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Las Vegas Metropolitan Police Department

ShotSpotter Pilot Assessment

A nine-month comprehensive evaluation of the LVMPD gunshot detection program and ShotSpotter technology.

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EXECUTIVE SUMMARY

In late 2017, the Las Vegas Metropolitan Police Department (LVMPD) launched a gunshot detection program using a technology called ShotSpotter. Based on a network of acoustic sensors, the ShotSpotter technology is designed to identify and triangulate the locations of gunfire. This type of data can lead to the identification of shootings that would normally go unreported to the police, as well as the recovery of evidence and faster response times. Perhaps, more importantly, the criminal intelligence gained from such data can also help the police predict and prevent future shootings.

It is this vision of preventing violence and improving the quality of life for Clark County residents that fueled the use of this technology in the first place. Not only is addressing violent crime Sheriff Joe Lombardo's top priority but it is also a key component of the *Pathway from Poverty* initiative that was developed by Clark County Commissioner Marilyn Kirkpatrick. There are some neighborhoods in Southern Nevada that have been plagued by crime for years, if not decades. This harsh reality is based on a variety of complex issues to include a deficiency in education, economic opportunities, quality of life, and security. The *Pathway from Poverty* initiative was established to help address these issues with the latter component of security focusing on the reduction of shootings.

With support from the University of Nevada Cooperative Extension and the Friends of the LVMPD Foundation, a pilot program for gunshot detection was developed in December 2017 to help achieve this goal. Managed by the new LVMPD Technical Operations (Tech Ops) Section, this one-year pilot program was based on the use of the ShotSpotter technology. The coverage area was limited to six square miles that incorporated crime hotspots in the northeast and south parts of Clark County, Nevada. Although the program was primarily based on a technology, it was the collaborative partnerships between the LVMPD Sheriff and Commissioners Kirkpatrick, Lawrence Weekly and Chris Giunchigliani, as well as the LVMPD area command captains, and several community partners that drove its success.

This report represents the final results of this pilot program, as well as recommendations for improvement and expansion. Most importantly, this report provides an in-depth analysis on how the LVMPD gunshot detection program could ultimately lead to the significant reduction of violent crime in Southern Nevada.

Key Findings

- There were 527 potential gunshot events within the coverage area. Of these potential shootings, 342 were identified exclusively by the ShotSpotter technology while 40 were identified exclusively by a citizen's call to 911. The remaining 145 potential shootings were identified mutually by the ShotSpotter technology and a citizen's call to 911. Although not as definitive as the data on confirmed shootings (presented below), these figures indicate that 65% (342 of 527) of the potential shootings that are occurring in the coverage area are going unreported by citizens.

- Of the 527 potential shootings identified by ShotSpotter and 911 calls, there were 234 that were confirmed as shootings by the collection of additional evidence (e.g., casings recovered, eyewitness testimony, and victim located). The ShotSpotter technology provided an alert for 89% (209 out of 234) of these confirmed shootings. More importantly, 42% (99 out of 234) of the total confirmed shootings were identified exclusively by ShotSpotter (i.e., no call to 911). It is also important to note that many of the remaining 278 potential shootings that could not be confirmed by additional evidence are still likely to have involved an actual shooting. For example, physical evidence of an actual shooting may not have been available due to the type of firearm used (e.g., revolver) or because the suspect picked up the shell casings prior to the police arriving on scene. The latter was confirmed to have occurred on at least three ShotSpotter-identified shootings.[1]

- There was a total of 40 calls for service on potential shootings that ShotSpotter did not capture. Of these events, 25 were confirmed as actual shootings by additional evidence (i.e. shells casings recovered). These 25 confirmed misses indicate that the ShotSpotter technology missed 10.5% (25 out of 234) of the total confirmed shootings identified in the coverage area.[2]

- The ShotSpotter technology led to the recovery of 792 spent shell casings from 153 shootings. While much less in comparison, there were also 17 ShotSpotter-identified shootings where a suspect was arrested before or shortly after the shooting; 15 shootings where a victim was located, and 15 shootings where at least one firearm was recovered.

[1] LVMPD events 171220-3932 and 180715-3721 are two specific examples where witnesses reported seeing the suspect pick up spent shell casings immediately after the shootings.

[2] This comparison is specific to confirmed shootings and therefore is more liberal analysis of the number of misses. For example, the percentage of missed events drops to 7.6% when comparing potential shootings (40 out of 527) instead of confirmed shootings (25 out of 234)

- The most significant success story during the pilot program involved the identification of a violent sexual assault and kidnapping. This incident involved a possible gunshot near an apartment complex. There were no calls for service to 911 and no indication that the police would have discovered the crime without the ShotSpotter technology.[3] Upon receiving the ShotSpotter alert, LVMPD officers responded to the area of the shooting. The location information for the incident brought the officers within seven feet of where a spent shell casing was discovered. From there, the officers canvassed the area and ultimately discovered a male and female that were robbed, kidnapped, tortured, and raped. Two suspects were arrested and two firearms were recovered. In addition to this event, ShotSpotter also identified a homicide that no one called the police on and multiple incidents where firearms were recovered. The most significant ShotSpotter miss include a homicide that ShotSpotter failed to provide an alert on and two robberies that involved undetected gunfire. More information on success stories and notable misses can be found on pages 40-43.

- The average time between a shooting and a ShotSpotter alert was approximately 70 seconds. This is slightly higher than the 60-second threshold promoted by the vendor however, this is based on the average for the entire assessment period, which was skewed by a small number of delayed alerts. For example, there were 5 events that exceeded 8 minutes from the time of shooting and alert and 1 alert in particular that was published nearly 30 minutes late because of a malfunction with the LVMPD computer. Although these six events represent less than two percent of the total alerts, the delays are long enough to skew the overall average. As such, an alternative perspective that measures the number of events that preformed under the 60-second threshold was more applicable in determining timeliness. In this regard, the technical evaluation shows that 337 (69%) alerts were published under 60 seconds. Likewise, the monthly averages show that the ShotSpotter technology performed under the 60-second threshold six out of the nine months. Nonetheless, this assessment identifies room for improvement when it comes to the timeliness of receiving and acknowledging ShotSpotter alerts.

- Although there is value in measuring the level of crime before and after the ShotSpotter deployment, there are two important limitations. First, simply comparing the number of shootings that occurred before and after the deployment of ShotSpotter does not indicate an impact on crime. ShotSpotter is primarily a tool used to identify crime and in large part, crime that would normally go unreported to the police. As such, a simple comparison of the number of shootings before and after ShotSpotter should only show

[3] In addition to no one calling the police, the victims indicated they were not likely to report the crime due to the sexual nature of the attack.

an increase. Secondly, it may be possible to correlate ShotSpotter to an increase or decrease in crime activity overall but it would be impossible to prove causation. There could be a hundred different reasons for why crime changes in a particular area to include environmental and socioeconomic factors, as well as the presence of overlapping crime fighting initiatives.[4] With that said, the level of crime in the LVMPD persistent hotspots that are located within the coverage area has decreased since the launch of ShotSpotter. More specifically, the pre-defined persistent hotspot in Northeast Area Command (NEAC) shows a 9% reduction in total ACTION crimes. While limited to a portion of the south coverage area, the persistent hotspot in South Central Area Command (SCAC) also shows a 3% reduction in total ACTION Crimes.[5]

- Of the 129 NIBIN notifications regarding an incident that occurred during the ShotSpotter deployment, 32% included a match to a ShotSpotter-identified shooting. This proportion is remarkable considering the 129 notifications were for all of Clark County, while ShotSpotter was limited to just six square miles of coverage. Additional data would be needed to confirm the scope of this analysis but this notable proportion of NIBIN notifications for 2018 would support the assumption that most shootings are likely to involve many of the same crime guns.

- Of the 153 ShotSpotter-identified shootings with casings recovered, 51 resulted in a NIBIN notification to at least one other shooting. This total represents 33% of the ShotSpotter-identified shootings that had casings recovered. More importantly, this analysis does not yet include the NIBIN notifications that have yet to be completed. The percentage, while notable already, will likely grow as more NIBIN matches are made by the LVMPD Crime Lab in the coming months.

- The most common time frame for a potential shooting was identified as 2000 to 0300 hours. More precisely, Monday and Thursday between 0000 and 0100 hours, as well as Sunday between 0100 and 0300 hours, showed the highest spike for shootings.

- The majority of potential shootings in both areas occurred within 50 yards of at least one other shooting. Many were even as close as five yards from at least one prior shooting. This proximity analysis is based on nine months of data and it may indicate that the location of one shooting may be a precursor to additional future shootings.

[4] As an example, the north coverage area is currently being treated by three different crime fighting strategies: the PIVOT program, VCI initiative, and ShotSpotter.

[5] This analysis was completed by the LVMPD Analytical Section (ANSEC) and it was based on the pre-defined LVMPD persistent hotspots. The NEAC persistent hotspot is representative of the majority of the north ShotSpotter coverage area. The SCAC persistent hotspot is representative of the highest crime area within the south ShotSpotter coverage, however, it only consists of a third of the geography for the south coverage area.

- Ultimately, the technical evaluation showed that the technology performed below the vendor's proposed estimates in some areas but still significantly high enough in most areas to make it quite valuable. More specifically, the technology proved effective in identifying 209 confirmed shootings and another 278 potential shootings within the six square miles of coverage. A conservative estimate based on the number of confirmed shootings indicates that there were at least 99 shootings that would have gone unreported to the police if it were not for the ShotSpotter technology. A more liberal estimate that includes all potential shootings indicates that this number may be as high as 342. Either way, these figures represent a significant number of shootings that occurred within only six square miles and in less than nine months.

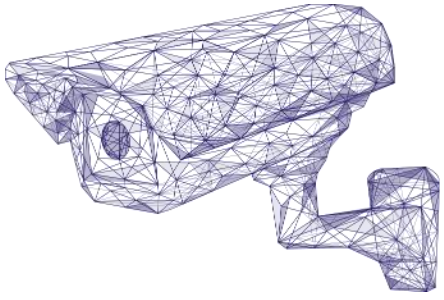
- Perhaps, more importantly, this data suggests that the number of unreported shootings that are occurring valley-wide is much higher. There are 10 persistent hotspots for crime in Clark County. While different in some ways, these hotspots are similar in size and criminal activity to the two ShotSpotter coverage areas. It is possible, if not likely, that the deployment of ShotSpotter in all 10 areas would produce four times the results. If that were to be correct, an expansion of this technology could help identify somewhere between 800 and 1,400 unreported shootings annually.

Key Recommendations

1. **Continue the LVMPD gunshot detection program for another year.** The LVMPD currently has a total of six square miles of ShotSpotter coverage that is set to expire on November 29, 2018. At a minimum, maintaining this coverage area for another year is highly recommend based on the initial results of the pilot assessment.

2. **Expand the ShotSpotter coverage area to all historical hotspots.** Ideally, a three-year expansion of the coverage area from 6 square miles to 24 square miles would offer the most potential for combatting gun crime in Southern Nevada. Such a proposal would expand the coverage area to all LVMPD historical hotspots, as well as several surrounding areas that are showing signs of increasing crime. Additional details on this expansion proposal are provided on pages 59-61.

3. **Deploy a network of real time public safety cameras within the ShotSpotter coverage area.** The ShotSpotter technology has proven quite effective in identifying shootings that would have normally been unreported to the police. The technology also proves valuable in increasing the collection of physical evidence and improving police response times. However, one area that did not meet expectations was the impact the technology could have on apprehending suspects at the time of crime. While significantly faster than a citizen's call to 911, the ShotSpotter technology still results in a one to two-minute delay between a shooting and an officer's



response. This small window of time is sufficient enough for a suspect to escape the crime scene. However, inclusion of police and privately-owned surveillance cameras in the ShotSpotter coverage area could help close this gap and provide critical intelligence regarding the identities of the shooters. Even more potential can be added by integrated these cameras to the ShotSpotter technology so that they automatically rotate towards the location of the gunshots in real-time.

4. **Re-educate patrol on the use of the ShotSpotter technology and increase the awareness of its value within the affected area commands.** The pilot assessment revealed a steady decline in the use of the technology from the beginning of the program to now. More importantly, there were several deficiencies identified that are specific to the ShotSpotter response protocol. For example, there are a number of documented incidents where officers dismissed the ShotSpotter alert based on an assumption that the incident was the result of fireworks or a vehicle backfire. In some of these cases, a citizen witness was lying to the officers and in others, the officers made this assumption based on their own opinion of the audio recording. While the ShotSpotter technology does produce a limited number of false positives, it is still important for officers to canvass the area for physical evidence and witnesses. There have been multiple accounts where casings were recovered after the incident was dismissed. Additionally, there is value in checking these areas even in situations where there is no physical evidence or when the event was not actually a shooting. The pilot assessment shows that most shootings occur within 50 yards from one another and that there is also a high concentration of shootings in certain areas. Thus, the response of an officer when a potential shooting is identified in close proximity to a previous shooting or near a concentration point can help prevent future shootings from occurring. As such, the future of ShotSpotter should involve 1) re-educating patrol on the technology, 2) ensuring patrol officers have access to the Google Chrome ShotSpotter application, 3) encouraging its full use, and 4) raising awareness of its success to encourage more success. This latter component involves establishing a formal feedback loop that provides officers with confirmation on the incidents they helped identify by using the technology.

5. **Consider revising the ShotSpotter response procedure to exclude the mandatory STAR protocol.** At the start of the pilot program, there was a belief that the technology would increase the likelihood of officer involved shootings. Although the system has resulted in faster response times, it has not yet proven to increase the number of engagements with armed suspects. In fact, only 3% of the ShotSpotter events resulted in an encounter with a suspect still on scene. This number will likely increase if cameras are added to the coverage area however, the change would likely still not be significant enough to require the STAR protocol on each event. With that said, there is no guarantee an officer involved shooting during a ShotSpotter event will not occur even with these low numbers. As such, the recommendation based on this pilot assessment involves a compromise. Ideally, the STAR protocol would remain in affect but only for the ShotSpotter events that involve details that confirm a potential threat. For example, a ShotSpotter event with potential gunshots heard would not automatically entail a STAR protocol but a ShotSpotter event with multiple persons reporting or confirmation from a secondary type of technology (e.g., cameras) would require a STAR protocol.

6. **Continue to improve the turnaround time for NIBIN acquisitions.** The greatest value ShotSpotter offers is based on the collection of shell casings. The technology has proven to increase the number of shootings identified and more importantly, the number of incidents where spent shell casings are recovered as evidence. When combined with NIBIN, the recovery of these casings can ultimately lead to the prevention of future gun crimes. As such, it becomes critically important that the NIBIN acquisition process be completed as quickly as possible and ideally within 48 hours. Simply put, ShotSpotter can fuel NIBIN by producing more casings for analysis and in turn, NIBIN can lead investigators to potential shooters by fusing together more pieces of intelligence.

7. **Increase the community engagement in the ShotSpotter coverage areas and especially within 24 hours of a confirmed ShotSpotter event.** The LVMPD gunshot detection program was designed as one component of the larger *Pathway From Poverty* concept that was established by Commissioner Kirkpatrick. The *Pathway from Poverty* concept focuses on addressing crime and quality of life issues by adopting a whole-of-community approach. The ShotSpotter technology plays an integral part in identifying the micro-hotspots that need the most services. Once identified, law enforcement can help solve crime and prevent future shootings by increasing the police presence and community engagement within these areas. Although the pilot program included some of this effort, there was certainly room for more. For example, there were several delays in obtaining door hangers that could have been used during neighborhood canvasses. Additionally, more Community Oriented Policing (COP) events following a ShotSpotter event, as well as investigative follow up, could help maximize the value of the ShotSpotter technology.

8. **Expand the use of cameras and other technologies to establish safety grids in each of the ShotSpotter coverage areas.** The use of technology in law enforcement provides an unprecedented opportunity to prevent violence before it occurs. In particular, combining the ShotSpotter technology with NIBIN, real-time public safety cameras, social media platforms, and a variety of other technical collection tools can help eliminate shootings in the areas that are most plagued by crime. It is not just technology that makes such a vision possible but also the reality that the gun crimes in these areas are highly concentrated. A surgical but whole-of-community approach that leverages technology could result in an extraordinary transformation of the persistent hotspots in Southern Nevada.

Illustration 1 - The Safety Grid Concept Applied in Las Vegas

INTRODUCTION

In May 2012, Commissioner Kirkpatrick initiated a program to help children and families escape the harsh reality that plagues impoverished communities. The program, entitled "Pathway from Poverty" was designed as a multilayered approach for providing safety, stability, and quality of life within the northeast area of Las Vegas. An important component of this program involved a partnership with LVMPD to combat crime and gun violence in particular. United in an effort to strengthen and expand this partnership, LVMPD leaders to include captains from the Northeast, South Central, and Southeast area commands introduced a proposal for a gunshot detection system that could help advance the overall vision of the *Pathway From Poverty* initiative. By September 2017, the team of project champions expanded to include County Commissioners Lawrence Weekly and Chris Giunchigliani, as well as leadership from the Nellis Air Force Base, Southern Nevada Counter Terrorism Center (SNCTC), and various components of the LVMPD. Collectively, the team selected a gunshot detection technology called ShotSpotter and then worked with The Friends of LVMPD Foundation and the University of Nevada Cooperative Extension to gain the needed funding to turn this idea for gunshot detection into a reality.

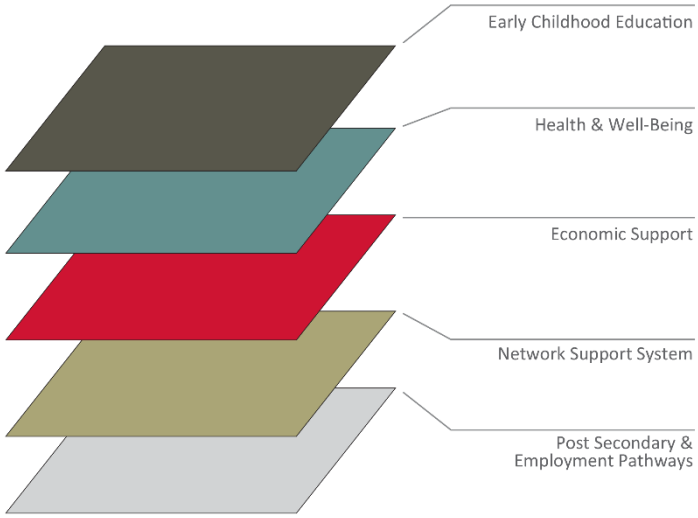


Illustration 2 - Key Layers of the Pathway from Poverty Initiative

What is ShotSpotter?

ShotSpotter is a gunshot detection technology designed to identify and triangulate the location of potential shootings. The technology is comprised of three primary components. The first component consists of a network of audio sensors that are installed on various buildings and light poles. The network of sensors is designed to capture a particular frequency of sound that resembles gunfire. Upon capturing these sounds, the system triangulates the originating location of the

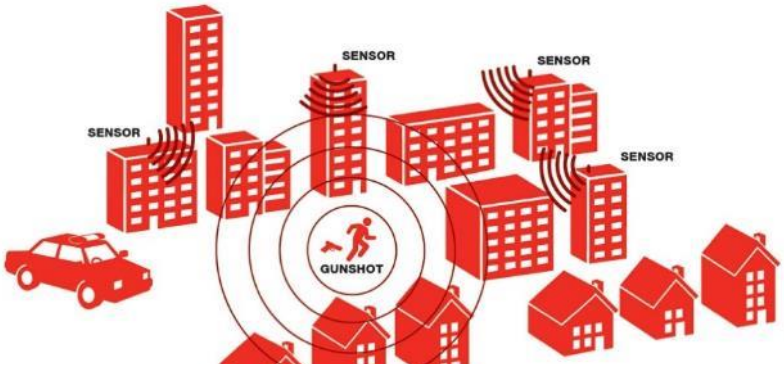


Illustration 3 - Vendor Example of how ShotSpotter Works

sound and transmits this data to a 24/7 Incident Review Center (IRC). The IRC, which is owned and managed by the vendor, functions as the second key component of the technology. Acoustic experts at the IRC review each file that is transmitted before confirming or rejecting the computer's classification of the sound. If a sound is believed to be gunfire, an alert is generated and shared with LVMPD via a user portal and mobile application. This third and final component of the technology alerts Fusion Watch, as well as LVMPD patrol and dispatch, of the potential shooting. The vendor promotes a turnaround time for this cycle to be 60 seconds or less.

Designing the Pilot Program

Law enforcement agencies across the United States have entered a new era of policing where technology has increasingly become the centerpiece of nearly every crime fighting strategy. From an information technology perspective, agencies are rapidly aiming to upgrade their radio and CAD systems, enhance their ability to capture and store digital evidence, and improve their access to wireless internet. Likewise, many police agencies are also drifting into the future as they adopt new and innovative technologies for collecting intelligence and combatting crime virtually. Whether it be sophisticated cameras and license plate readers or facial recognition and gunshot detection sensors, there is a growing interest in adopting cutting-edge technologies for combatting crime.

While more promising than ever before, this shift towards technology-based policing is not free of its own unique challenges. In particular, determining which technology is best designed for a given problem is often a complicated matter. Agencies first have to shift through the sheer number of vendors before they find what appears to be the best option. From there, agencies need to carefully evaluate whether the proposed solution can actually deliver on the established requirements. As many agencies have experienced, the expectations set during vendor demonstrations do not always match reality and a disconnect between the two can often result in frustration and wasteful spending. It is for this reason the LVMPD gunshot detection program was designed as a one-year, limited pilot program. This approach to adopting new technology allows the LVMPD to conduct a comprehensive assessment from which a more educated decision on expansion can be made at the appropriate time.

The concept plan for this pilot program included the following six key components:

1. Program Management

First, a multi-layered program management strategy was established. The program would be developed and led by a program manager, who would report to an executive steering committee. The program manager would also establish an implementation team, as well as an advisory group that represented the various stakeholders within the LVMPD. Collectively, these

groups helped guide the implementation plan for the new technology.

2. Hardware Installation

The ShotSpotter technology requires the hardwire installation of audio sensors in a predesignated area. Determining how many sensors are required to provide the needed coverage and what locations could provide the best results requires a great deal of preparation. The LVMPD identified two locations for deployment based on this analysis. The first location was three square miles located in the NEAC. The second location was three square miles that spanned across SCAC and Southeast Area Command (SEAC). Each of these locations were selected based on the analysis of crime in the area, as well as the availability of resources to support the introduction of the new gunshot detection technology. Ultimately, the north and south coverage areas would include approximately 120 sensor installations.

Prior to installing these gunshot detection sensors, the LVMPD and ShotSpotter company worked collaboratively to gain support from the affected business, government, and community members that were located in the coverage areas. Permission and liability waivers were obtained from each entity that voluntarily agreed to a house a gunshot detection sensor on their property. The vendor then completed the installation work.

