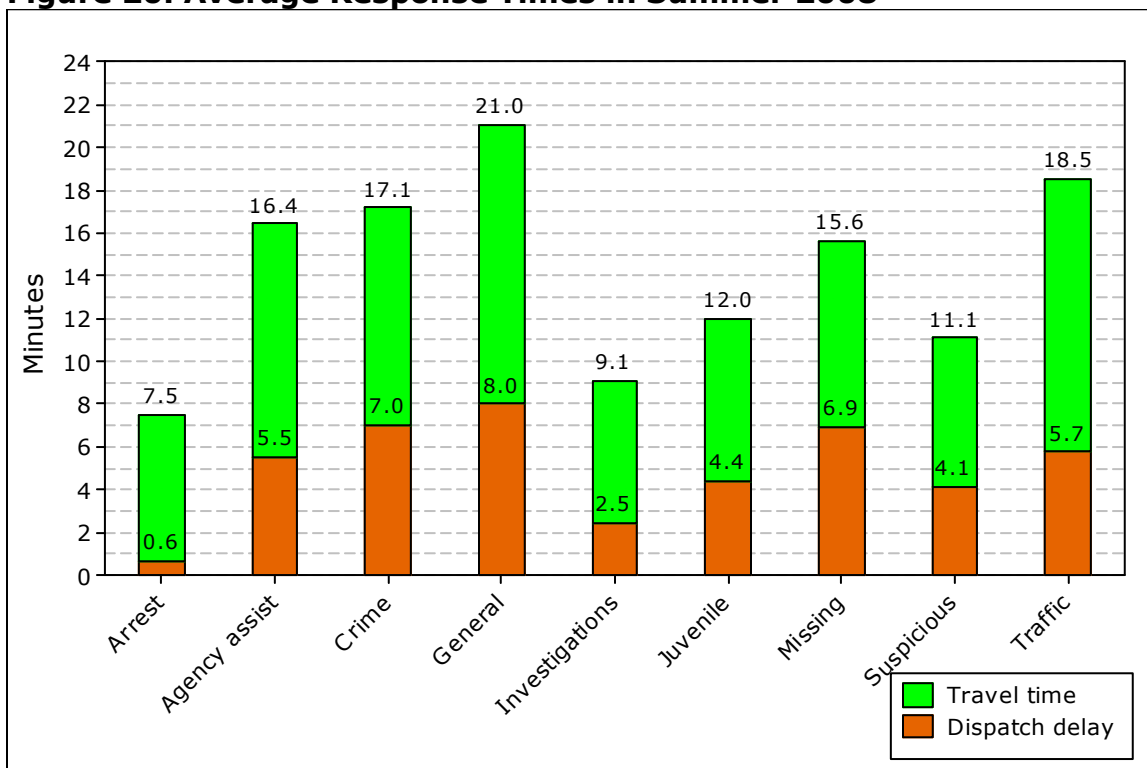


Table 11. Average Response Time Components, by Category

Category	Winter 2008			Summer 2008		
	Dispatch	Travel	Response	Dispatch	Travel	Response
Arrest	9.7	3.8	13.4	0.6	6.9	7.5
Agency assist	2.4	5.5	7.9	5.5	10.9	16.4
Crime	4.6	8.2	12.8	7.0	10.1	17.1
General	5.0	15.1	20.2	8.0	13.0	21.0
Investigations	3.4	7.6	11.0	2.5	6.6	9.1
Juvenile	2.6	13.5	16.0	4.4	7.6	12.0
Missing	7.4	6.7	14.1	6.9	8.7	15.6
Suspicious	2.8	3.3	6.1	4.1	6.9	11.1
Traffic	4.0	9.8	13.8	5.7	12.8	18.5
Total	4.3	9.3	13.6	5.9	10.1	15.9

Table 12. 90th Percentiles for Components, by Category

Category	Winter 2008			Summer 2008		
	Dispatch	Travel	Response	Dispatch	Travel	Response
Arrest	75.6	12.1	87.7	1.2	11.7	11.8
Agency assist	7.2	14.3	19.3	12.1	15.5	30.7
Crime	9.3	16.8	35.5	25.5	30.5	48.9
General	12.6	53.2	62.5	23.0	39.4	68.9
Investigations	5.5	18.2	23.2	5.0	16.3	19.2
Juvenile	10.0	87.2	88.4	9.8	23.7	32.3
Missing	26.0	19.4	41.5	32.3	26.6	44.1
Suspicious	8.0	9.8	17.2	16.6	15.0	26.3
Traffic	8.3	20.4	29.5	10.5	43.2	56.6
Total	8.4	20.5	34.4	14.8	28.7	44.5

Observations:

- Response times varied significantly by call category.
- Since there were no other-initiated directed patrol calls, we cannot report response times. In addition, it should be noted that the average response times for arrests were based on very small samples. There were fewer than 10 arrest calls that were other-initiated during the summer or the winter.
- In summer, average response times were as short as 9.1 minutes (for investigations) and as long as 21 minutes (for general noncriminal calls).
- In winter, average response times were as short as 6.1 minutes (for suspicious incidents) and as long as 20.2 minutes (for general noncriminal calls).
- Average response times for crimes were 17.1 minutes for summer and 12.8 minutes for winter.
- In summer, average dispatch delays varied between 2.5 minutes (for investigations) and 8 minutes (for general noncriminal calls).
- In winter, average dispatch delays varied between 2.4 minutes (for juvenile calls) and 7.4 minutes (for uncategorized calls).
- In summer, 90th-percentile values for response times were as short as 19.2 minutes (for investigations) and as long as 68.9 (for general noncriminal calls).
- In winter, 90th-percentile values for response times were as short as 17.2 minutes (for suspicious incidents) and as long as 88.4 (for juvenile calls).