3. Software Installation

In addition to hardware, the program management team also had to coordinate the installation of software within the LVMPD. At the start of the pilot, the LVMPD was limited to using Internet Explorer and the Silverlight plug-in. This was noted as a significant deficiency during the planning phase of the pilot program. The ShotSpotter technology is most effective when the officers in the field have full and real-time access to the gunshot alerts. However, based on the limitations within LVMPD at the time of launch, this level of access could not be achieved. The software application had to be installed on patrol tablets using Internet Explorer and Silverlight. This inhibited the ability for officers to receive the tone alert for ShotSpotter notifications. To help limit the impact, Fusion Watch was tasked with broadcasting the alerts over the radio. Although this helped, it proved to be less effective than if the officers were able to receive the full alert in real-time.

4. Policy and Procedure

Once the hardware and software were installed, the program management team coordinated the development of a ShotSpotter response procedure. The primary responsibility for managing the ShotSpotter technology and response was assigned to the newly developed LVMPD Tech Ops Section, which is comprised of the Fusion Watch operations unit, Crime Gun Intelligence Center (CGIC), and Technical and Surveillance Squad (TASS). Collectively, these components use advanced technologies and specialized intelligence collection methods to conduct technical surveillance, virtual crime-fighting operations, and crime-gun investigations.

Although each of the Tech Ops components played an integral role in the pilot program, Fusion Watch served as the key unit for deploying the technology. This placement of responsibility was especially relevant since Fusion Watch was already functioning as a 24/7 real-time crime center that deployed a variety of crime-fighting technologies. Fusion Watch also managed the ShotSpotter response procedure, which involves the following steps:

1. Upon receiving a ShotSpotter alert, Fusion Watch would broadcast the information to patrol and begin researching the incident information.

2. LVMPD dispatch would then generate a call for service with a unique identifier for ShotSpotter. Additionally, each ShotSpotter event would require the application of the LVMPD STAR protocol.[6] The general assumption was that the ShotSpotter technology could result in faster response times and more engagements with potential shooters. This in turn could increase the likelihood of an OIS. To limit the potential impact, the STAR protocol was required for all ShotSpotter events. Dispatch would announce the need for STAR protocol and begin coordinating patrol resources once the notification was made over the radio.

3. Patrol officers would then respond to the area upon receiving the alert from the mobile application, hearing the broadcast from Fusion Watch, or being dispatched to the call for service.

4. Fusion Watch would provide any amplifying intelligence during the response to include information about the number of shots, whether there may be multiple shooters, and the likely location of the gunfire.

5. Patrol would use the intelligence to address any potential threats, assist victims if located, arrest suspects if on scene, and collect evidence when available. Patrol officers and/or COP units would then conduct preliminary follow-up. This follow up included checking the ShotSpotter area for shell casings and other evidence, canvassing the affected neighborhood for potential intelligence, and disseminating door hangers that encouraged community resilience and assistance in solving the related gun crime.

6. The final step in the process involved the documentation of the results. Patrol would document any relevant findings in CAD and Fusion Watch would log the details of each event in the LVMPD ShotSpotter Log.

[6] As designated by LVMPD policy, any event that involves a suspect with a weapon requires three officers and a sergeant to respond when available. This level of response is referred to as a STAR protocol and it was determined prior to the pilot launch that ShotSpotter events would qualify under this requirement.

5. Live Fire Tests

The last step prior to activation involved live fire tests of the ShotSpotter technology in the south and north. The project management team worked with the vendor, area commands, LVMPD range staff, and the Clark County Fire Department to create a safe environment for testing the gunshot detectors. Each test involved firing live rounds into a barrel so the system could be calibrated accordingly. Each of these tests were conducted without issue.

6. Activation

The system was then activated following the live fire tests. The north coverage area was activated on October 25, 2017 however, the LVMPD was not able to begin using the technology until the response procedure was approved on November 16, 2017. Likewise, the south coverage area was activated on November 30, 2017 however, the technology was not officially launched in the south by the LVMPD until December 1, 2017.

Additionally, although the pilot program began on these dates, the assessment period for which this report is based on was limited to the period of December 1, 2017 to September 1, 2018 (nine months of data).

Illustration 4 - ShotSpotter Deployed in Las Vegas Neighborhood

METHODOLOGY

The LVMPD ShotSpotter pilot assessment serves as a comprehensive evaluation of the ShotSpotter technology and the overall use of gunshot detection within law enforcement. This report provides the results of this assessment, which is primarily divided into five focus areas.

Technical Evaluation

The most important topic covered in this report is a technical evaluation of the ShotSpotter technology. As indicated in the program development section, it has become increasingly important to ensure that every technology adopted by law enforcement actually meets expectations. More simply stated, the adoption of any new technology requires knowing whether it works and whether it is worth adopting. The technical evaluation focuses on answering these questions for the ShotSpotter technology. The technical evaluation is divided into four subtopics.

The first focuses on the technology's general performance, which is measured by evaluating ShotSpotter's ability to record potential gunshot sounds, filter these sounds to help identify potential shootings, and transmit this data to LVMPD via the ShotSpotter user portal. The second subtopic focuses on the systems accuracy in identifying shootings. This metric is measured by evaluating the number of potential and confirmed gunshot events identified, as well as the number of potential and confirmed gunshot events missed. This metric also considers the technology's ability to accurately identify the location of a crime scene. The third subtopic focuses on the systems investigative impact, which is defined as its utility in identifying the location of physical evidence and victims, as well as the apprehension of suspects. The final subtopic focuses on the systems timeliness, which includes how long it takes for a shooting to be identified, an alert to be published, and for the user to acknowledge receipt of the shooting alert. This subtopic also focuses on whether the system provides a faster response than a citizen's call to 911 for the same shooting.

Qualitative Assessment

To supplement the technical evaluation, this report also includes a qualitative assessment based on success stories, as well as notable misses. These excerpts are of real ShotSpotter events that occurred during the assessment period. While not exhaustive, they collectively provide a snapshot regarding the value of the ShotSpotter technology that goes beyond just the numbers.

Incident Analysis

In addition to the quantitative and qualitative assessments, this report also includes guidance and intelligence for combatting gun crime in the coverage areas. When aggregated and analyzed, the ShotSpotter-related data that was collected for this assessment can provide decision makers with intelligence for combatting the crimes that are occurring in the coverage areas. This analysis includes insight into the locations of gun crimes, the caliber of weapons used, the proximity between shootings, the frequency of events, and much more.

Crime Analysis

The fourth focus area focuses on measuring crime before and after the deployment of ShotSpotter. Although there are limitations in connected the technology to the rise or fall of crime, there is still some value in understanding whether the technology potentially contributed one way or another. More importantly, the crime analysis in this report provides a foundation from which additional analysis can occur once more crime data is collected during the second year of deployment.

Operational Review

The fifth focus area that is covered in the pilot assessment focuses on the response to ShotSpotter events and the overall application of the technology within LVMPD. This area addresses the human side of how well the program worked within Fusion Watch, patrol, and dispatch, as well as the areas that could be improved in the future.

In addition to these five focus areas, this report also includes a *what-if* scenario regarding the future of ShotSpotter, as well as an expansion proposal and a concept plan for the Safety Grid Strategy that is highlighted as a future recommendation.

Target Audience

The target audience for this report includes the LVMPD Sheriff and executive staff, the Clark County Commission, Las Vegas City Council, the Friends of LVMPD Foundation, Nevada Cooperative Extension, Fusion Watch, SNCTC partner agencies, and the affected area command personnel. This report may also provide value to other law enforcement agencies and political figures that are interested in using gunshot detection systems to combat crime.

Data Collection

Two sets of data were used for this pilot assessment. The first and primary dataset was formed independently from the ShotSpotter technology by LVMPD Fusion Watch personnel. This dataset included 49 different types of data (e.g., event number, time of shooting, location, whether casings were recovered, and caliber of weapon), each of which were manually recorded following the alert of a potential shooting in the coverage area. Ultimately, this dataset resulted in 25,823 points of data that collectively represent the most comprehensive and objective perspective of the pilot results. Appendix A includes 17,391 of the 25,823 data points used for this assessment. The remaining data points contained Personal Identifying Information (PII) and were redacted for privacy purposes. However, the data points that are included are sufficient for recreating the statistical analysis represented in this report.

The second dataset that is primarily used for comparison consists of information collected by the ShotSpotter investigator portal. This portal automatically records a variety of data points for each ShotSpotter event. Although the automation of this dataset alleviates the issues caused by human error, it is insufficient for the purpose of making an objective assessment. For example, the portal records the number of alerts published but this number does not represent the number of confirmed shootings. There are also limitations on what may be recorded in the investigator portal but not received by the users due a system malfunction. Finally, this dataset does not account for the nuances of an incident that can only be captured by coordinating the exchange of information with those responding to the scene of a ShotSpotter event.

Research Limitations

The assessment period for this report focuses on the data collected from December 1, 2017 to September 1, 2018. The ShotSpotter technology began identifying potential shootings on October 20, 2017 for the north coverage area and on November 7, 2017 for the south coverage area. A portion of this time frame included the installation and testing of the system. Secondly, the official launch for the north preceded the launch in the south by approximately three weeks. This staggered approach in launching the technology did not allow for an equal comparison between the two areas. To avoid these two issues, the pilot assessment period excluded the data collected in October and November (184 events). Instead, the assessment period only focuses on the data collected between December 1, 2017 and September 1, 2018.

This assessment period also excludes the events that occurred from December 31st at 2000 hours to January 1st, 2018 at 0400 hours. The LVMPD did not use the ShotSpotter technology during this brief timeframe due to issues with the New Year's Eve (NYE) celebration (e.g., influx of celebratory gunfire and fireworks). In addition to this suppression of NYE data, the program management team also excluded 47 events that were not logged because they appeared to be echoes or duplicate notifications of a prior ShotSpotter event. Finally, there were 25 potential shootings recorded in the ShotSpotter Investigator Portal that were not logged by Fusion Watch. It appears 15 of these events did not include an alert to LVMPD at the time of incident and 10 were missed by Fusion Watch for an unknown reason.

Ultimately, the primary dataset used for this report is based on 487 ShotSpotter events and 40 additional 911 calls from citizens that were not captured by the technology. The total number of ShotSpotter events matches the number of events recorded by the vendor once the aforementioned exclusions are accounted for.

Margin of Error

The analysis provided in this report is primarily based on the manual collection and recording of data. As such there is likely to be some level of error due to typos or miscalculations. However, to avoid any significant discrepancies, the data has been checked multiple times and calculated using Microsoft Excel, as well as a standard electronic calculator.

FRAMING THE DATA

The primary dataset was divided into two frameworks. The first is based on all reports of potential shootings within the coverage area to include those that were reported by ShotSpotter, as well as those reported by 911 calls for service. These 'potential' shootings are considered unconfirmed since they are primarily based on the reporting of gunshot sounds, as opposed to physical evidence. The second framework is of 'confirmed' gunshot events, which is primarily based on the report of gunfire sounds combined with some form of additional evidence. The assessment of additional evidence included the recovery of spent shell casings or ammunition, the location of witnesses, victims, or suspects, or any other physical evidence that a shooting occurred (i.e., impacts to building). Although this second framework is more accurate in determining whether a shooting occurred, both have value for the purpose of evaluating the ShotSpotter technology.

Potential vs. Confirmed Shootings

The first framework of potential shootings accounts for all shootings within the coverage area. It is important to note that the lack of additional evidence for each of these potential shootings does not automatically indicate a false positive. For example, there are many reasons why casings may be missed from a crime scene to include the use of a revolver, the suspect picking up the shell casings prior to police arriving, and environmental factors (e.g., poor lighting) that cause an officer to miss evidence. There have been multiple events where each of these examples have proven true during this assessment period. Likewise, the report of a gunshot sound, whether it be based on a human or computer assessment, is not always accurate. For example, there are situations where a firecracker, the backfire of a vehicle, or another loud banging noise was mistakenly processed as gunfire.

It is because of these limitations that both frameworks are used in this report. The potential shootings framework provides the reader with a broader and more comprehensive view of all the potential shooting activity while the confirmed shootings framework offers a limited but more definitive perspective.

Total Potential Shootings

There were 527 potential gunshot events within the coverage area. Of these potential shootings, 342 were identified exclusively by the ShotSpotter technology while 40 were identified exclusively by a citizen's call to 911. The remaining 145 potential shootings were identified mutually by the ShotSpotter technology and a citizen's call to 911. In total, ShotSpotter provided an alert for 92% (487 of 527) of the total potential shootings identified in the coverage area.

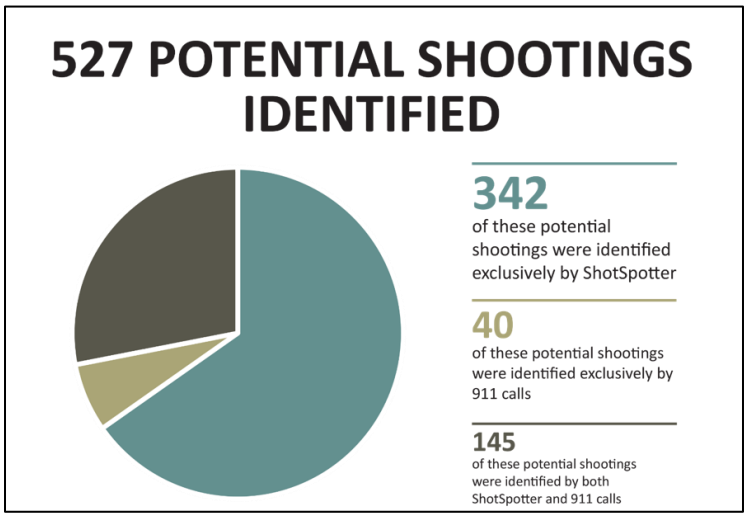


Figure 1 - All Potential Shootings for Coverage Area

Although not as definitive as the data on confirmed shootings, these figures indicate that 65% (342 of 527) of the potential shootings that may be occurring in the coverage area are going unreported by citizens.

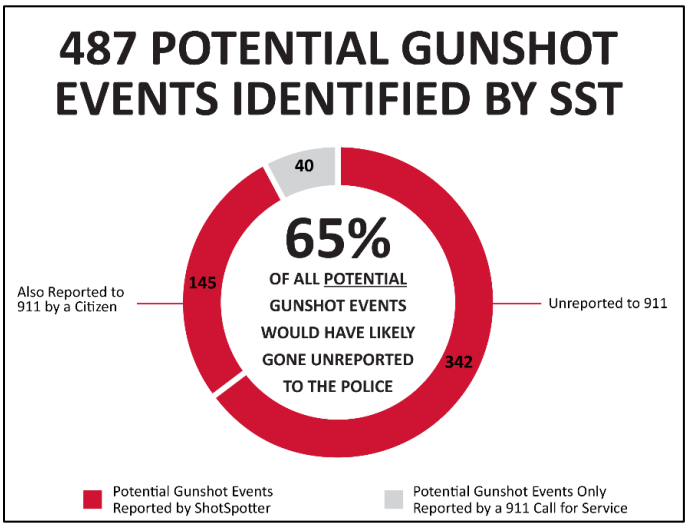


Figure 2 - Potential Shootings Identified by ShotSpotter

ShotSpotter Events by Alert Type

The ShotSpotter system generates three primary alert types: Possible Gunshot or Firecracker alert, Single Gunshot alert, and Multiple Gunshots alert. The classification of these events is based on a two-step process. First, the ShotSpotter computer makes an initial determination upon sensing a sound that resembles gunfire. The system classifies the sound using a predesignated set of 22 options and then sends the analysis to the ShotSpotter IRC. At this point, an acoustic expert confirms, changes, or rejects the computer's assessment. The confirmation of gunfire is categorized into one of the three primary alert categories and then sent to the user. Based on this process, the LVMPD received and logged 487 alerts during the assessment period. This included 97 possible gunshot alerts, 161 single gunshot alerts, and 229 multiple gunshots alerts.

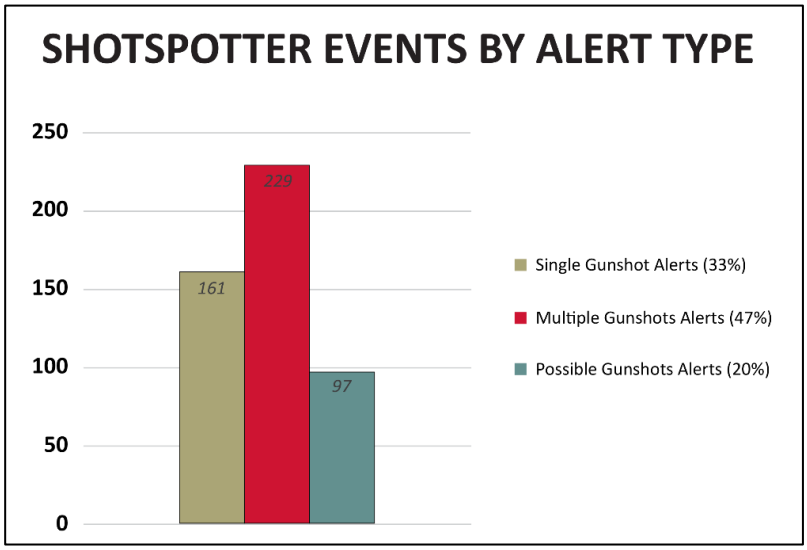


Figure 3 - ShotSpotter Events by Vendor Alert Type

Total Potential Gunshots Reported by ShotSpotter

The ShotSpotter technology also captures the number of gunshots recorded during an alert. Of the 487 potential shootings identified by ShotSpotter, the system registered 1,487 potential gunshots in total.

Illustration 5 - Number of Gunshots Reported by ShotSpotter

A per event analysis shows that more than half of the potential shootings involve multiple gunshots with three being the average number of shots for an individual incident. The highest number of gunshots for a single event is 27, which involved the use of a rifle.

TECHNICAL EVALUATION

General Performance

The ShotSpotter technology functions primarily as a network of audio sensors that are designed to identify and triangulate the originating location of a possible gunshot. To accomplish this task, the system has to capture and analyze any sound that resembles gunfire to include what ultimately could be a loud firecracker, the backfire of a vehicle exhaust, a low flying helicopter or anything else that may generate a loud banging noise. The technical evaluation revealed that this necessary screening is quite comprehensive and complex. For example, since the installation period, the ShotSpotter technology captured and analyzed 9,622 sounds that resembled gunfire in the north coverage area. Of these sounds, only 300 were initially screened to be possible gunfire events.

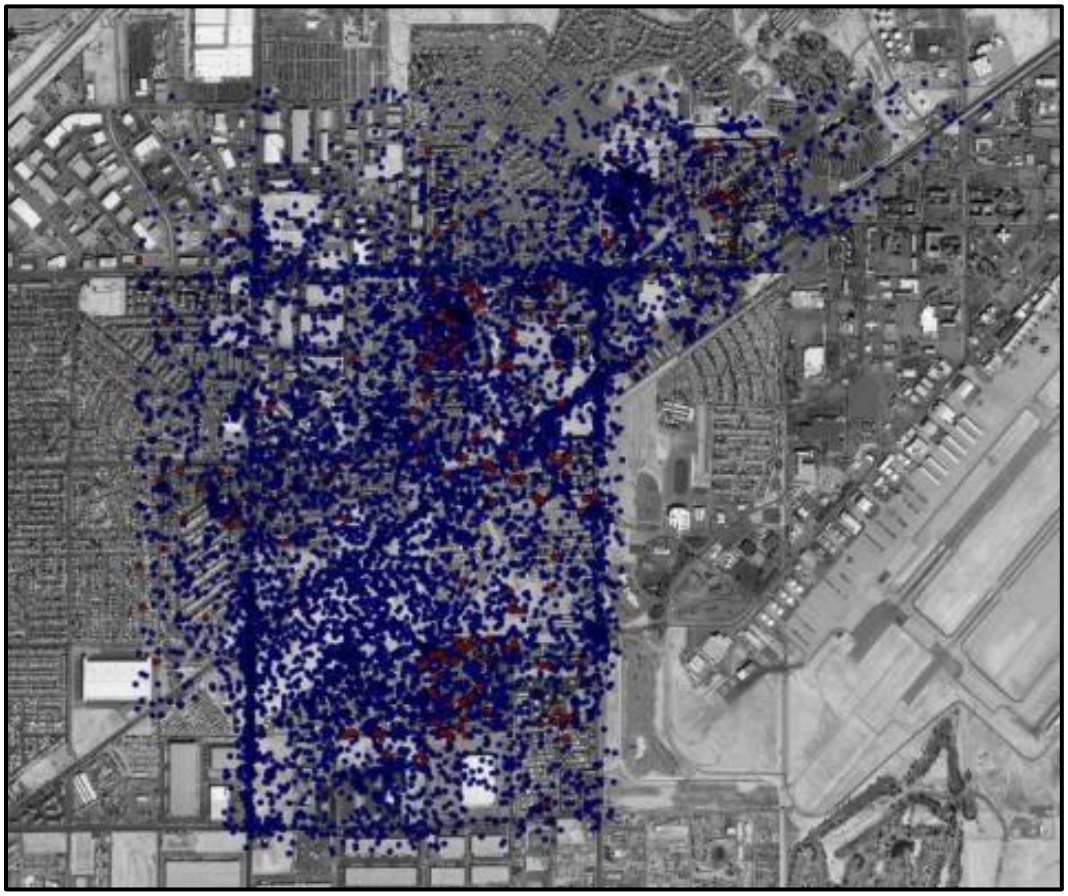


Illustration 6 - Screening of Gunfire Sounds in the North Area

Note: The map compares all of the sounds captured by ShotSpotter that resembled gunfire (blue dots) against the sounds that were ultimately determined to be potential shootings (red dots)

While significantly less than the north coverage area, the system captured another 6,052 sounds that resembled gunfire in the south. Of these sounds, 297 were initially screened as possible gunfire.

In total, the 20,165 audio sounds that resembled gunfire were effectively filtered down to only 784 events.[7]

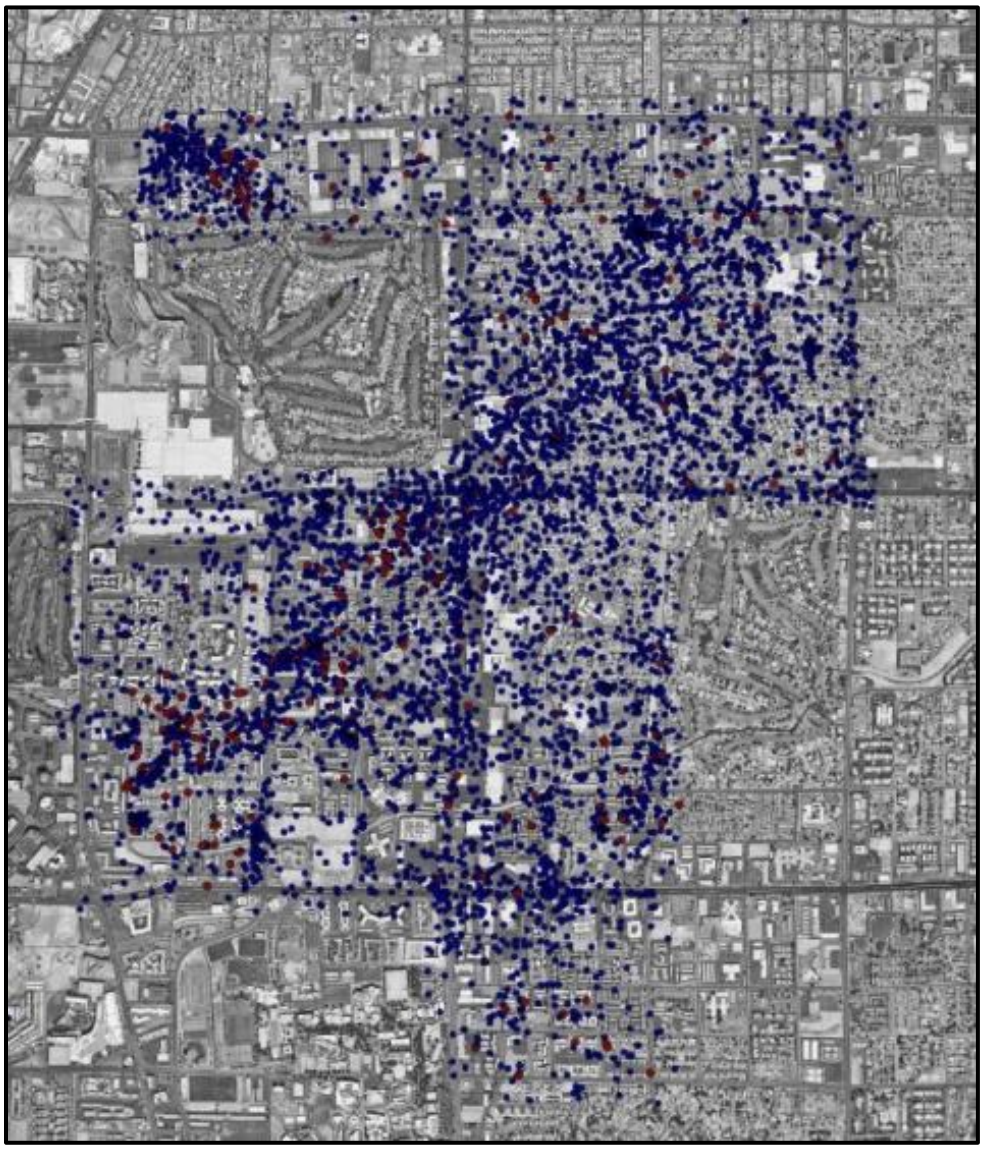


Illustration 7 - Screening of Gunfire Sounds in the South Area

Note: The map compares all of the sounds captured by ShotSpotter that resembled gunfire (blue dots) against the sounds that were ultimately determined to be potential shootings (red dots)

[7] This total number of events is larger than the 487 potential shootings mentioned earlier because it encompasses the entire time the technology was active, to include the test period.

Accuracy - Confirmation of ShotSpotter Events by Physical Evidence

The accuracy of the system was determined by two types of measurements. The first involved confirmation of potential shootings, which was determined by the presence of additional evidence (e.g., shell casings and eyewitnesses). In this regard, there were 209 ShotSpotter-identified events that were confirmed through additional evidence during the pilot assessment period. There were no prior calls for service to 911 for 20% (99) of these events.

As previously mentioned, the potential shootings that were not confirmed does not necessarily mean the shootings did not occur. On the contrary, a review of the audio recordings suggests that many of these unconfirmed shootings likely involved actual gunfire but simply lacked additional evidence on scene.

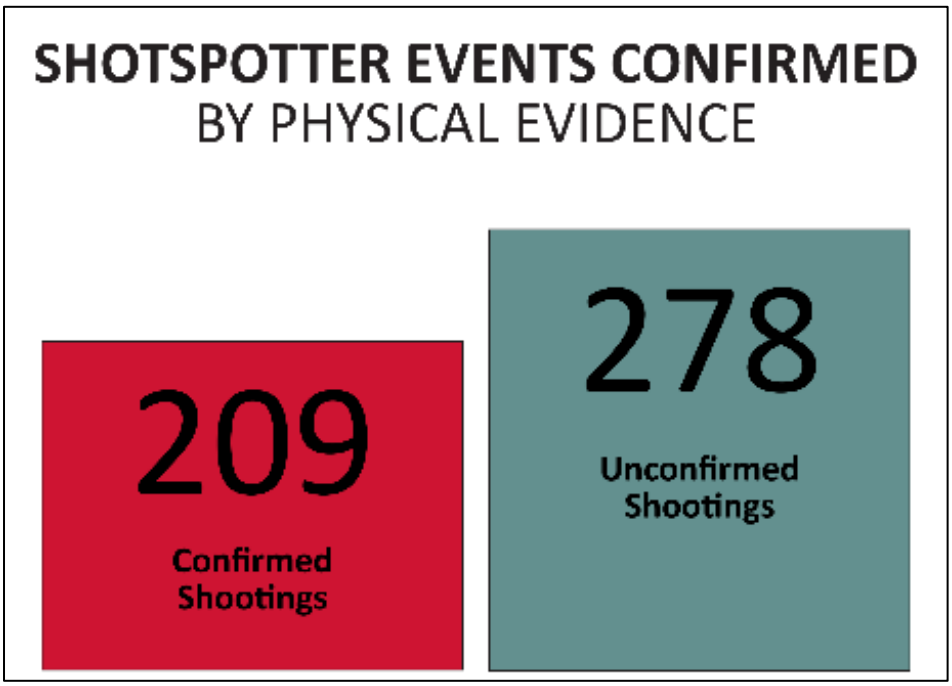


Figure 4 - ShotSpotter Events Confirmed by Physical Evidence

Accuracy - Confirmation Rates by ShotSpotter Event Type

The most common type of ShotSpotter alert that was confirmed was the Multiple Gunshots alert (144 confirmed events). The Single Gunshot alerts (41 confirmed events) and Possible Gunshot alerts (21 confirmed events) were far less likely to result in confirmation by additional evidence. This analysis suggests the Multiple Gunshots alert is more credible than the other two alert types.

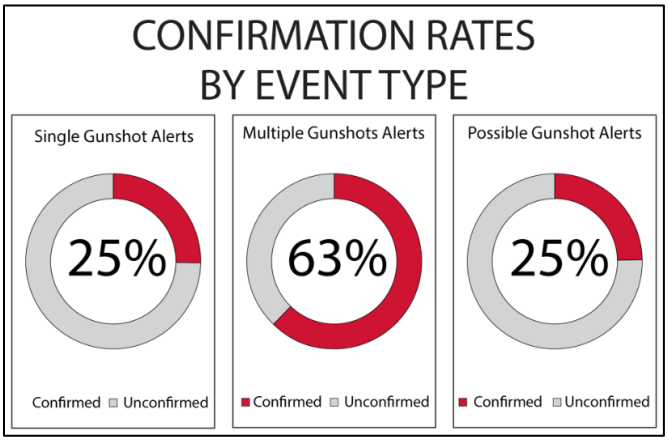


Figure 5 - Confirmation Rates for ShotSpotter Events by Vendor Type

Accuracy – Confirmation Rate for Missed Shootings

The final measurement of accuracy was based on evaluating the number of times the ShotSpotter technology missed a potential or confirmed shooting. There was a total of 40 potential shootings called into 911 by a citizen that ShotSpotter did not register. Of these events, 25 events were confirmed as shootings that ShotSpotter missed (i.e., casings recovered). Six of the remaining events fell outside the system parameters (e.g., a shooting that occurred indoors) and nine were never confirmed (e.g., no witnesses or evidence) as shootings. In total, this data indicates ShotSpotter missed 7.6% of all the potential shootings that occurred in the coverage area (40 out of 527) or 10.5% of just the confirmed shootings (25 out of 237).

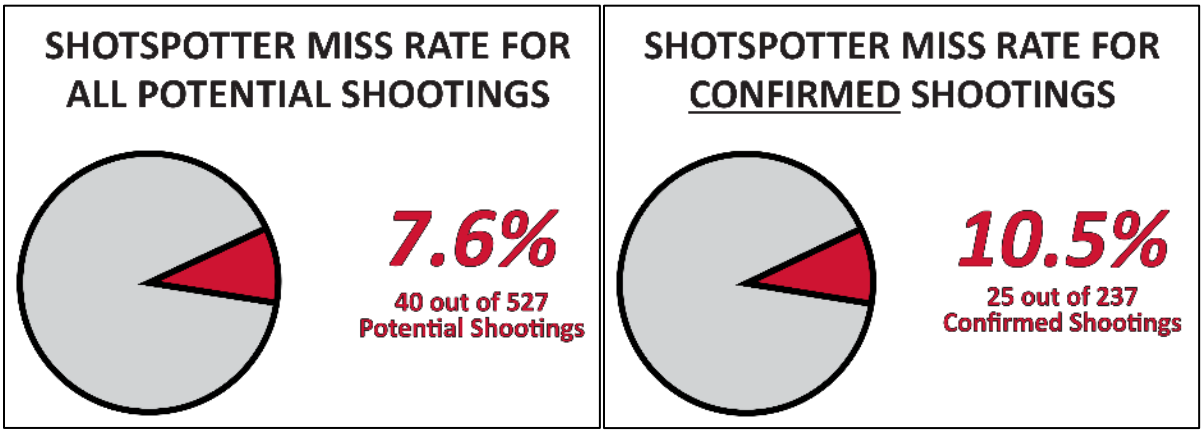


Figure 6 - ShotSpotter Miss Rates for Potential and Confirmed Shootings

Accuracy – Echoes and Duplicate Alerts

The ShotSpotter technology produced 47 echoes or duplicate alerts during the assessment period. Echoes were determined to be a second or third alert on a gunshot event that had already been received seconds prior. The reason for the echoes is primarily based on environmental factors that influence the travel of sound (e.g., large buildings). Duplicate alerts were determined to be a second or third alert that was unique in the gunfire pattern but related to a previously published notification. In most cases, duplicates appeared to be a continuation of the same shooting event and/or the presence of a second shooter.

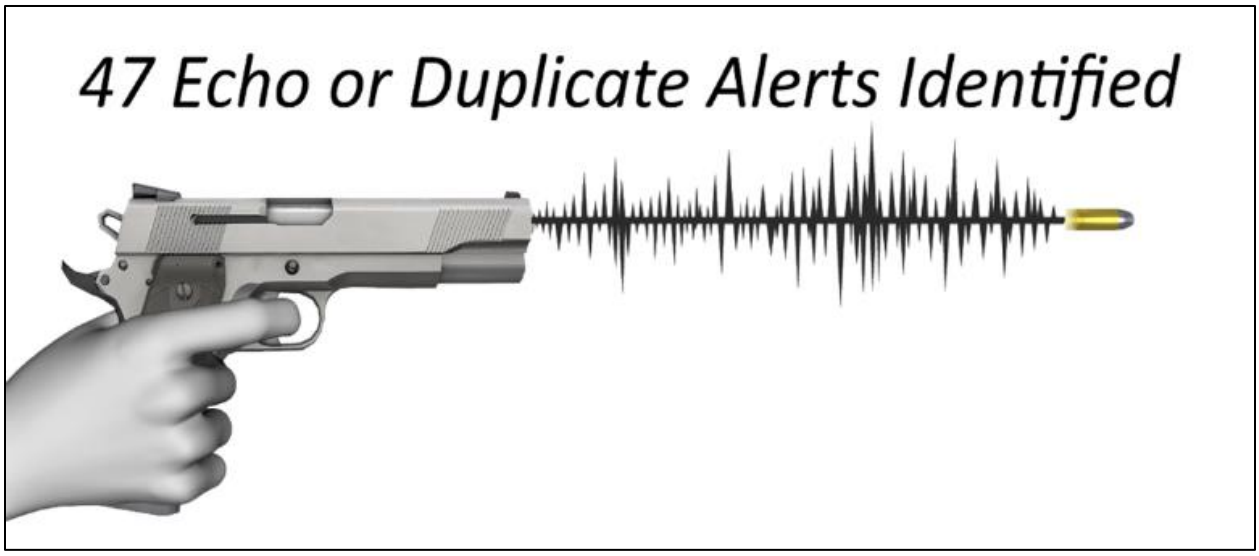


Illustration 8 - Number of Echo or Duplicate Alerts

Although most of these echoes and duplicates could be recognized and discarded at the time of receipt, the result was unexpected and did create some confusion within the first three months of the pilot program. For example, an echo of a previously published alert of the same shooting would often result in multiple broadcasts of the same event, as well as a misconception regarding the number of shootings within the area. After the initial few months, Fusion Watch began discarding the echoes and duplicates, which resolved most of this confusion.

Speed – Timeliness Rates for ShotSpotter Events

The technical evaluation included three primary measurements of timeliness. The first focused on the time between a shooting and the publication of an alert. The second focused on the time between the alert being published and acknowledged by the user. The third and final timeliness rate focused on the time between the alert acknowledgement and the creation of a CAD event by dispatch.

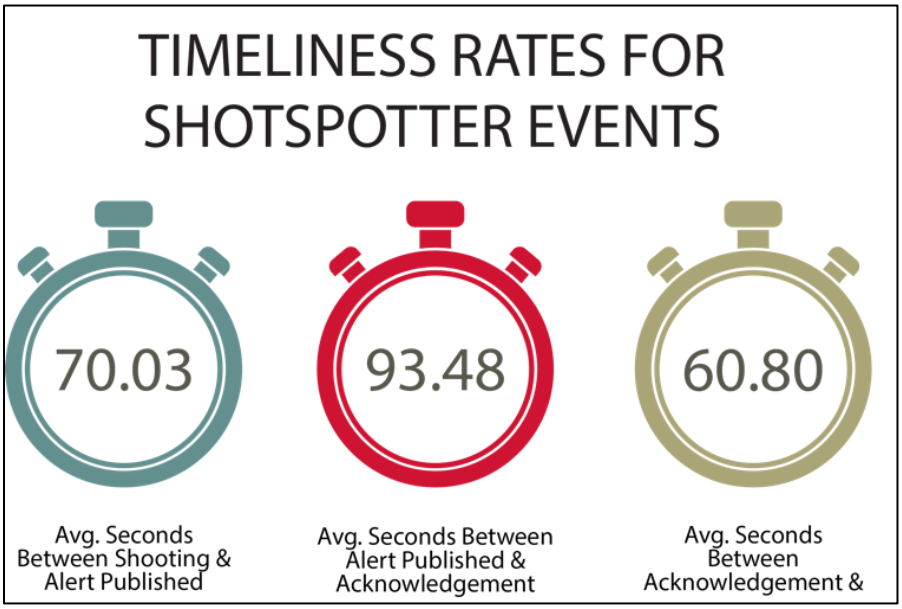


Figure 7 - Timeliness Rates for All ShotSpotter Events

According to the ShotSpotter company, "the total time from gunshot to alert is less than 60 seconds." However, the technical evaluation in this report indicates the average time between a shooting and alert was slightly over 70 seconds. There were five events that exceeded eight minutes from the time of shooting and alert and one alert in particular that was published nearly 30 minutes late because of a malfunction with the LVMPD computer. Although these six events represent less than two percent of the total alerts, the delays were long enough to skew the overall average. As such, an alternative perspective that measures the number of events that preformed under the 60-second threshold was more applicable in determining timeliness. In this regard, the technical evaluation shows that 337 (69%) alerts were published under 60 seconds and nearly all (91%) were published within two minutes.

The average time between an alert being published and acknowledged was nearly 94 seconds. Similar to the other measurements, this number was also skewed by challenges that accompanied the initial launch of the program. For example, in the initial months of the pilot, there were multiple occasions where the LVMPD computer designated for ShotSpotter malfunctioned. This created a lengthy delay between the alert and acknowledgment by Fusion Watch personnel. In particular, there were six events that exceeded 11 minutes between the alert being published and acknowledged and another two that were delayed by nearly three

hours. These delays greatly skew the timeliness rate and misrepresents the time it takes to process these alerts on most occasions. For example, a more in-depth analysis actually shows there were 453 (93%) events that were acknowledged within 60 seconds of the alert being published and the far majority of these events (384) were actually acknowledged in 15 seconds or less.

It is important to note, the eight events that were significantly delayed due to computer issues would have likely been avoided if the ShotSpotter software could have been deployed on Google Chrome instead of Internet Explorer, which was a known issue at the time of pilot launch. Fortunately, LVMPD has since switched to Google Chrome, which should alleviate this problem in the future.

Finally, the average time between an acknowledged alert and the creation of a CAD event by dispatch was 60.80 seconds. Like the previous two rates, this average time is also skewed by the aforementioned delays. However, the impact on the CAD event times is less of an issue since an event does not need to be created prior to an officer responding to the area. In other words, ShotSpotter alerts are broadcasted over the radio and transmitted via the mobile ShotSpotter application. This notifies officers and allows them to begin responding to the area even prior to dispatch creating an event in CAD.

Speed - Analysis of Timeliness Rates by Month

As previously indicated, the average timeliness rates for the ShotSpotter events were skewed by numerous delays that occurred during the development of the program. When viewed as a whole, the results are misleading and indicate a partial lack of performance. However, when viewed by monthly average, the results show that the ShotSpotter technology performed under the 60 second threshold six out of the nine months. Nonetheless, the average speed between a shooting and an alert for the entire assessment period or by month still reveals room for improvement.

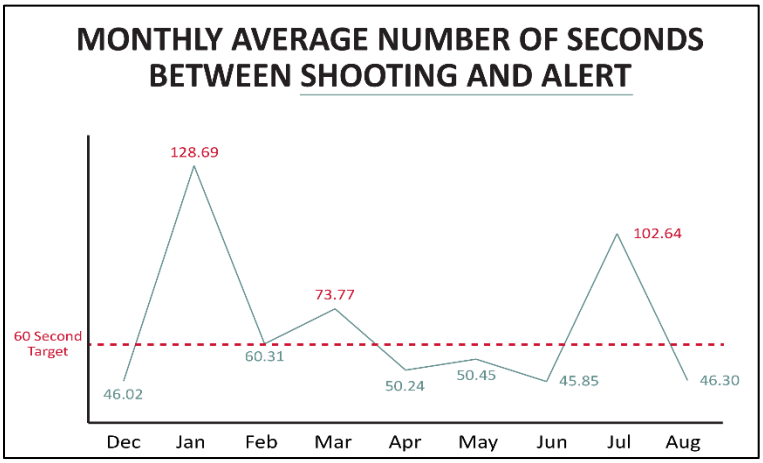


Figure 8 - Monthly Average Time Between Shooting & Alert

The monthly averages for the number of seconds between an alert and acknowledgment by LVMPD is fairly good. Four of the nine months show an average under 13 seconds and only three months resulted in over 60 seconds. Additionally, the month of May shows how just two events that were delayed by hours can greatly skew the average for the entire month. However, as indicated earlier, this average should still be improved to under 10 seconds in the future.

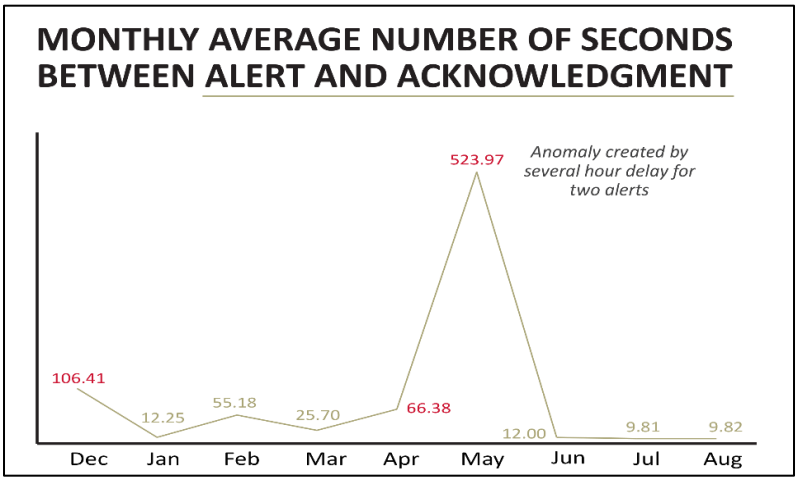


Figure 9 - Monthly Average Time Between Alert & Acknowledgment

Speed - Timeliness Comparison Between ShotSpotter and 911 Calls

The technical evaluation also included a comparative analysis between the ShotSpotter technology and the traditional 911 system. The primary goal of this measurement was to determine whether ShotSpotter was faster in alerting law enforcement to a shooting than a citizen's call to 911. The data shows that 86% (125 of 145) of the events that included both a ShotSpotter alert and a citizen's call to 911 were reported faster by ShotSpotter. Although the specific time difference is unknown, the earlier reporting resulted in faster response times for patrol, which was also anecdotally reported by users in the south coverage area.

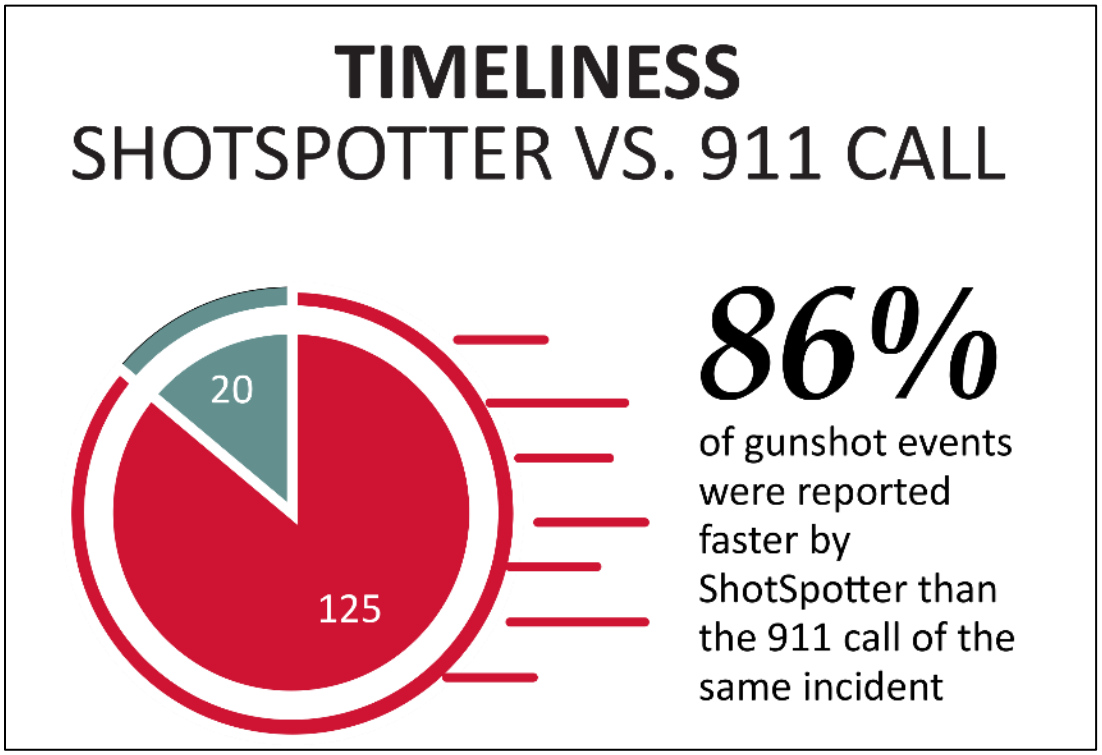


Figure 10 - ShotSpotter Events Reported Faster than 911

Investigative Impact – Crime Scene Identification

The identification of crime scenes combined with the recovery of physical evidence was used as the primary measurement for determining the investigative impact of the ShotSpotter technology. Of the 487 potential shootings identified by ShotSpotter, there were 209 crimes scenes identified by the presence of physical evidence. The most common type of evidence involved the recovery of shell casings, which consisted of 792 casings recovered from 153 events.

In comparison, the number of events where a suspect or victim was located, or a firearm was recovered, was far less than that of casings. There were 17 events where a suspect was arrested before or shortly after a shooting, 15 events where a victim was located, and 15 events where at least one firearm was recovered.

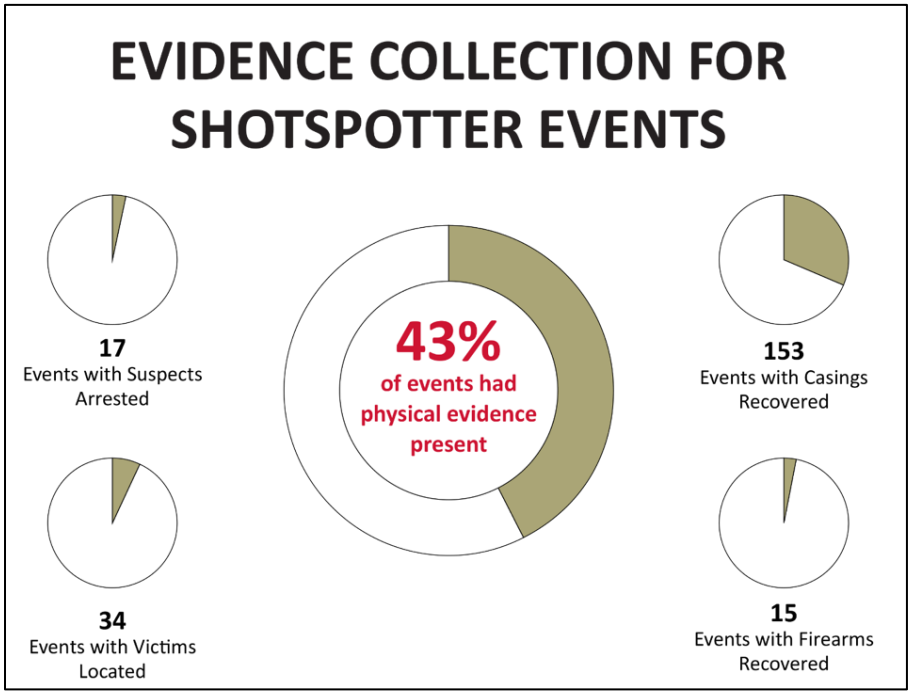


Figure 11 - ShotSpotter Events with Evidence Collected

The investigative impact in these latter three categories proved to be less than expected, however, the gap between expectations and reality was mostly driven by a misconception of what the ShotSpotter technology was designed to accomplish. For example, there was some belief that the ShotSpotter technology would result in more close encounters with shooters. Although the technology has proven to be faster than a citizen's call to 911, it is still only *near* real-time and not *in* real-time. In other words, even 60 seconds is enough time for a suspect to escape a crime scene. With that said, the use of an integrated camera network that automatically turns towards the location of a ShotSpotter-identified shooting could greatly enhance the apprehension of suspects.

The second reason for the relatively low numbers of arrests and firearm recoveries is due to a delay in the NIBIN acquisition process and investigative follow-up. The LVMPD Crime Lab has already made significant progress in managing a substantial backlog of NIBIN acquisitions and improving the overall process for completing the forensic analysis of shell casings. However, the Crime Lab is still in the process of catching up and as such, the timeliness between shootings and the related NIBIN notifications are far from ideal. One of the primary benefits of the ShotSpotter technology involves the identification and recovery of shell casings. This critical evidence can prove invaluable in preventing future shootings so long as the casings are processed through NIBIN in a timely manner.

When shootings are connected by NIBIN, the potential for identifying the suspects and/or recovering firearms increases substantially. However, the opportunity for this gain is highly dependent on the timeliness of the NIBIN matching process.

Ultimately, the NIBIN data has less value for preventing crime if the connection between multiple shootings takes weeks or months to establish. Fortunately, the LVMPD Crime Lab has already set the stage for resolving this issue in the near future by adding more resources, increasing training, and improving the procedures for NIBIN acquisitions. The second component, which addresses the deficiency in investigative follow-up has also been established by the recent creation of the LVMPD Crime Gun Intelligence Center (CGIC). The new CGIC task force is designed to help fill the gap by using ShotSpotter and NIBIN to identify crime guns and serial shooters.

Investigative Impact – The Value of NIBIN

There were 129 NIBIN notifications regarding an incident that occurred during the ShotSpotter deployment.[8] Of these, 32% included a match to a ShotSpotter-identified shooting. This proportion is remarkable considering the 129 notifications were for all of Clark County, while ShotSpotter was limited to just six square miles of coverage. Additional data would be needed to confirm but this significant proportion of NIBIN notifications for 2018 would support the assumption that most shootings are likely to involve many of the same crime guns.

Figure 12 - NIBIN Hits Related to ShotSpotter

This trend can also be seen by analyzing the number of ShotSpotter-identified shootings that resulted in a NIBIN notification. As previously mentioned, there were 153 ShotSpotter-identified shootings with casings recovered. Of these events, 51 resulted in a NIBIN notification to at least one other shooting. This number represents 33% of the ShotSpotter-identified shootings that had casings recovered. More importantly, this analysis does not yet include the NIBIN notifications that have yet to be completed. The percentage, while notable already, will likely grow as more NIBIN matches are made by the LVMPD Crime Lab in the coming months.

Ultimately, these two measurements reinforce the important relationship between the use of ShotSpotter and NIBIN. In many ways, the ShotSpotter technology is designed to increase the collection of shell casings by identifying unreported shootings and providing more accurate location information. On the other hand, the NIBIN technology is designed to identify shootings that are interconnected by the forensic analysis of spent shell casings. As such, there is no doubt the synchronized use of both of these technologies could provide unparalleled potential for preventing future shootings. Simply put, ShotSpotter can fuel NIBIN by producing more casings for analysis and in turn, NIBIN can lead investigators to more potential shooters by fusing together the pieces of intelligence.

[8] Fusion Watch received 211 NIBIN notifications between December 2017 and September 2018 for all of Clark County, NV. Of these, 77 were notifications regarding incidents that occurred prior to the deployment of ShotSpotter and 5 did not contain enough information to determine the incident dates (i.e., other jurisdiction with no incident date on the report). After removing these delayed and incomplete notifications, there were a total of 129 NIBIN notifications that could be analyzed for the purpose of this report.

Investigative Impact – By Area Command

The most apparent difference in the investigative impact between area commands was noticed in the recovery of shell casings. As indicated in the below figure, there were 76 events with casings recovered in NEAC, 50 in SCAC, and 27 in SEAC. This discrepancy between area commands is likely due to one or two reasons. First, the proportion between events with available evidence differs from one area to another. For example, there were more potential shootings in SCAC then in SEAC. Additionally, the use of a revolver or a suspect picking up casings may be more prevalent in one area over another. Second, it is equally possible that the officers in one area are more familiar and/or diligent in searching for additional evidence during a ShotSpotter event than in another area. This reason, while less likely to be more common than the first, would suggest that some officers may be missing the opportunity to collect casings.

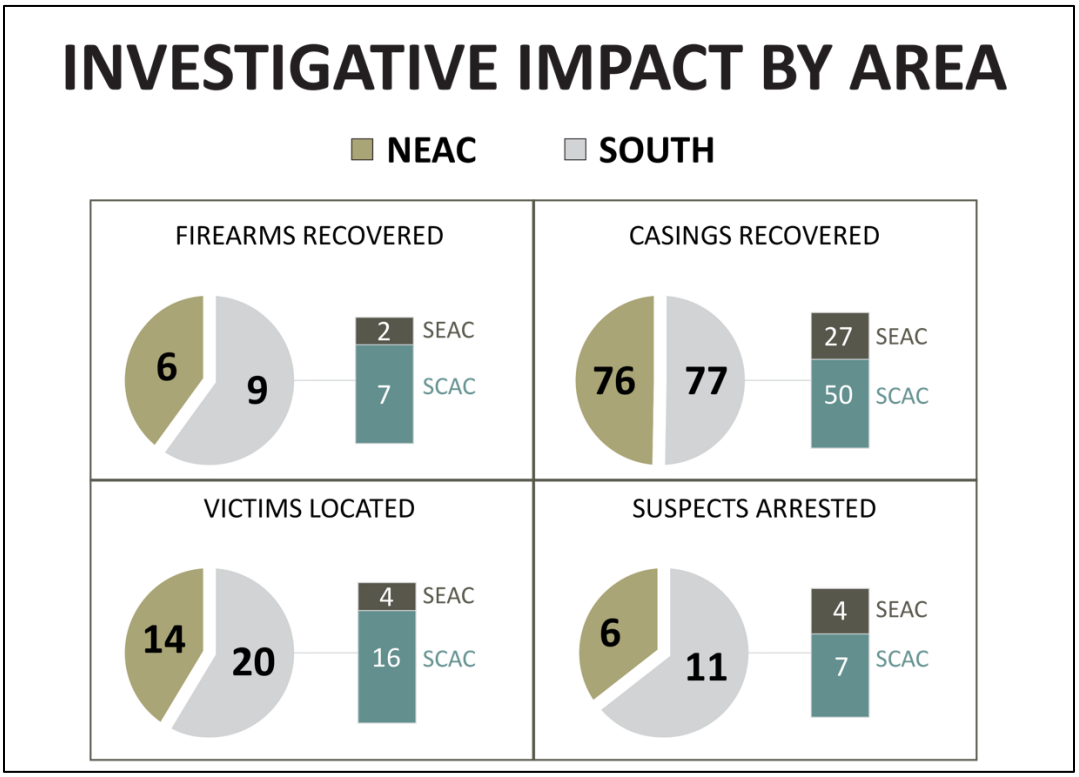


Figure 13 - ShotSpotter Events with Evidence Collected by Area Command

In either case, there is a need for more re-education on the technology. There have been significant personnel changes since the launch of the ShotSpotter pilot and increasing the awareness of how to use the technology would only improve the collection of shell casings in all three area commands.

Investigative Impact – ShotSpotter Forensic and Litigation Services

The ShotSpotter technology captures detailed time and location data for each of the impulsive sounds that are recorded by the network of sensors. This data can be analyzed and provided as a forensic report that provides the user with a detailed examination of when each shot was registered by the system, as well as the number of shooters and the potential direction of travel. Unfortunately, this service was only requested on one occasion during the pilot assessment. In March 2018, the ShotSpotter technology missed a shooting that resulted in a homicide. Although the technology failed to alert to this particular shooting, it did capture the gunshot data. As a result, the LVMPD was able to request a forensic report of the incident and use the data to help advance the homicide investigation. The forensic report helped identify the presence of two shooters, as well as their likely location during the shooting. Ultimately, the increased use of this tool, as well as the free litigation service that involves vendor-facilitated experts that can testify in court, could be quite useful in the future.

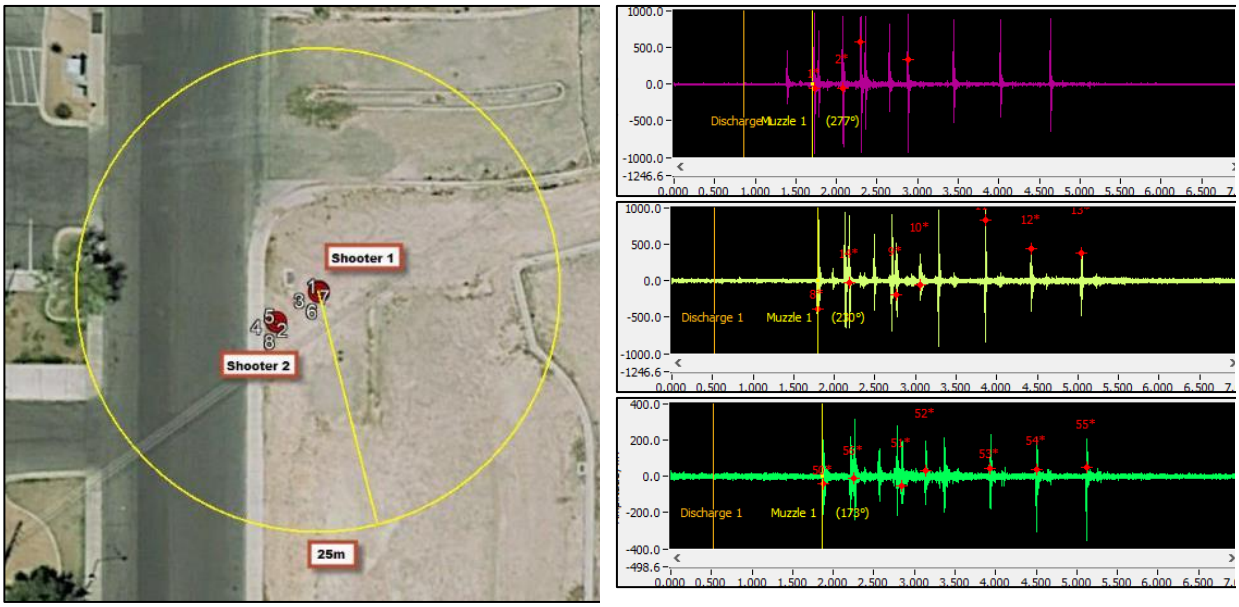


Illustration 9 - Example Forensic Analysis of ShotSpotter Events

QUALITATIVE REVIEW

As a key component of the *Pathway From Poverty* initiative, the ShotSpotter technology was adopted to help enhance the perception and reality of security in some of the most victimized communities within Southern Nevada. While difficult to measure the full affect, the pilot assessment did reveal a substantial positive impact in improving community relations and advancing security within key neighborhoods. In the south area, citizens expressed their surprise with how quickly officers were suddenly arriving to crime scenes. Likewise, in the north, several business owners and community leaders shared their appreciation for the added security and community engagement that accompanied the ShotSpotter technology. A sense of unity among public and private organizations also began to form with various entities to include the Regional Transportation Commission (RTC), Nellis Air Force Base (NAFB), Lowman Manch Elementary School, Green Our Planet, and the Nevada Cooperative Extension. Ultimately, this whole-of-community approach to combatting crime highlighted the value of the ShotSpotter technology and the overarching *Pathway From Poverty* initiative.

Below are some specific success stories and notable misses that help emphasize the impact and potential impact the technology had in advancing crime.

SUCCESS

ShotSpotter Used to Disrupt a Violent Kidnapping and Sexual Assault: In January 2018, the LVMPD Fusion Watch unit received a ShotSpotter gunshot detection alert and generated a call for service. The team used a variety of tools to include Google maps and the ShotSpotter investigator portal to place officers within seven feet of the spent shell casing. After being directed to the area, patrol initiated an investigation and found a male and female that were beaten, kidnapped, and sexually assaulted. The victims were provided medical assistance and two firearms were recovered. One of the suspects was also arrested on scene and a second was arrested at a later time. The incident was not called into 911 by a citizen and it would not have been identified without the technology.

SUCCESS

ShotSpotter Leads to the Discovery of a Homicide Victim: In January 2018, the LVMPD Fusion Watch unit received a ShotSpotter alert involving five rounds. Fusion Watch immediately generated a call for service and provided officers with the location of the crime. Upon arrival, officers located a male with several gunshot wounds laying in the street. The victim was transported to the hospital where he later died. Despite the severity of the crime, there was never a 911 call from a citizen.

Prohibited Person Arrested Using ShotSpotter: In December 2017, the LVMPD Fusion Watch unit used ShotSpotter to identify a shooting involving a single gunshot near an apartment complex. The shooting was not reported by any other means. Fusion Watch directed patrol officers to the location of the crime. Upon arrival, officers could not find any shell casings but did locate a witness that directed them to the suspect's apartment. Patrol then used the information to gain a confession from the suspect, who admitted to shooting one round in the air. The suspect, who was on probation for selling narcotics was arrested. He was also identified as a gang member. The semi-automatic handgun used in the crime was recovered and impounded.

SUCCESS

SUCCESS

ShotSpotter Used to Recover a Crime Gun: In January 2018, the LVMPD Fusion Watch unit generated a ShotSpotter event after receiving an alert and then guided officers to the location of the shooting. Upon arrival, officers located a 40-caliber handgun and four spent shell casings in the street. The firearm was impounded and removed from the hands of a violent offender.

ShotSpotter Alert Leads to Suspect and Firearm: In September 2018, the LVMPD Fusion Watch unit received a ShotSpotter alert for an apartment complex in the northeast area. Fusion Watch immediately broadcasted the event over the radio and updated officers as to the location of the gunfire. Officers arrived and located a witness who stated that an unknown male fired a round into the air. Officers then located a spent shell casing near an apartment. Contact was made with the resident of this unit, who eventually confessed to firing one round into the air in an effort to scare people. The suspect was cited for unlawful discharge of a firearm and the firearm was impounded.

SUCCESS

SUCCESS

ShotSpotter Used to Recover a Firearm from a Gang Member at a Party: In February 2018, the LVMPD Fusion Watch unit received a ShotSpotter alert for a single gunshot. Upon arrival, officers located several people outside of a nearby party. A preliminary investigation ultimately resulted in a firearm being recovered from a gang member that had violent priors.

ShotSpotter Reveals a Domestic Shooting Involving Three Children: In July 2018, the LVMPD Fusion Watch unit received a ShotSpotter alert for five rounds near an apartment complex. The information was broadcasted to patrol within 50 seconds of the shooting. Patrol arrived in the area soon after and discovered a female that was flagging the officers down. A preliminary investigation revealed that a subject opened fire into his wife's apartment. Although no one was hit by the gunfire, the incident could have been deadly as there were three young children in the apartment during the shooting. The ShotSpotter alert resulted in such a fast response that there was never a call to 911.

SUCCESS

SUCCESS

ShotSpotter Leads to the Recovery of a Rifle and Handgun: In January 2018, the LVMPD Fusion Watch unit received a ShotSpotter alert for two rounds. There were no other calls to the police regarding the incident. Officers were advised that the location of the shooting appeared to be in the backyard of a residence. Upon arrival, officers could see shell casings in the backyard of the residence that was identified. A consensual interview was conducted with the occupants of the residence, which ultimately led to the recovery of a rifle, handgun, a pound of marijuana, and evidence that suggested the illegal sales of narcotics.

ShotSpotter Used to Locate a Critically Injured Victim: In July 2018, the LVMPD Fusion Watch unit received a ShotSpotter alert in the south area. There were no calls for service to police by any source asides from ShotSpotter. On arrival, officers located a residence that appeared to have several bullet impacts to its exterior. While conducting a welfare check on the occupants, officers located an injured male with a skull fracture. The preliminary investigation revealed that the male was hit with an object by several subjects who then fired indiscriminately into the residence as they fled the scene. It is likely the victim would not have been located for several hours if the ShotSpotter alert had not been created. Such a delay could have proved fatal as the skull fracture was reported to be significant.

SUCCESS

ShotSpotter Failed to Publish Alert on a Robbery Involving a Shooting: In December 2017, a vehicle with four suspects pulled up next to the victim and demanded money. One of the subjects exited the vehicle and shot the victim twice as he began to run. ShotSpotter recorded the gunshot sounds but did not publish an alert at the time of the shooting.

MISS

MISS

ShotSpotter Misclassified Shooting as a Vehicle Backfire: In February 2018, officers heard gunshots while on a call for service. The officers checked the area and located a victim with gunshot wounds laying on the sidewalk. ShotSpotter did not publish a gunshot alert on the incident.

ShotSpotter Missed a Shooting that was Caught on Camera: In March 2018, the LVMPD received a call for service regarding a subject that had been shot. Upon arrival, officers located the subject and discovered that the shooting was captured on a nearby public safety camera. The subject had been shot in mouth but survived.

MISS

MISS

ShotSpotter Dismisses Gunshot Alert on a Homicide: In March 2018, the LVMPD received a call for service for a deceased subject lying on the ground by a tow truck driver. Upon arrival, officers determined the subject had been shot several times. ShotSpotter recorded the incident but dismissed the sound as firecrackers.

ShotSpotter Misses Shooting in Northeast Area. In April 2018, the LVMPD received a call for service for a subject that claimed he was shot during a fight. The victim had two gunshot wounds to the back. The shooting was not captured by ShotSpotter.

MISS

INCIDENT ANALYSIS

Potential Gunshot Events Identified by Area

The difference in the number of potential shootings between the two coverage areas is fairly minor. There were 160 potential shootings identified in the north and 182 in the south, however, a deeper dive into the south area shows more of a difference between the number of potential shootings in SCAC and SEAC. In SCAC there were 110 potential shootings identified whereas only 72 in SEAC.

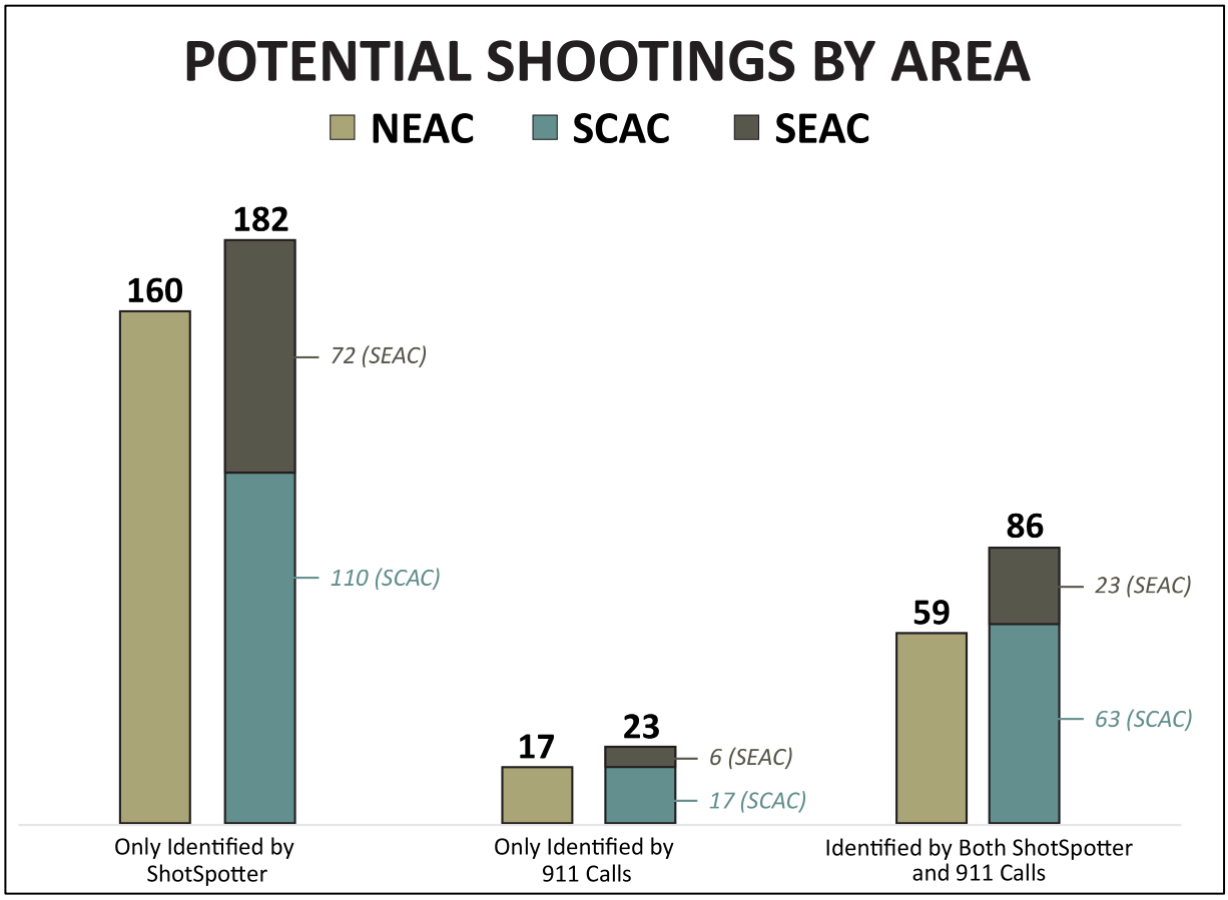


Figure 14 - ShotSpotter Potential Shootings by Area

Firearm Caliber Analysis by Area

As previous indicated, there were 153 events where shell casings were recovered. Of these events, the most common caliber of casings was 9mm (present in 77 events). The second most common caliber was .40 caliber (present in 36 events). The third most common caliber was .380 (present in 17 events). The remaining caliber types were present in less than 14 events, with the most infrequent being the .223 caliber.

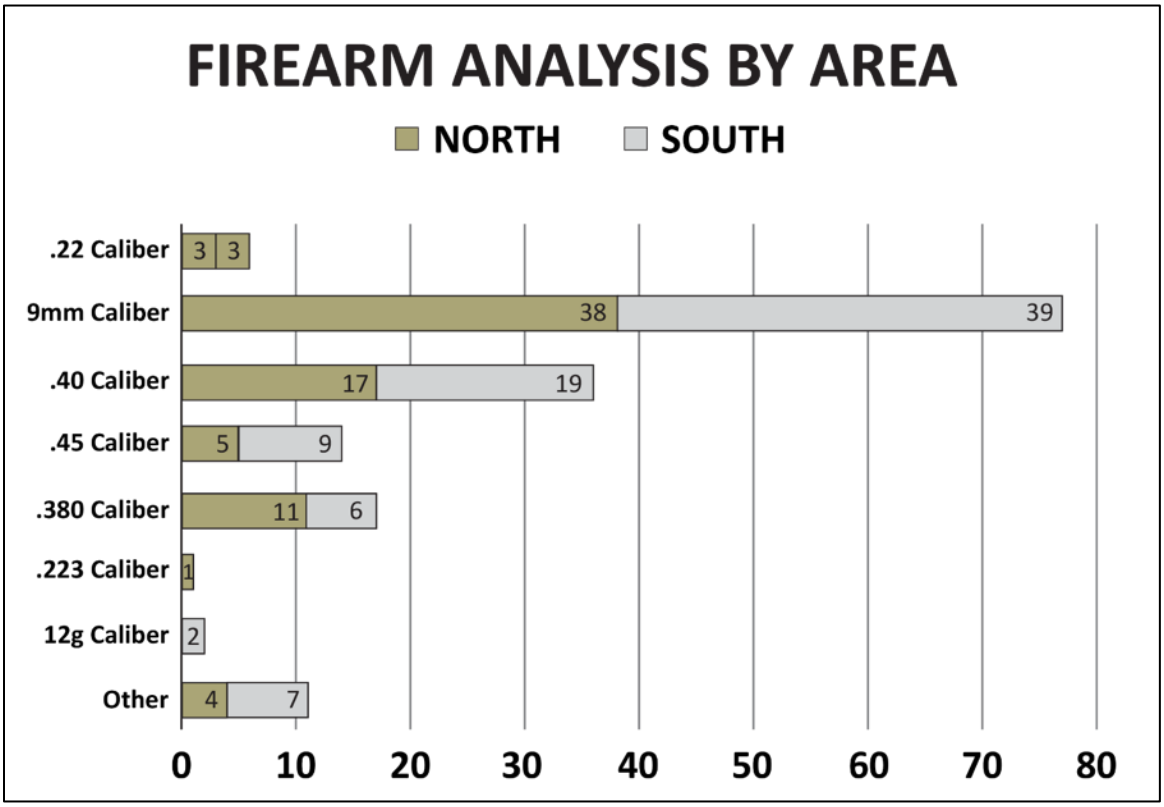


Figure 15 - Common Calibers Identified for ShotSpotter Events

This analysis indicates the most common firearm likely used in the coverage area is a 9mm handgun. The data also indicates that the use of long guns and high-powered rifles is quite unique. This latter form of intelligence could prove valuable as the uniqueness of certain calibers can more easily be connected to a pattern of activity.

Gunshot Volume Analysis

Analysis of the volume of gunfire per event shows that most shootings involve more than one round being fired, however, anything more than five rounds begins to become more unique as the number of rounds grow. For example, there were less than 20 incidents that involve more than 10 rounds being fired and only 4 of these went beyond 20 rounds. Similar to the caliber analysis, the events that are more unique may offer intelligence in preventing certain gun crimes. For example, the event that involved 27 rounds being fired was reported by citizens as fireworks, however, ShotSpotter was able to guide officers to the location of 27 rifle casings. Ultimately, this data proved more valuable than a shooting with less rounds because the significance of the firepower encouraged more follow-up than normal.

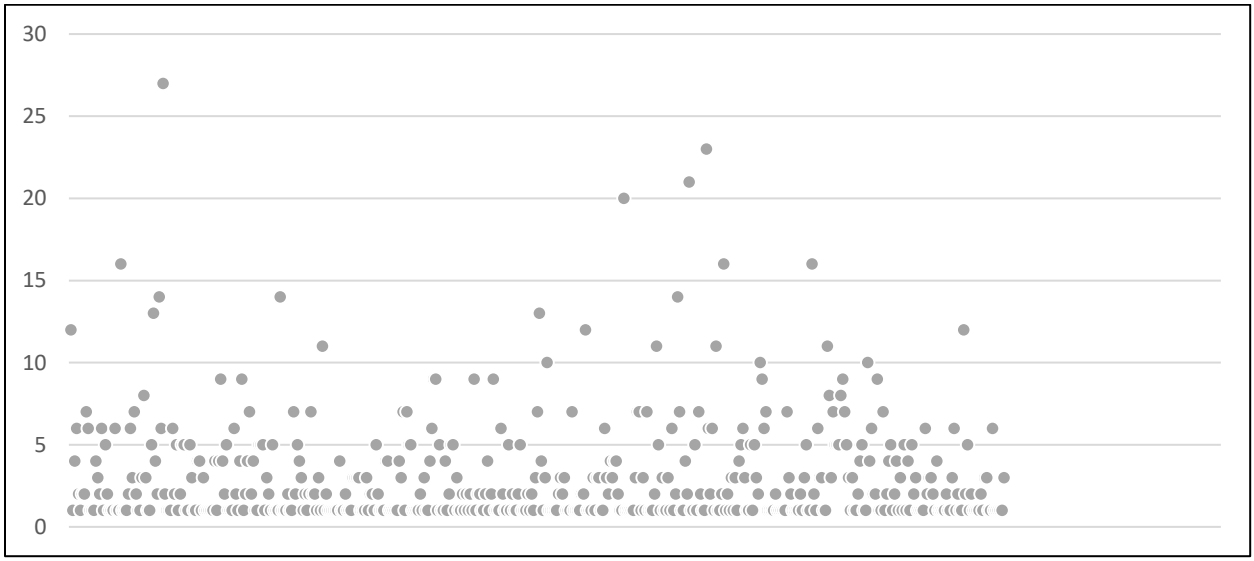


Figure 16 - Number of Gunshots Per ShotSpotter Event

Gunshot Events by Frequency

The number of potential shootings per month has fluctuated since the start of the pilot program. In the north, the number dropped significantly within two months of launching the technology. A spike of shootings followed immediately after and since March there has been a shifting decline with the second lowest point being August. The activity in the south reached its highest point in the beginning of the program and has also declined each month with the exception of June. Unfortunately, a longer period of time would be needed to draw any significant conclusions regarding these patterns of activity.

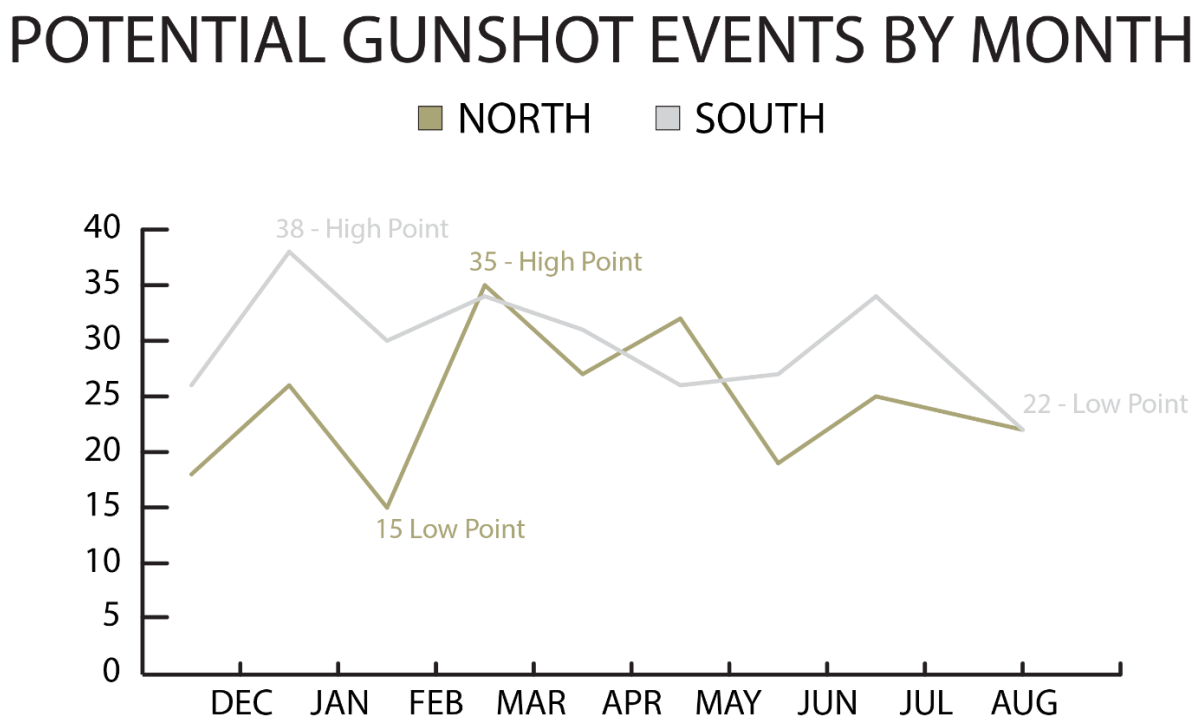


Figure 17 - Number of ShotSpotter Events by Month

Gunshot Events by Day and Time of the Week

Analysis of the 487 potential shootings shows that the most common time frame for a shooting is likely to be between the hours of 2000 and 0300. More precisely, Monday and Thursday between 0000 and 0100 hours, as well as Sunday between 0100 and 0300 hours showed the highest spike.

			MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
12:00	–	12:59	1	2	0	0	0	3	1
13:00	–	13:59	0	0	1	3	3	0	0
14:00	–	14:59	0	0	3	1	0	0	1
15:00	–	15:59	0	0	2	0	2	1	1
16:00	–	16:59	0	0	1	0	1	1	3
17:00	–	17:59	3	1	1	0	3	3	1
18:00	–	18:59	1	1	2	3	2	3	2
19:00	–	19:59	1	2	1	2	5	1	4
20:00	–	20:59	8	3	5	7	6	2	8
21:00	–	21:59	6	5	1	3	7	9	7
22:00	–	22:59	8	1	2	6	8	5	9
23:00	–	23:59	9	5	6	6	7	7	7
0:00	–	0:59	11	1	7	13	4	7	6
1:00	–	1:59	6	5	6	9	7	4	10
2:00	–	2:59	9	7	6	7	2	5	10
3:00	–	3:59	4	3	3	4	6	6	5
4:00	–	4:59	1	8	3	3	2	9	4
5:00	–	5:59	2	1	3	1	5	5	0
6:00	–	6:59	0	0	0	2	2	1	1
7:00	–	7:59	0	0	1	0	0	5	0
8:00	–	8:59	0	2	0	1	0	1	0
9:00	–	9:59	3	1	0	0	1	0	1
10:00	–	10:59	0	1	0	0	0	2	0
11:00	–	11:59	0	0	0	0	2	0	3

Figure 18 - Common Times for ShotSpotter Shootings

Confirmed Shootings by Location

Most of the shootings throughout the north coverage area are concentrated to various micro-hotspots. There were at least three particular areas that had between 11 and 15 shootings within a relatively specific location.

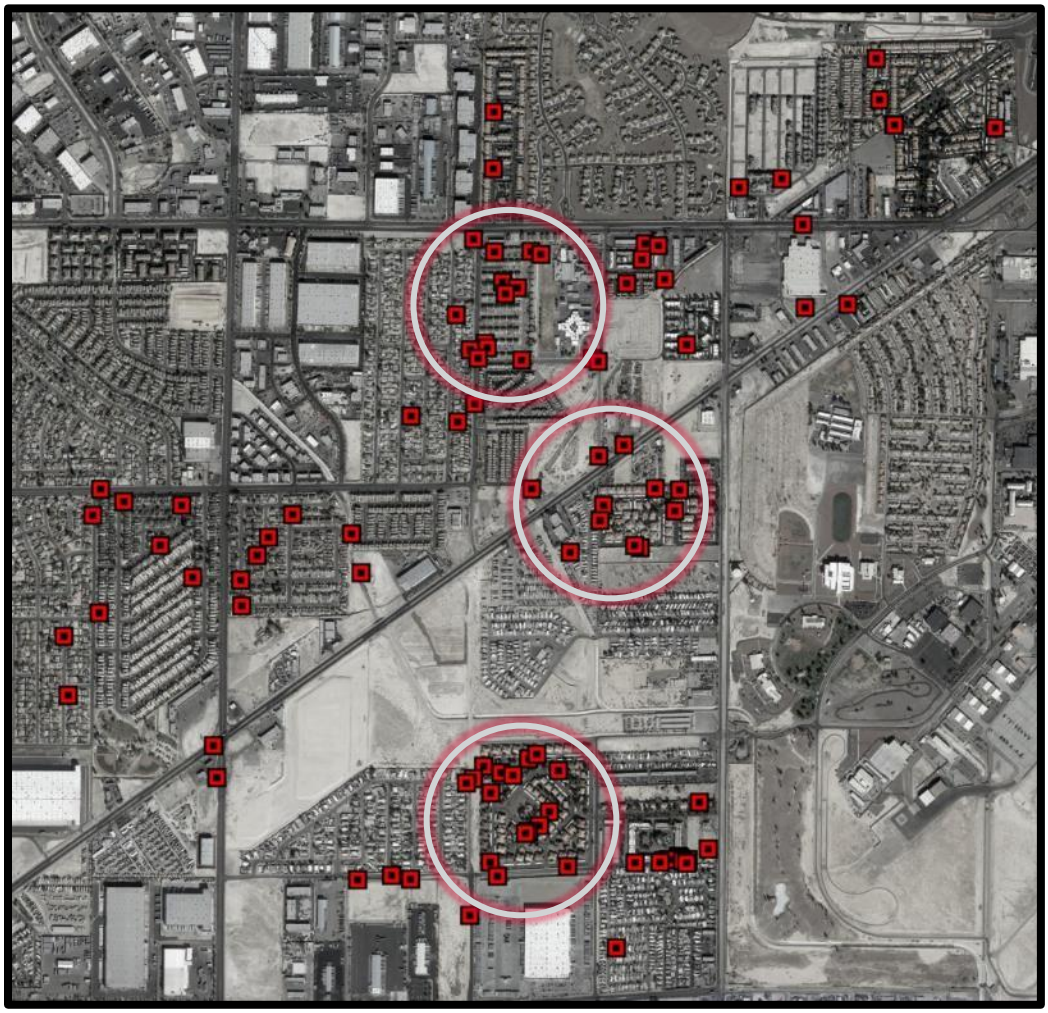


Illustration 10 - Concentration Points for Confirmed Shootings in the North

The confirmed shootings in the south coverage area were more spread out, especially the SEAC portion. However, there were still three primary areas where a large portion of shootings were concentrated. In particular, there was one location where there were over 30 confirmed shootings within the past nine months. There was also an adjacent location that had another 20 confirmed shootings.

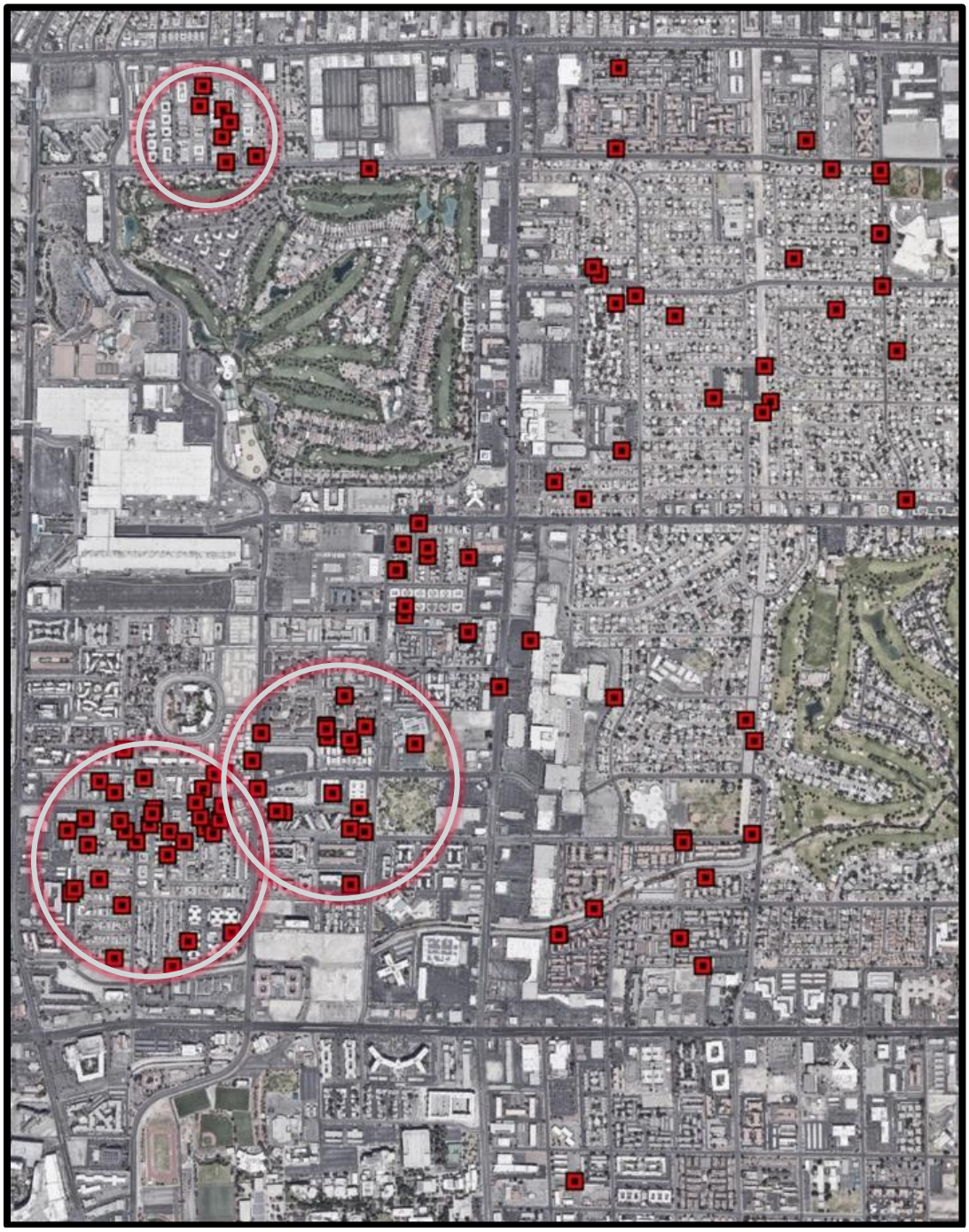


Illustration 11 - Concentration Points for Confirmed Shootings in the South

Casings Recovered by Location

The concentration points for the recovery of shell casings matches the locations of confirmed shootings. Additional data in the future could help identify areas where the frequency of shootings does not match the number of casings recovered. As a result, such an assessment may indicate whether suspects are picking up casings in that specific area or whether a certain type of firearm is being used (e.g., revolver).

Illustration 12 - Concentration Points for Casings Recovered

Victims and Suspects Located by Area

There were less concentration points for the location of victims and suspects than there were for the recovery of casings or the confirmation of shootings. Each area maintained one matching concentration point, but the remaining data points were less concentrated. Additional data over a longer period of time is needed to draw any significant conclusions on this topic.

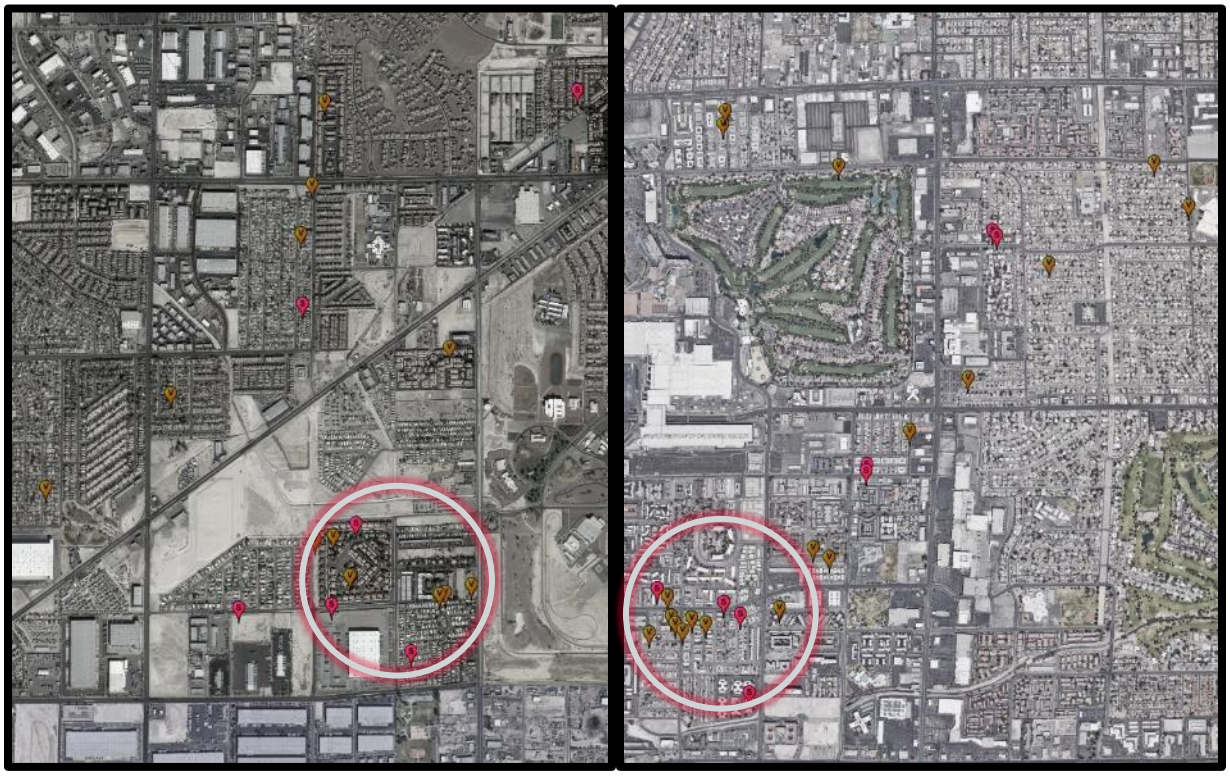


Illustration 13 - Concentration Points for Victims & Suspects Located

Proximity of Shootings

The incident analysis process revealed an interesting pattern regarding the proximity of shooting events. The majority of potential shootings in both areas occurred within 50 yards of at least one other shooting. To be more precise, there were 134 pairs (268 events) of potential shootings that met this threshold. Many were even as close as five yards from at least one prior shooting. This proximity analysis is based on nine months of data and it may indicate that the location of one shooting may be a precursor to additional future shootings. This certainly does not apply to every shooting as there are many that were also isolated. Nonetheless, the majority show the same pattern as the example below.

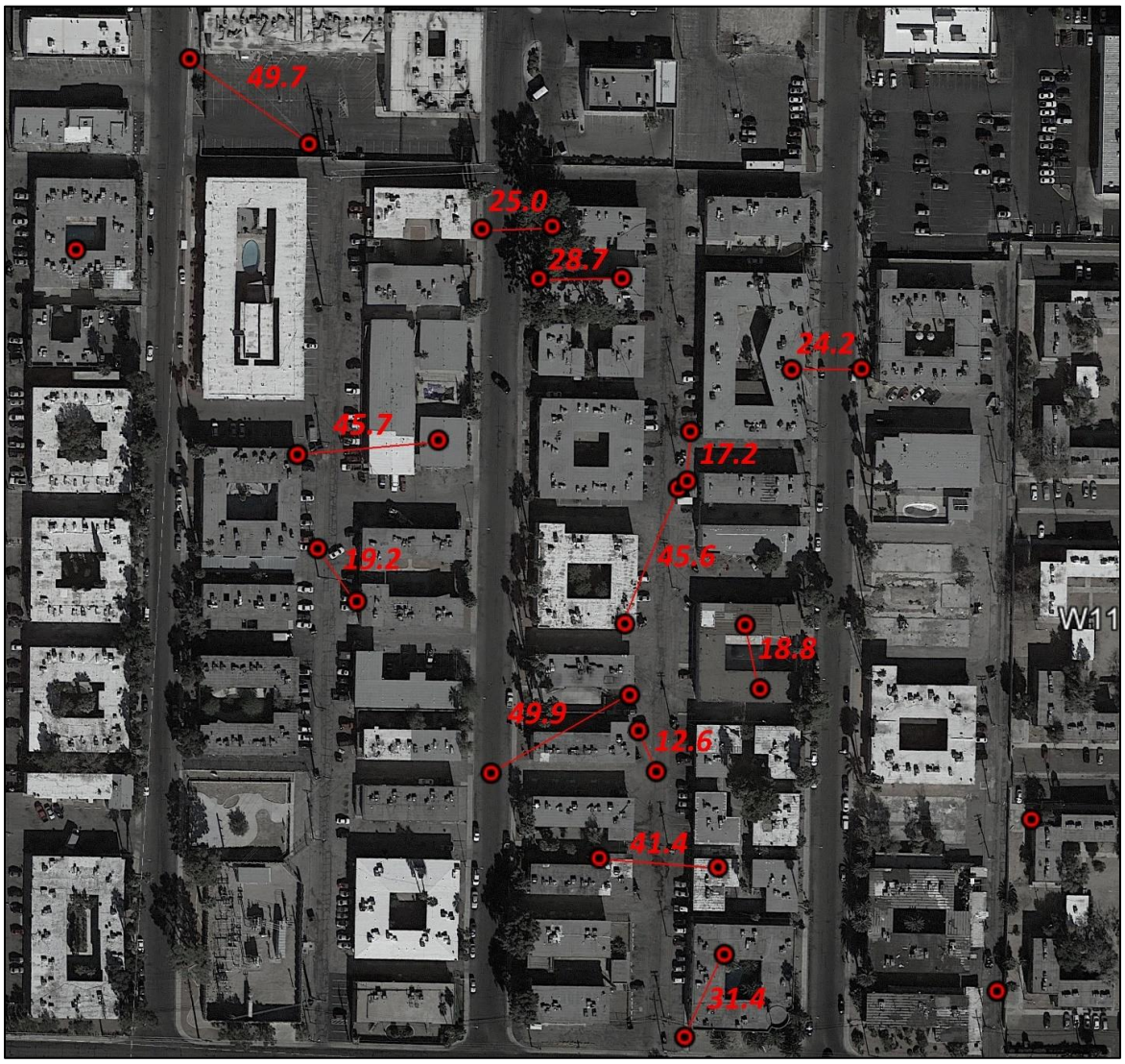


Illustration 14 - Example of Proximity Analysis for ShotSpotter Events

CRIME ANALYSIS

A natural avenue for measuring the effectiveness of any technology or crime fighting initiative often involves the analysis crime statistics. Although there is value in taking this approach, there are two important of limitations.

Crime Identification vs. Crime Reduction

First, simply comparing the number of shootings that occurred before and after the deployment of ShotSpotter does not indicate an impact on crime. ShotSpotter is primarily a tool used to identify crime and in large part, crime that would normally go unreported to the police. For example, the data for the assessment period indicates there were somewhere between 99 and 342 shootings identified by ShotSpotter that would have normally gone unreported to the police.[9] These shootings did not occur because of ShotSpotter however, ShotSpotter is the only reason these shootings were identified. As such, a simple comparison of the number of shootings before and after ShotSpotter should only show an increase. The crime analysis of the number of shootings before and after ShotSpotter proves this to be true and reinforces the fact that ShotSpotter effectively identified more shootings post deployment. However, this analysis only speaks to the identification of more shootings and not the technology's impact on the reduction of crime.

Correlation vs. Causation

The second limitation in comparing crime statistics has to do with scientific validity. As with any ethical research project, it is important to measure what is actually intended to be measured. For example, analyzing the level of violent crime as a whole can be more effective than simply quantifying the number of shootings, however, even this is not the same thing as measuring the impact ShotSpotter actually had on reducing crime. This is where the logical fallacy of "correlation proves causation" comes into play. It may be possible to correlate ShotSpotter to an increase or decrease in crime but it would be impossible to prove causation. There could be a hundred different reasons for why crime changes in a particular area to include environmental and socioeconomic factors, as well as the presence of overlapping crime fighting initiatives. Ultimately, to attribute the rise or fall of crime to a single technology would be counterfactual.

This limitation also applies to any other technology that is used to combat crime. Like ShotSpotter, an Automated License Plate Reader (ALPR) is another crime identification tool that results in an increase in the identification of wanted vehicles and persons. It is possible to measure the effectiveness of ALPR by tallying up the number of alerts and evaluating the

[9] The number 99 represents confirmed shootings that went unreported by citizens, while 342 represents all potential shootings that went unreported by citizens.

number of vehicle recoveries, but it would be impossible to declare the tool as the only reason for the rise or fall of crime. Likewise, NIBIN, body cameras, facial recognition and every other tool that is deployed in policing cannot be measured to show causation in and of itself.

Crime Analysis Before and After ShotSpotter

With that said, the level of crime in the LVMPD persistent hotspots that are located within the coverage area has decreased since the launch of ShotSpotter. ShotSpotter may be correlated to this positive outcome but it is unlikely to be the single or even primary cause for the aforementioned reasons. Nonetheless, analysis of violent crime within the persistent hotspots in NEAC and SCAC both showed an overall reduction. In the NEAC, the persistent hotspot shows a 9% reduction in total ACTION crimes and in SCAC, the persistent hotspot shows a 3% reduction in total ACTION Crimes.

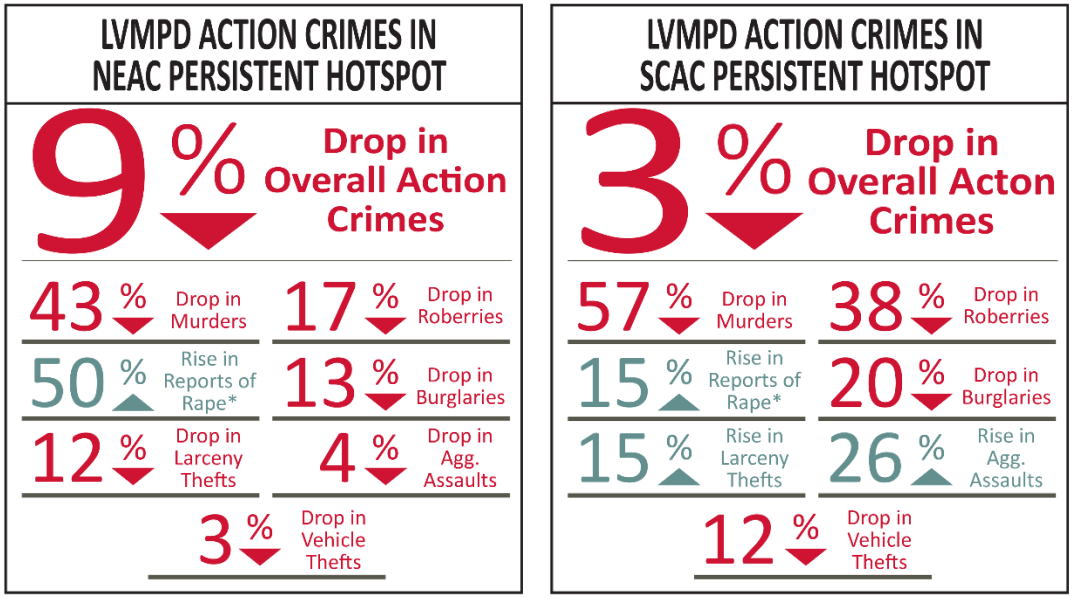


Figure 19 - Crime Change in NEAC & SCAC Hotspots Post ShotSpotter

This analysis conducted by ANSEC was based on comparing crime statistics for the ShotSpotter assessment period (December 1, 2017 to September 1, 2018) against the crime statistics for the same months prior to the deployment of ShotSpotter (December 1, 2016 to September 2017). The data used for analysis was based on the pre-identified persistent hotspots in NEAC and SCAC. The NEAC persistent hotspot represents the far majority of the north ShotSpotter coverage area or 83% to be exact. The persistent hotspot in SCAC represents the location with the highest crime in the south ShotSpotter coverage area, however, this location only represents 33% of the entire south coverage area. This limitation is partially due to the fact that there were no pre-identified LVMPD persistent hotspots in SEAC that were located in the ShotSpotter coverage area.

** The increase in rape statistics is related to delayed reporting and as such, it does not accurately represent the change in the number of recent incidents from last year.*

A more in-depth evaluation of the crime statistics in the NEAC hotspot shows a reduction in murders, robberies, aggravated assaults, burglaries, larceny thefts, and vehicle thefts. The only category in the NEAC hotspot that showed an increase was rape. The SCAC hotspot showed a reduction in murders, robberies, burglaries and vehicle thefts. The categories in the SCAC hotspot that increased included rapes, aggravated assaults, and larceny thefts.

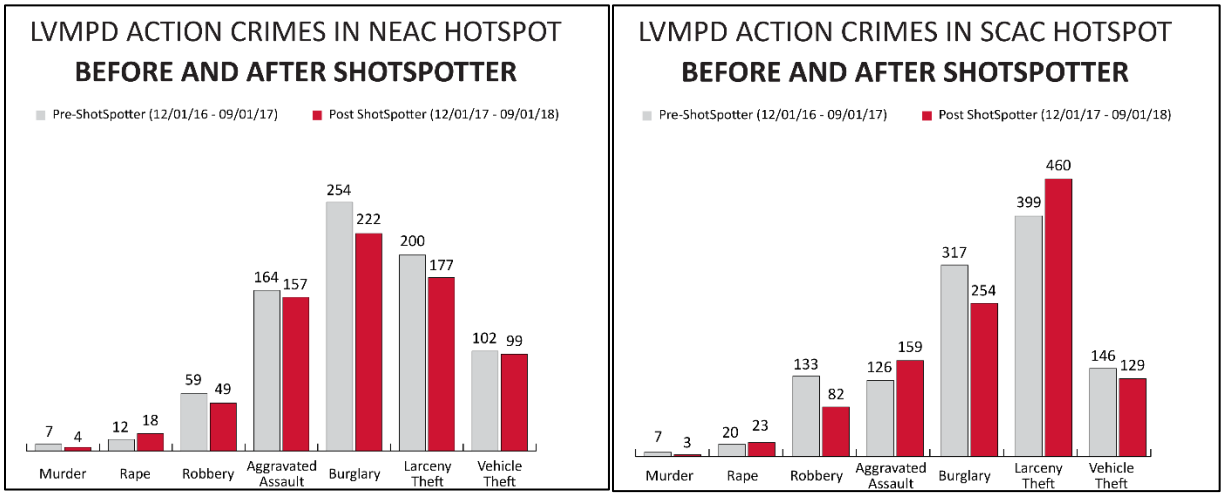


Figure 20 - ANSEC Crime Stats for Hotspots Before and After ShotSpotter

Future Analysis of Crime Post ShotSpotter

While interesting, it is too early and unreasonable to attribute this reduction to ShotSpotter alone or any other single technology. Doing so would be misleading regardless of whether crime went up or down. However, this early collection of data provides a foundation from which more effective crime analysis can be done once ShotSpotter is active for a longer period of time. Rather than depending exclusively on a before-and-after comparison, the second year of ShotSpotter should provide an opportunity to measure the reduction of crime from the first to the second year of use. This will prove more useful since a baseline will have been established that accounts for the expected increase in the identification of shootings. Additionally, another year of data will allow for a comparison of crime for the entire ShotSpotter coverage area. This year's crime analysis geographically represents the majority of the north coverage area and a third of the south coverage area. Although the latter still accounts for the area with the highest crime, there would be value in collecting more data for the entire south coverage area in the future.

OPERATIONAL REVIEW

As with any pilot program, there were a number of growing pains and challenges discovered during the application of the ShotSpotter technology. For example, the use of Internet Explorer and Silverlight for the ShotSpotter software proved problematic. There were numerous ShotSpotter alerts that were delayed because of computer issues on the LVMPD side. More importantly, patrol officers were unable to receive the alerts as quickly as they could have by using Google Chrome instead. Fortunately, LVMPD recently switched to Google Chrome which should resolve this issue.

Beyond problems with the browser, the results also revealed a deficiency in the preliminary follow up of ShotSpotter events. In some cases, patrol officers canceled the response to a ShotSpotter event based on an assumption that the audio sounded like fireworks. In other cases, officers responded but did not fully canvass the area for evidence or prematurely classified the event as unfounded. In these situations, casings were often located after the fact and/or additional information suggested the dismissed alert was in fact a shooting.

The requirement for a STAR protocol on every ShotSpotter event was another area that may be worth some reconsideration. The reasoning for mandating such a response was warranted at the start of the pilot, but the data now indicates that the likeliness of encountering potential shooters on scene is not as significant as expected.

Finally, the timeliness rates for the ShotSpotter technology did not perform as well as expected. Although the technology proved to be faster than the far majority of 911 calls, it was still lacking. The average time between the shootings and alerts for at least three of the nine months measured over the 60-second threshold projected by the vendor. Likewise, the time between an alert being published by the vendor and acknowledged by Fusion Watch was also below expectations. Both of these rates showed significant improvement over time, especially as adjustments were made to the software, but nonetheless, there is still room for progress. Ultimately, every second that can be shaved off improves the odds of apprehending potential shooters.

WHAT IF ANALYSIS

Most of this report addresses the effectiveness and efficiency of the ShotSpotter technology but the basic question of value still remains. Ultimately, ***what if*** LVMPD did not have the ShotSpotter technology for the past nine months and more importantly, ***what if*** the organization elects not to continue using this technology beyond the pilot program. The answer to this scenario is fairly simply but also limited to nine months of data.

The data clearly shows that the technology proved effective in identifying 209 confirmed shootings and another 278 potential shootings within the six square miles of coverage. A conservative estimate based on the number of confirmed shootings indicates that there were at least 99 shootings that would have gone unreported to the police if it were not for the ShotSpotter technology. A broader estimate that includes all potential shootings indicates that this number could have been as high as 342. Either way, these figures represent a significant number of shootings that occurred within only six square miles and in less than nine months.

Perhaps, more importantly, this data suggests that the number of unreported shootings that are occurring valley-wide is much higher. There are 10 historical crime hotspots in Clark County. While different in some ways, these hotspots are similar in size and criminal activity to the two ShotSpotter coverage areas. It is possible, if not likely, that the deployment of ShotSpotter in all 10 areas would produce four times the results. If that were to be correct, an expansion of this technology could help identify somewhere between 800 and 1,400 unreported shootings annually. This estimate is based on an expansion from the current two hotspots that span across six square miles to 11 hotspots that span across 24 square miles. The low estimate multiplies the 209 confirmed shootings in the current coverage area by four while the high estimate multiplies the 342 confirmed *and* unconfirmed shootings in the current coverage area by four.

Based on this rough estimate, it seems that having this technology has already provided a substantial amount of gun crime intelligence that would normally have been missed. This estimate also indicates that an expansion of this technology could ultimately lead to intelligence on more than 1,000 unreported shootings. On the other end, discontinuing its use would save a substantial amount of money but cost a tremendous amount of intelligence and potential evidence.

EXPANSION PROPOSAL

Option 1 – Maintain Current Coverage Area

At a minimum, the results of the pilot program indicate there is tremendous value in maintaining the current ShotSpotter coverage. The program is less than a year old and it is still early into the development phase. Cutting back this soon into such a costly and complex program may prove wasteful. Furthermore, the pilot program reveals several areas for improvement that would only increase the return on investment that has already been seen in the first nine months. This first option would involve maintaining the current coverage of six square miles, which incorporates two (NEAC Frank Area & SCAC) of the 10 historical hotspots.

Option for Maintaining Current Coverage Areas

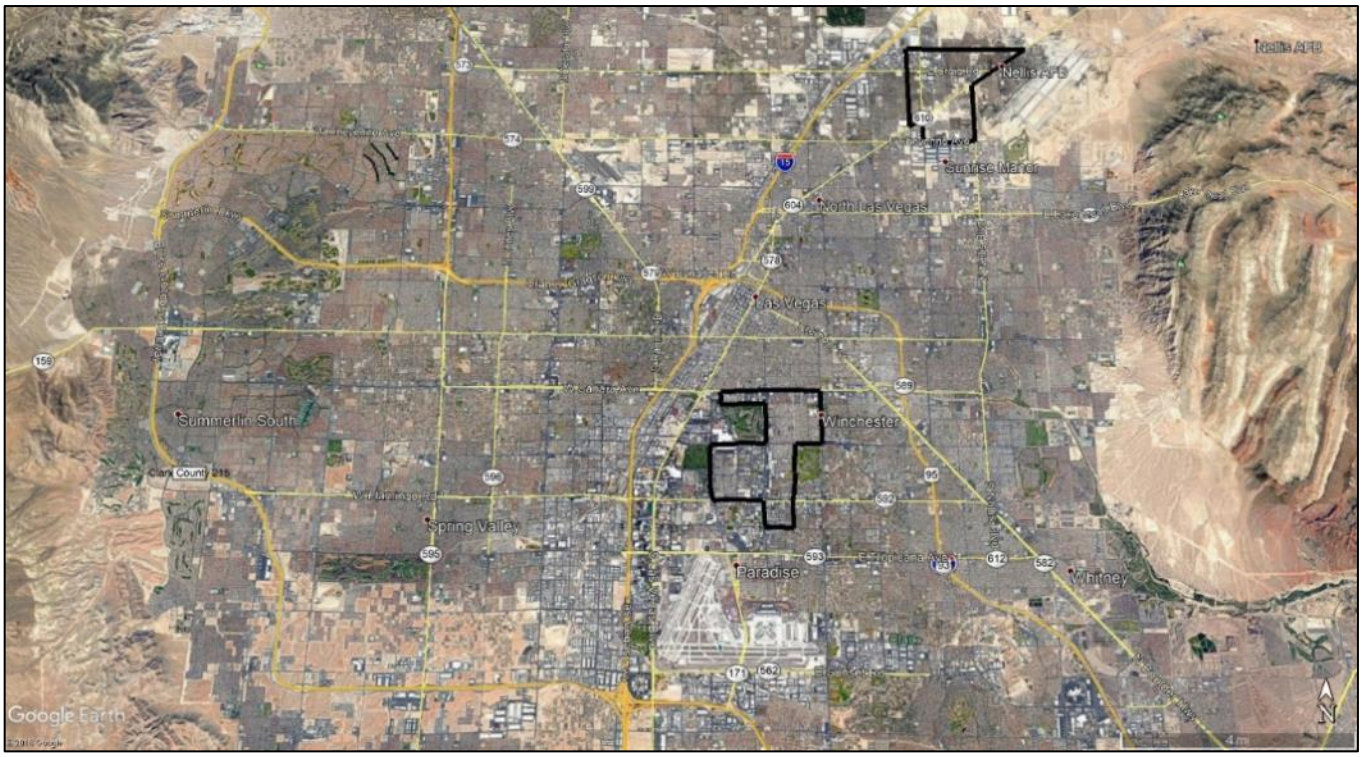


Illustration 15 - Proposed Coverage Area for Maintaining Two Hotspots

Option 2 – Expand Coverage to at Least Half of the Historical Hotspots

If funding is limited, the recommendation would be to expand the coverage area from two historical hotspots to six traditional hotspots. The value of the ShotSpotter technology is based on applying a long-term approach to combatting gun crime. The pilot has been active for a little over nine months and while value has been seen thus far, there is far more potential now that lessons have been learned. This option would involve expanding the coverage area from 6 square miles to 15 square miles. This new coverage would add four more historical hotspots (W5, W6, A5, P5), two new hotspots (J1 &J2), and some other surrounding areas (W4, B2, B3, B4, & P4).

Option for Expanding to a Total of Six Hotspots

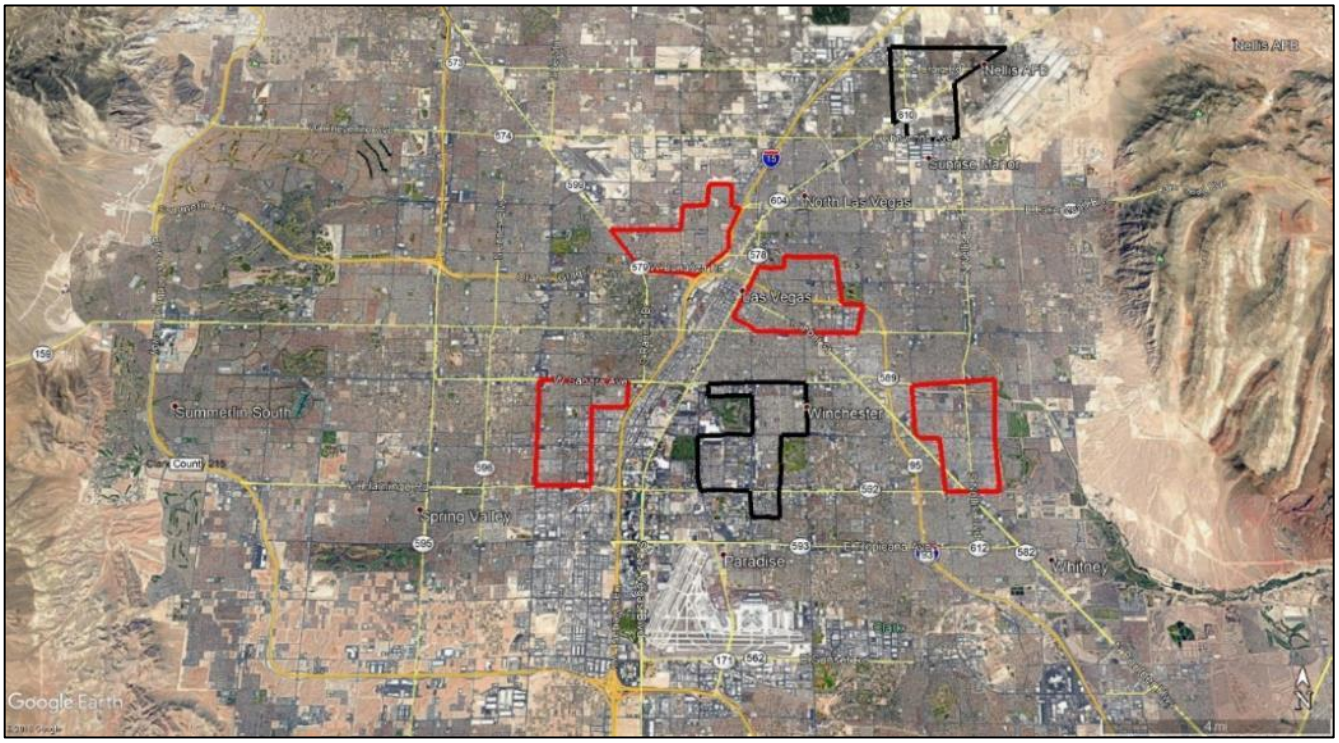


Illustration 16 - Proposed Coverage Area for Expanding to Six Hotspots

Option 3 – Expand Coverage to All Traditional Hotspots

The gold standard and the one option that offers the opportunity to address nearly all of the gun crime in Clark County would involve expanding the program to all 10 historical hotspots. In addition to maintaining the current coverage areas, this option would incorporate all of the areas that have been plagued with gun violence for decades (W5, W6, A5, P5, J4, G2, W1, V5), as well as new hotspots (J1 & J2), and numerous surrounding areas (W4, B2, B4, C2, C3, P4, J1, J2, K3, N3, F1, G3, & W2) that fluctuate in crime. This option is only worth pursuing if there is sufficient funding to expand the entire program, and not just the ShotSpotter technology. In other words, as the data has shown, the best approach for maximizing the gunshot detection technology is a wholistic one that incorporates cameras, NIBIN, and other technologies, as well as sufficient personnel to manage the expected increase in activity.

Option for Expanding to All High Crime Areas

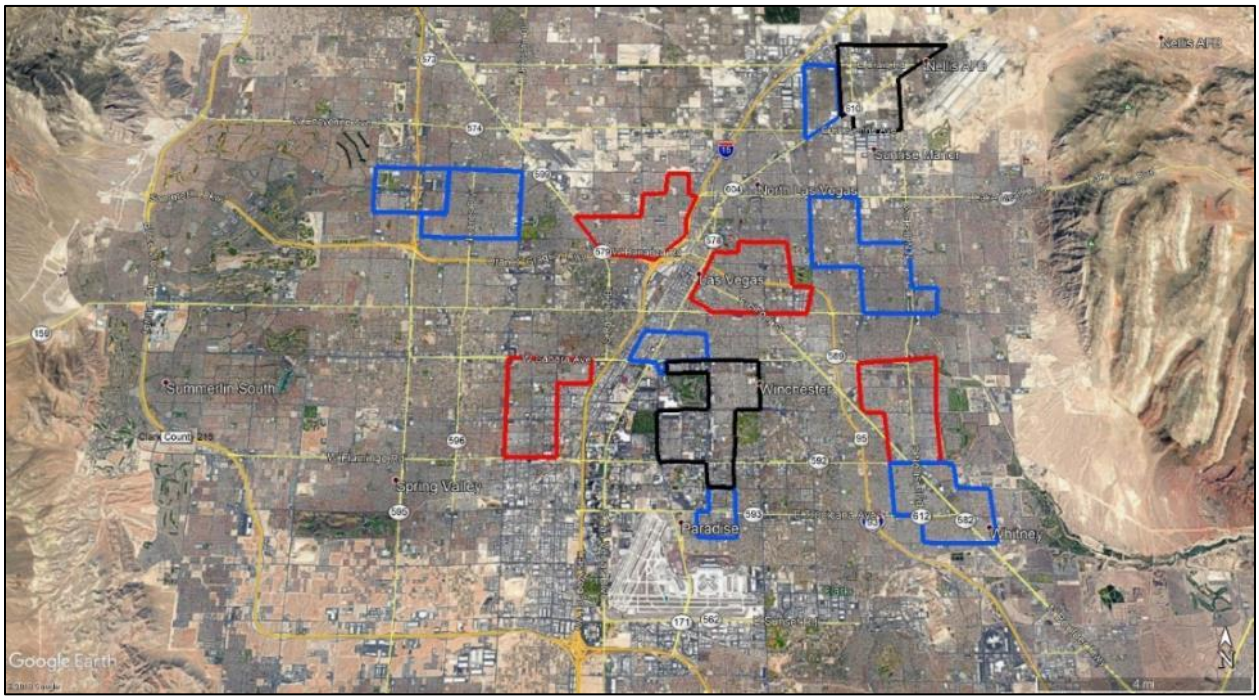


Illustration 17 - Proposed Coverage Area for Expanding to All Hotspots

THE SAFETY GRID STRATEGY

The expansion of the ShotSpotter pilot program, with the right support, could provide an unprecedented opportunity to prevent much of the violence in the valley before it occurs. As indicated earlier, this idea is based on the concept of creating technology-based safety grids in the communities that are suffering from crime the most. In partnership with the community, this surgical and technical approach to combating gun violence would make it nearly impossible to commit a gun crime without being caught. To be fully effective, this Safety Grid strategy would be based on the following key principals:

1. **The selection of each location should be surgical and based on the historical analysis of micro-hotspots.** The larger the area, the harder it becomes to encapsulate with technology-based safety measures. Likewise, the more intentional the selection, the easier it is to formulate a plan for deploying the technology in the area.
2. **Each Safety Grid should be based on the integration of a variety of technologies.** The use of ShotSpotter alone would not accomplish the goal of this strategy. Rather, it is the use of ShotSpotter in addition to a synchronized network of public safety cameras, NIBIN, social media platforms, and other technical collection tools that would be the most effective.
3. **The application of this strategy not only requires technology but also the personnel to proactively leverage the technology.** This includes sufficient staffing for monitoring cameras and gunshot detections, as well as resources for ensuring investigative follow-up and community engagement.
4. **The program should include measures for ensuring privacy protections**. The use of advanced technology in law enforcement can truly help save lives and advance the quality of life in the communities that need it most. However, ensuring technology is used appropriately is equally important and can be accomplished with the right policies, limitations and oversight.

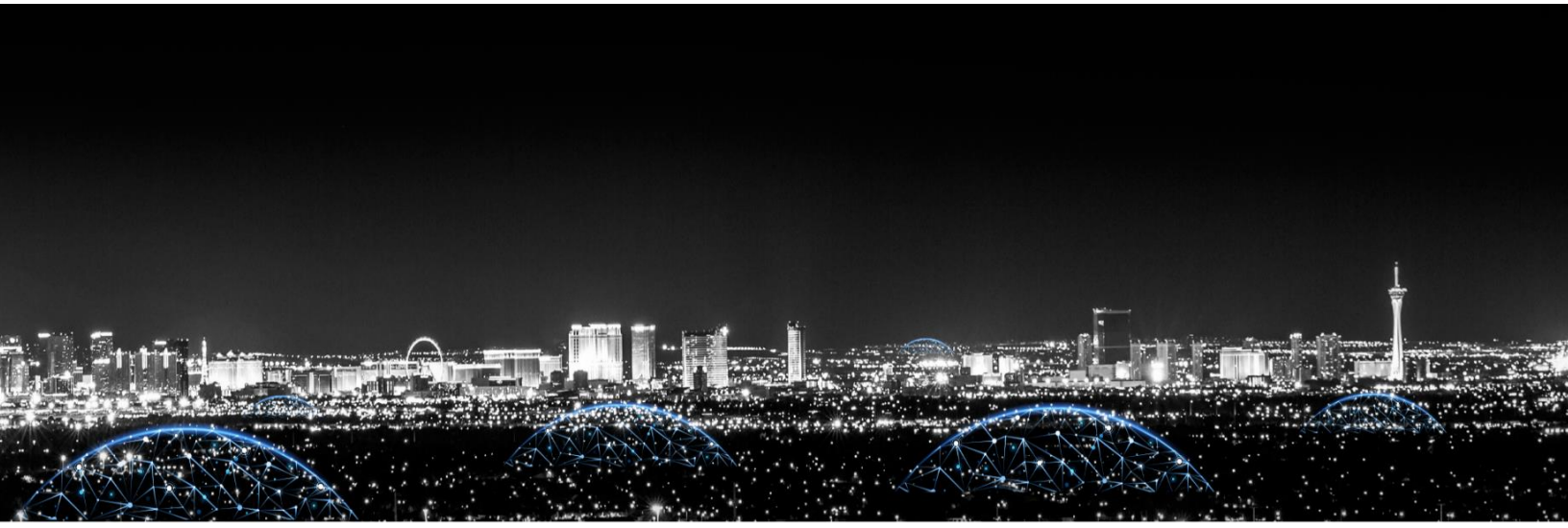


Illustration 18 - Second Example of the Safety Grid Concept

CONCLUSION

There is no question that the ShotSpotter technology proved effective in identifying shootings, to include many of which go unreported to the police. The technology also proves quite useful in identifying the location of physical evidence (e.g., shell casings) that can then be used to connect crime guns to multiple shootings. Another benefit that is more difficult to measure, but still quite valuable in combatting gun crime, is the speed in which the technology reports shootings. The average time between the shootings and alerts exceeded the 60 -second threshold that the vendor proposed, however, the speed in comparison to the traditional 911 call from a citizen was still faster in the far majority of ShotSpotter events. The faster response time provides a better chance for officers to assist victims, recover evidence, and enhance police presence in high crime areas. Unfortunately, the improved response time does not automatically equate to finding more suspects on scene, however, this is not surprising. As mentioned early in this report, it only takes a matter of seconds for a suspect to flee a crime scene and without the addition of cameras and faster NIBIN acquisitions, the ShotSpotter technology is limited in this area.

The big question that remains is whether these benefits are sufficient enough to affect crime. The answer is likely to be yes but this cannot be confirmed in such a short period of time. For one, measuring the correlation between a crime fighting program and the rise or fall of crime is fairly complex and usually requires more than nine months of data. Not only are there numerous external factors (economy, weather, geography, etc.) that contribute to crime but there are also a number of variables within the law enforcement apparatus (e.g., resource allocation, and parallel crime fighting programs) that would need to be controlled if such a judgement was to be made. More importantly, the ShotSpotter technology is primarily a crime and evidence identification tool. As such, if the technology is used without a crime fighting strategy it is only likely to reveal more crime. This is especially true for the beginning of any gunshot detection program, where the value of the technology is still being evaluated and adjusted.

The bottom line is ShotSpotter offers value and should be maintained for further evaluation, if not expanded to additional hotspots within Clark County. The technical evaluation showed that the technology performed below the vendor's proposed estimates in some areas but still high enough in most areas to make it quite valuable. Likewise, the collection of success stories highlights the impact a single technology can have on a significant crime. The incident analysis revealed the potential intelligence value for developing new crime fighting strategies that are more surgical and effective in dealing with gun crime. Lastly and perhaps most importantly, maximizing the effectiveness of this technology now that lessons have been learned, and the initial investment made, is only logical and likely to lead to even better results in the coming months. With that said, any continuation of this type of program should be re-evaluated annually to ensure the same findings continue to surface each year.

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APPENDIX A – PRIMARY DATA SET (PII REDACTED)

#	DATE	ENTRY TYPE	SST ID #	ALERT TYPE	EVENT #	A/C	S/B	COVERAGE AREA	TIME OF SHOOTING	TIME OF ALERT	ACKNOWLEDGE TIME	TIME OF CAD EVENT	PR	PR TIME	# OF SHOTS	VICTIM LOCATED	SUSPECT LOCATED	SUSPECT ARRESTED	FIREARM RECOVERED	CASINGS LOCATED	# OF CASINGS	22	9MM	40	45	380	223	12G	OTHER	CONFIRMED SHOOTING	MISS REMOVED	REASON
1	12/01/17	SST	547	POSSIBLE	171201-0633	SEAC	H3	South	4:19:19	4:20:31	4:20:50	4:20:41	Yes	4:20:41	12	No	No	No	No	Yes	12	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
2	12/03/17	CAD	N/A	MISS	171203-0073	NEAC	F4	North	N/A	N/A	N/A	0:17:00	N/A	0:17:00	0	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	Unfounded
3	12/04/17	SST	2430	SINGLE	171204-0130	NEAC	F4	North	0:54:49	0:55:20	0:55:40	0:58:00	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
4	12/04/17	SST	2431	POSSIBLE	171204-0359	NEAC	F4	North	2:50:56	2:52:06	2:52:16	2:52:54	Yes	2:52:54	4	No	No	No	No	Yes	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
5	12/04/17	SST	2440	MULTIPLE	171204-3286	NEAC	F4	North	17:57:36	17:58:08	17:58:15	17:58:35	No	N/A	6	Yes	No	No	No	Yes	8	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
6	12/05/17	SST	639	POSSIBLE	171205-0497	SEAC	H1	South	4:25:50	4:26:26	4:28:16	4:30:52	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
7	12/05/17	SST	643	POSSIBLE	171205-3304	SEAC	N2	South	17:53:26	17:54:20	17:54:34	17:56:20	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
8	12/05/17	SST	2464	MULTIPLE	171205-4455	NEAC	F3	North	23:38:34	23:39:07	23:39:28	23:40:33	No	N/A	2	No	No	No	No	Yes	2	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
9	12/05/17	CAD	N/A	MISS	171205-3679	SCAC	N2	South	N/A	N/A	N/A	19:42:00	N/A	19:42:00	0	Yes	Yes	Yes	Yes	Yes	1	No	No	Yes	No	No	No	No	No	Yes	Yes	Indoor
10	12/06/17	SST	2468	MULTIPLE	171206-0529	NEAC	F3	North	5:22:01	5:23:08	5:23:57	5:24:53	No	N/A	2	Yes	No	No	No	Yes	2	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
11	12/06/17	CAD	N/A	MISS	171206-4057	NEAC	F4	North	N/A	N/A	N/A	21:32:00	N/A	21:32:00	0	Yes	No	No	No	Yes	7	No	No	No	No	No	No	No	No	Yes	No	N/A
12	12/07/17	SST	2480	MULTIPLE	171207-0020	NEAC	F3	North	0:05:35	0:06:24	0:07:25	0:07:09	No	N/A	7	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
13	12/07/17	CAD	N/A	MISS	171207-0410	NEAC	F4	North	N/A	N/A	N/A	4:22:00	N/A	N/A	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	No	N/A
14	12/07/17	CAD	N/A	MISS	171207-3840	NEAC	F3	North	N/A	N/A	N/A	21:22:00	N/A	21:22:00	0	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	Unfounded
15	12/07/17	CAD	N/A	MISS	171207-0254	SCAC	N1	South	N/A	N/A	N/A	2:32:00	N/A	2:32:00	0	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	Yes	Unfounded
16	12/09/17	SST	717	MULTIPLE	171209-0402	SEAC	H1	South	2:34:38	2:35:11	2:35:29	2:36:00	No	N/A	6	No	No	No	No	Yes	4	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
17	12/09/17	SST	719	SINGLE	171209-0677	SEAC	H1	South	4:43:18	4:43:55	4:44:13	4:46:00	No	N/A	1	No	No	No	No	Yes	1	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
18	12/09/17	SST	735	POSSIBLE	171209-3983	SCAC	N2	South	22:32:36	22:33:59	22:34:09	22:34:32	Yes	22:40:56	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
19	12/09/17	SST	2574	SINGLE	171209-1760	NEAC	F4	North	12:17:11	12:18:09	12:24:47	12:20:00	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
20	12/09/17	SST	2589	MULTIPLE	171209-2822	NEAC	F3	North	17:33:50	17:34:20	17:34:31	17:35:09	Yes	17:35:09	4	Yes	No	Yes	No	Yes	9	No	Yes	No	No	Yes	No	No	No	Yes	N/A	N/A
21	12/09/17	SST	2591	MULTIPLE	171209-2822	NEAC	F3	North	17:34:14	17:35:14	17:35:20	17:35:09	Yes	17:35:09	3	Yes	Yes	Yes	Yes	Yes	8	No	Yes	No	No	Yes	No	No	No	Yes	N/A	N/A
22	12/10/17	SST	743	MULTIPLE	171210-0760	SEAC	H3	South	4:26:15	4:27:02	5:07:08	4:27:50	No	N/A	2	No	No	No	No	Yes	3	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
23	12/10/17	SST	746	MULTIPLE	171210-0782	SEAC	H1	South	4:41:46	4:42:27	5:02:16	4:43:33	No	N/A	6	No	No	No	No	Yes	6	No	No	No	No	No	No	No	No	Yes	Yes	N/A	N/A
24	12/10/17	SST	766	POSSIBLE	171210-3662	SCAC	N2	South	21:20:02	21:21:00	21:21:05	21:21:00	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
25	12/10/17	CAD	771	MISS	171210-3725	SCAC	N2	South	9:50:54	N/A	N/A	21:52:00	N/A	21:52:00	0	No	No	No	No	Yes	7	No	No	No	No	Yes	No	No	No	Yes	No	N/A
26	12/11/17	CAD	N/A	MISS	171211-3814	SCAC	N2	South	N/A	N/A	N/A	21:30:00	N/A	21:30:00	0	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	Unfounded
27	12/13/17	SST	845	MULTIPLE	171213-0107	SEAC	H3	South	0:58:58	0:59:27	0:59:59	1:00:00	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
28	12/13/17	SST	882	MULTIPLE	171213-4056	SEAC	H3	South	23:20:44	23:21:15	23:22:06	23:22:05	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
29	12/13/17	CAD	N/A	MISS	171213-4136	NEAC	F4	North	N/A	N/A	N/A	23:56:00	N/A	23:56:00	0	Yes	Yes	Yes	No	No	0	No	No	No	No	No	No	No	No	No	Yes	Yes	Indoor
30	12/14/17	SST	2893	SINGLE	171214-0260	NEAC	F3	North	2:11:01	2:11:49	2:11:57	2:12:00	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
31	12/15/17	SST	903	POSSIBLE	171214-4310	SCAC	N2	South	23:41:58	23:42:28	23:42:39	23:43:00	No	N/A	1	No	Yes	Yes	Yes	No	0	No	No	No	No	No	No	No	No	Yes	Yes	N/A	N/A
32	12/15/17	SST	2964	SINGLE	171215-3478	NEAC	F3	North	19:10:55	19:12:12	19:12:17	19:12:00	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
33	12/16/17	CAD	N/A	MISS	171216-2344	SEAC	H1	South	N/A	N/A	N/A	14:10:00	N/A	14:10:00	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	No	N/A
34	12/17/17	SST	969	MULTIPLE	171217-0604	SEAC	H1	South	3:23:33	3:23:57	3:24:07	3:24:00	Yes	3:27:39	6	No	No	No	No	Yes	4	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
35	12/17/17	SST	977	SINGLE	171217-3384	SCAC	N2	South	19:20:01	19:20:31	19:20:39	19:21:53	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
36	12/18/17	CAD	N/A	MISS	171218-2514	SCAC	N3	South	N/A	N/A	N/A	14:50:00	N/A	14:50:00	0	Yes	No	No	No	Yes	1	No	No	No	No	No	No	No	No	No	Yes	Yes	Indoor
37	12/19/17	CAD	1054	MISS	171219-3742	SEAC	H1	South	7:40:50	N/A	N/A	19:42:00	N/A	19:42:00	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	No	N/A
38	12/19/17	SST	1060	SINGLE	171219-4221	SCAC	N2	South	21:51:37	21:52:05	21:52:12	21:52:58	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
39	12/19/17	SST	3116	MULTIPLE	171219-4223	NEAC	F3	North	21:51:50	21:52:41	21:52:50	21:53:22	Yes	21:53:00	16	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
40	12/19/17	CAD	N/A	MISS	171219-4322	NEAC	F3	North	N/A	N/A	N/A	22:22:00	N/A	22:22:00	0	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	Yes	Unfounded
41	12/20/17	CAD	N/A	MISS	171220-2987	SCAC	N1	South	N/A	N/A	N/A	17:13:00	N/A	17:13:00	0	No	No	No	No	Yes	5	Yes	No	No	No	No	No	No	No	Yes	No	N/A
42	12/21/17	SST	1215	SINGLE	171221-3932	SCAC	N2	South	22:39:36	22:40:00	22:40:10	22:40:30	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
43	12/22/17	SST	1237	SINGLE	171222-3322	SCAC	N2	South	19:08:58	19:09:57	19:09:57	19:13:20	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
44	12/22/17	SST	3416	POSSIBLE	171222-0436	NEAC	F4	North	3:25:28	3:26:14	3:26:20	3:27:01	No	N/A	1	No	No	No	No	Yes	1	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
45	12/23/17	SST	1259	POSSIBLE	171223-2558	SCAC	N2	South	16:22:40	16:23:31	16:23:48	16:24:38	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
46	12/23/17	CAD	N/A	MISS	171223-0468	NEAC	F4	North	N/A	N/A	N/A	2:53:00	N/A	2:53:00	0	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	No	Yes	Unfounded
47	12/24/17	CAD	1341	MISS	171224-3770	SCAC	N1	South	23:41:06	N/A	N/A	23:43:00	N/A	23:43:00	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	No	N/A
48	12/25/17	SST	1351	MULTIPLE	171225-0021	SEAC	H1	South	0:04:49	0:05:17	0:05:35	0:06:10	Yes	0:07:09	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	No	N/A	N/A
49	12/25/17	SST	1358	MULTIPLE	171225-0151	SEAC	H1	South	0:44:56	0:45:32	0:45:37	0:46:14	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
50	12/25/17	SST	1365	MULTIPLE	171225-0518	SEAC	H1	South	3:41:07	3:41:37	3:41:46	3:42:20	Yes	3:45:12	7	Yes	No	No	No	Yes	5	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
51	12/25/17	SST	1366	MULTIPLE	171225-0518	SEAC	H1	South	3:41:07	3:41:37	3:41:46	3:42:20	Yes	3:42:20	2	Yes	No	No	No	Yes	5	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
52	12/25/17	SST	1410	SINGLE	171225-2831	SEAC	H1	South	20:40:18	20:40:57	20:41:05	20:41:17	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	No	N/A	N/A
53	12/25/17	SST	3593	SINGLE	171225-3103	NEAC	F4	North	22:31:18	22:32:15	22:32:37	22:32:57	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	No	N/A	N/A
54	12/25/17	SST	3595	MULTIPLE	171225-3103	NEAC	f4	North	22:31:40	22:32:03	22:32:09	22:32:57	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	No	N/A	N/A
55	12/26/17	SST	1468	MULTIPLE	171226-3810	SCAC	N2	South	21:35:59	21:36:37	21:36:43	21:37:14	No	N/A	8	No	No	No	No	Yes	8	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
56	12/26/17	CAD	3596	MISS	171226-0015	NEAC	F4	North	12:04:45	N/A	N/A	0:05:00	N/A	0:05:00	0	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	No	Yes	Unfounded
57	12/27/17	SST	3679	MULTIPLE	171227-3277	NEAC	F4	North	18:18:59	18:19:58	18:20:05	18:20:00	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	No	N/A	N/A
58	12/28/17	SST	3768	POSSIBLE	171228-4607	NEAC	F4	North	23:54:35	23:55:39	23:55:46	23:57:08	No	N/A	1	No	No	No	No	Yes	1	Yes	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
59	12/29/17	SST	3785	POSSIBLE	171229-0313	NEAC	F3	North	1:49:33	1:50:00	1:50:00	1:50:00	Yes	1:51:00	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	No	Yes	N/A	N/A
60	12/31/17	SST	1643	MULTIPLE	171231-1615	SCAC	N2	South	9:34:32	9:35:43	9:35:50	9:36:00	No	N/A	5	No	No	No	No	Yes	5	No	Yes	No	No	No	No	No	No	No	Yes	N/A	N/A
61	12/31/17	SST	1658	MULTIPLE	171231-3145	SCAC	N2	South	16:35:09	16:36:53	16:37:25	16:35:56	Yes	16:35:56	13	Yes	Yes	Yes	Yes	Yes	14	No	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
62	01/01/18	SST	1915	MULTIPLE	180101-1911	SCAC	N2	South	9:16:40	9:17:58	9:18:04	9:17:59	Yes	9:17:59	4	No	No	No	No	Yes	19	Yes	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
63	01/01/18	SST	1925	MULTIPLE	180101-2603	SEAC	H1	South	12:38:40	12:40:43	12:40:53	12:41:30	No	N/A	2	Yes	No	No	No	Yes	2	No	Yes	No	No	No	No	No	No	No	Yes	N/A	N/A
64	01/01/18	SST	2000	MULTIPLE	180101-3593	SCAC	N2	South	17:22:07	17:24:52	17:25:24	17:24:09	Yes	17:24:09	14	No	No	No	No	Yes	14	No	Yes	No	Yes	No	No	No	No	No	Yes	N/A	N/A
65	01/01/18	SST	2010	MULTIPLE	180101-4271	SCAC	N1	South	20:13:53	20:15:46	20:15:53	20:15:19	Yes	20:15:19	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	No	N/A	N/A
66	01/01/18	SST	4666	MULTIPLE	180101-1276	NEAC	F2	North	5:23:22	5:24:32	5:24:39	5:25:06	Yes	5:25:06	27	No	No	No	No	Yes	26	No	No	No	No	No	No	Yes	No	Yes	Yes	N/A	N/A
67	01/01/18	SST	4731	MULTIPLE	180101-4550	NEAC	F3	North	21:22:00	21:23:07	21:23:12	21:23:44	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	No	N/A	N/A

APPENDIX A – PRIMARY DATA SET (PII REDACTED)

68	01/02/18	SST	2027	POSSIBLE	180102-0164	SCAC	N1	South	1:00:17	1:03:51	1:03:56	1:01:58	Yes	1:01:58	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
69	01/02/18	SST	2037	POSSIBLE	180102-1229	SEAC	H1	South	8:49:09	8:54:12	8:54:22	8:55:37	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
70	01/02/18	SST	2066	POSSIBLE	180102-4699	SCAC	N1	South	22:26:53	22:32:33	22:33:41	22:33:45	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
71	01/03/18	SST	4762	MULTIPLE	180102-2745	NEAC	F4	North	14:52:04	14:52:59	14:53:31	14:56:10	No	N/A	6	Yes	No	No	No	Yes	5	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
72	01/03/18	SST	4825	POSSIBLE	180103-2693	NEAC	F4	North	15:15:51	15:17:32	15:17:43	15:18:31	No	N/A	2	No	Yes	Yes	Yes	Yes	2	Yes	No	No	No	No	No	No	No	Yes	N/A	N/A
73	01/03/18	SST	4850	MULTIPLE	180103-4342	NEAC	F4	North	22:24:06	22:24:37	22:25:47	22:25:29	No	N/A	5	No	No	No	No	Yes	4	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
74	01/04/18	SST	4863	POSSIBLE	180104-0285	NEAC	F4	North	2:19:08	2:20:07	2:20:12	2:10:07	No	N/A	5	No	No	No	No	Yes	7	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
75	01/04/18	SST	2109	POSSIBLE	180104-0050	SCAC	N2	South	0:10:50	0:20:53	0:21:04	0:21:52	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
76	01/04/18	SST	2110	POSSIBLE	180104-0061	SEAC	H3	South	0:17:19	0:25:48	0:25:56	0:26:29	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
77	01/04/18	CAD	2130	MISS	180104-2605	SCAC	N2	South	15:25:39	N/A	N/A	15:30:23	N/A	15:30:23	0	Yes	Yes	Yes	Yes	Yes	1	No	No	No	No	No	No	No	No	Yes	No	N/A
78	01/04/18	SST	4860	MULTIPLE	180104-0285	NEAC	F4	North	2:08:19	2:09:01	2:09:06	2:10:07	No	N/A	5	No	No	No	No	Yes	7	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
79	01/05/18	SST	2147	POSSIBLE	180105-3228	SEAC	H1	South	18:15:22	18:20:00	18:20:05	18:23:13	No	N/A	1	Yes	No	Yes	Yes	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
80	01/05/18	SST	2150	POSSIBLE	180105-3458	SEAC	H1	South	19:27:04	19:33:09	19:33:15	19:33:40	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
81	01/05/18	SST	2153	POSSIBLE	180105-4062	SCAC	N2	South	22:14:37	22:19:15	22:19:25	22:19:51	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
82	01/05/18	SST	2154	MULTIPLE	180105-4049	SEAC	H3	South	22:15:27	22:19:42	22:19:45	22:18:03	Yes	22:18:03	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
83	01/05/18	SST	2156	SINGLE	180105-4208	SCAC	N2	South	22:50:39	22:54:41	22:54:47	22:55:38	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
84	01/05/18	SST	4998	SINGLE	180105-3553	NEAC	F3	North	20:03:11	20:03:45	20:03:51	20:04:15	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
85	01/05/18	CAD	N/A	MISS	180105-4420	NEAC	F4	North	N/A	N/A	N/A	23:50:38	N/A	23:50:38	0	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A
86	01/06/18	SST	2166	MULTIPLE	180106-0227	SCAC	N2	South	0:57:43	1:07:11	1:07:16	1:08:05	Yes	1:00:13	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
87	01/06/18	SST	5029	MULTIPLE	180106-1775	NEAC	F4	North	12:04:35	12:05:32	12:06:18	12:06:17	Yes	12:08:00	4	No	Yes	Yes	Yes	Yes	5	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
88	01/07/18	SST	5068	POSSIBLE	180107-0500	NEAC	F3	North	2:45:18	2:45:30	2:45:45	2:46:59	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
89	01/07/18	SST	5084	MULTIPLE	180107-3396	NEAC	F4	North	20:48:28	20:48:55	20:49:02	20:49:46	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
90	01/08/18	SST	2247	POSSIBLE	180108-0390	SEAC	H1	South	2:49:41	2:52:51	2:52:56	2:53:39	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
91	01/08/18	SST	5116	POSSIBLE	180108-3378	NEAC	F3	North	18:36:30	18:37:28	18:37:33	18:38:40	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
92	01/10/18	SST	5153	POSSIBLE	180110-0302	NEAC	F4	North	14:19:09	14:19:49	14:19:55	14:21:19	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
93	01/11/18	SST	2325	POSSIBLE	180111-0534	SCAC	N2	South	4:27:32	4:31:02	4:31:12	4:32:44	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
94	01/11/18	SST	5209	POSSIBLE	180111-3959	NEAC	F3	North	22:35:52	22:37:13	22:37:27	22:38:22	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
95	01/12/18	SST	2344	MULTIPLE	180112-0186	SEAC	H1	South	1:16:45	1:17:13	1:17:28	1:18:45	No	N/A	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
96	01/12/18	SST	2361	POSSIBLE	180112-2466	SEAC	H3	South	15:16:48	15:18:05	15:18:27	15:19:45	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
97	01/14/18	SST	5372	MULTIPLE	180114-0576	NEAC	F4	North	2:58:31	2:59:01	2:59:05	2:59:45	No	N/A	4	No	No	No	Yes	Yes	3	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
98	01/15/18	SST	2516	POSSIBLE	180115-1254	NEAC	H1	North	9:31:55	9:35:04	9:35:14	9:35:51	No	N/A	9	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
99	01/16/18	SST	2565	MULTIPLE	180115-3902	SCAC	N2	South	21:53:03	21:58:33	21:58:40	21:54:20	Yes	21:54:20	4	No	No	No	No	Yes	4	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
100	01/16/18	SST	2575	MULTIPLE	180116-0329	SCAC	N2	South	2:32:12	2:33:37	2:33:44	2:34:19	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
101	01/16/18	SST	2583	MULTIPLE	180116-0517	SCAC	N2	South	4:30:20	4:32:06	4:32:11	4:32:43	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
102	01/16/18	SST	2603	SINGLE	180116-1602	SEAC	H1	South	10:34:29	10:35:51	10:35:56	10:36:17	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
103	01/16/18	SST	5479	POSSIBLE	180116-0548	NEAC	F4	North	4:57:10	4:57:50	4:57:55	4:58:27	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
104	01/18/18	SST	2680	POSSIBLE	180118-0048	SCAC	N2	South	0:15:05	0:17:25	0:17:29	0:18:14	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
105	01/18/18	SST	2694	MULTIPLE	180118-0594	SCAC	N2	South	4:38:07	4:39:33	4:39:42	4:40:17	Yes	4:43:03	6	No	No	No	No	Yes	6	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
106	01/18/18	SST	2709	MULTIPLE	180118-3550	SEAC	H1	South	18:48:59	18:50:46	18:50:58	18:51:50	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
107	01/18/18	SST	2716	SINGLE	180118-3772	SCAC	N2	South	19:45:19	19:46:57	19:47:05	19:47:36	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
108	01/19/18	SST	2741	MULTIPLE	180119-1832	SEAC	H3	South	11:56:05	11:58:16	11:58:38	12:00:10	Yes	11:57:21	4	No	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
109	01/19/18	SST	2752	MULTIPLE	180119-4185	SCAC	N2	South	22:08:20	22:10:08	22:10:16	22:12:09	No	N/A	9	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
110	01/20/18	SST	5671	POSSIBLE	180120-1058	NEAC	F3	North	7:31:17	7:31:55	7:32:21	7:33:18	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
111	01/20/18	CAD	N/A	MISS	180120-2881	SCAC	N2	South	N/A	N/A	N/A	17:34:21	N/A	17:34:21	0	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	No	N/A
112	01/21/18	SST	2789	MULTIPLE	180121-2292	SEAC	H3	South	15:37:18	15:38:06	15:38:13	15:38:48	No	N/A	2	No	No	No	No	Yes	1	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
113	01/21/18	SST	5721	MULTIPLE	180121-3711	NEAC	F3	North	22:35:21	22:36:12	22:36:26	22:38:00	No	N/A	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
114	01/23/18	SST	5830	MULTIPLE	180123-3945	NEAC	F4	North	20:42:29	20:42:55	20:43:04	20:44:22	No	N/A	7	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
115	01/24/18	SST	2878	MULTIPLE	180124-3799	SCAC	N2	South	20:14:27	20:16:40	20:16:49	20:16:21	Yes	20:16:21	2	No	No	No	No	Yes	2	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
116	01/24/18	SST	5859	MULTIPLE	180124-0552	NEAC	F3	North	4:59:05	4:59:25	4:59:33	5:00:18	Yes	5:01:13	4	No	No	No	No	Yes	4	No	Yes	Yes	No	No	No	No	No	Yes	N/A	N/A
117	01/25/18	SST	2924	SINGLE	180125-4116	SCAC	N2	South	22:13:09	22:15:34	22:15:41	22:17:08	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
118	01/26/18	SST	5992	POSSIBLE	180126-3875	NEAC	F3	North	21:45:09	21:45:55	21:46:07	21:47:02	No	N/A	1	No	No	No	No	No	0	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
119	01/27/18	SST	2983	MULTIPLE	180127-0576	SCAC	N2	South	3:27:38	3:28:26	3:28:36	3:29:28	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
120	01/27/18	SST	6001	MULTIPLE	180127-0869	NEAC	F3	North	6:00:08	6:01:32	6:01:41	6:01:38	Yes	6:02:01	5	No	No	No	No	Yes	5	No	Yes	No	No	No	No	No	Yes	Yes	N/A	N/A
121	01/28/18	SST	3012	MULTIPLE	180128-0515	SEAC	H1	South	2:40:47	2:43:07	2:43:15	2:42:27	Yes	2:24:27	5	No	No	No	No	Yes	2	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
122	01/28/18	SST	3024	SINGLE	180128-3375	SEAC	H1	South	19:31:13	19:31:51	19:31:56	19:32:49	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
123	01/28/18	SST	3030	MULTIPLE	180128-3724	SCAC	N2	South	21:26:25	21:27:01	21:27:15	21:27:35	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
124	01/28/18	SST	6035	MULTIPLE	180128-0061	NEAC	F3	North	0:19:27	0:19:58	0:20:25	0:21:36	No	N/A	2	No	Yes	No	Yes	Yes	2	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
125	01/29/18	SST	3033	SINGLE	180129-0006	SCAC	N2	South	23:59:44	0:00:26	0:00:33	0:01:14	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
126	01/29/18	SST	6068	MULTIPLE	180129-0298	NEAC	F4	North	1:40:26	1:40:50	1:40:57	1:41:31	No	N/A	5	Yes	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
127	01/30/18	SST	3055	SINGLE	180129-3765	SCAC	N2	South	19:45:28	19:46:03	19:46:15	19:46:47	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
128	01/30/18	SST	6169	POSSIBLE	180130-2020	NEAC	F4	North	12:39:15	12:40:01	12:40:10	12:41:06	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
129	02/01/18	SST	3166	SINGLE	180201-0215	SCAC	N2	South	1:30:23	1:31:04	1:31:37	1:32:18	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
130	02/01/18	SST	3190	MULTIPLE	180201-2325	SCAC	N2	South	14:02:30	14:03:22	14:03:30	14:03:33	Yes	14:03:33	14	Yes	No	No	No	Yes	14	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
131	02/01/18	SST	3213	SINGLE	180201-4401	SEAC	H1	South	23:10:46	23:11:25	23:11:31	23:12:08	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
132	02/03/18	SST	3273	SINGLE	180203-0160	SCAC	N2	South	0:42:50	0:43:30	0:43:34	0:44:12	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
133	02/03/18	SST	6399	SINGLE	180203-0410	NEAC	F3	North	2:10:53	2:11:18	2:11:25	2:12:02	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
134	02/03/18	SST	6400	POSSIBLE	180203-0506	NEAC	F3	North	2:50:18	2:51:11	2:51:16	2:51:45	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
135	02/04/18	SST	3319	POSSIBLE	180204-0397	SEAC	H3	South	1:44:11	1:44:56	1:45:02	1:45:44	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
136	02/04/18	SST	3348	POSSIBLE	180204-2970	SEAC	H1	South	18:27:58	18:29:09	18:29:38	18:32:45	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
137	02/04/18	SST	6502	MULTIPLE	180204-2198	NEAC	F3	North	14:18:49	14:19:21	14:19:27	14:15:14	Yes	14:15:14	7	No	No	No	No	Yes	6	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A

APPENDIX A – PRIMARY DATA SET (PII REDACTED)

138	02/08/18	SST	3443	POSSIBLE	180208-0382	SCAC	N2	South	2:32:16	2:33:05	2:33:15	2:34:18	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	Yes	N/A	N/A
139	02/08/18	SST	3446	MULTIPLE	180208-0807	SCAC	N2	South	6:27:20	6:28:11	6:28:50	6:29:20	Yes	6:31:12	5	Yes	No	No	No	No	0	No	No	No	No	No	No	No	Yes	Yes	N/A	N/A
140	02/08/18	SST	6690	MULTIPLE	180208-0223	NEAC	F4	North	1:24:33	1:24:58	1:25:10	1:25:46	Yes	1:31:18	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
141	02/08/18	SST	6743	MULTIPLE	180208-3946	NEAC	F3	North	20:27:16	20:28:00	20:28:11	20:30:13	Yes	20:46:27	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
142	02/09/18	SST	6756	SINGLE	180209-0126	NEAC	F3	North	0:44:59	0:45:51	0:45:59	0:46:46	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
143	02/09/18	CAD	N/A	MISS	180209-1660	SCAC	N1	South	N/A	N/A	N/A	11:33:28	N/A	11:33:28	0	Yes	No	No	No	Yes	7	No	Yes	No	No	No	No	No	No	Yes	No	N/A
144	02/10/18	SST	3528	MULTIPLE	180210-2811	SEAC	H3	South	15:33:03	15:33:59	15:34:15	15:36:20	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
145	02/10/18	SST	3535	SINGLE	100210-4144	SCAC	N2	South	21:33:04	21:33:55	21:34:11	21:35:21	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
146	02/10/18	SST	3537	MULTIPLE	180210-4459	SEAC	H1	South	22:51:32	22:52:47	22:53:02	22:54:02	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
147	02/11/18	SST	3566	MULTIPLE	180211-3549	SCAC	N1	South	20:39:31	20:40:26	20:52:48	20:40:44	Yes	20:40:44	7	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
148	02/11/18	CAD	3575	MISS	180211-3904	SCAC	N1	South	10:29:18	N/A	N/A	22:31:13	N/A	N/A	5	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	No	N/A
149	02/11/18	SST	6928	MULTIPLE	180211-3400	NEAC	F4	North	19:58:45	19:59:29	20:05:40	20:00:45	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
150	02/12/18	SST	3580	MULTIPLE	180212-0154	SCAC	N2	South	0:47:09	0:47:53	0:48:03	0:48:35	Yes	0:49:00	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
151	02/15/18	SST	3657	POSSIBLE	180215-0233	SCAC	N3	South	1:18:46	1:19:32	1:20:18	1:20:02	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
152	02/15/18	SST	3687	MULTIPLE	180215-3991	SCAC	N2	South	20:58:41	20:59:14	20:59:45	21:00:06	No	N/A	3	No	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
153	02/15/18	SST	3692	POSSIBLE	180216-0004	SCAC	N3	South	23:59:30	23:59:31	23:59:50	0:00:15	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
154	02/15/18	SST	7097	MULTIPLE	180215-3743	NEAC	F3	North	19:50:26	19:50:50	19:52:35	19:51:46	Yes	19:54:29	11	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
155	02/16/18	SST	3709	SINGLE	180216-3846	SEAC	H1	South	20:35:43	20:36:42	20:36:51	20:37:16	No	N/A	1	No	No	Yes	Yes	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
156	02/16/18	SST	3713	MULTIPLE	180216-4147	SCAC	N2	South	21:43:00	21:43:48	21:43:57	21:44:54	Yes	21:44:31	2	Yes	No	No	No	Yes	1	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
157	02/16/18	SST	3715	POSSIBLE	180216-4428	SCAC	N3	South	23:03:40	23:04:43	23:04:50	23:05:45	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
158	02/16/18	SST	7150	SINGLE	180216-2603	NEAC	F3	North	15:46:30	15:47:06	15:47:14	15:48:22	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
159	02/17/18	SST	3752	POSSIBLE	180217-3122	SEAC	H3	South	18:24:02	18:25:04	18:25:15	18:26:23	No	N/A	1	No	No	No	No	Yes	2	No	No	No	No	No	No	Yes	Yes	Yes	N/A	N/A
160	02/17/18	SST	3766	POSSIBLE	180217-4090	SCAC	N2	South	22:10:00	22:10:48	22:10:57	22:11:39	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
161	02/17/18	SST	7194	POSSIBLE	180217-3824	NEAC	F4	North	21:12:39	21:13:37	21:13:52	21:14:32	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
162	02/22/18	SST	7448	POSSIBLE	180222-2160	NEAC	F4	North	13:41:44	13:41:45	13:41:52	13:42:48	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
163	02/23/18	SST	3887	MULTIPLE	180223--0631	SCAC	N1	South	5:13:15	5:15:33	5:15:39	5:15:02	Yes	5:15:02	4	Yes	No	No	No	Yes	15	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
164	02/23/18	SST	3909	POSSIBLE	180223-3657	SEAC	H3	South	20:45:42	20:47:20	20:47:30	20:48:24	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
165	02/23/18	SST	3910	POSSIBLE	180223-3816	SCAC	N2	South	21:23:58	21:25:59	21:26:11	21:26:58	Yes	21:29:31	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
166	02/23/18	SST	7496	MULTIPLE	180223-3961	NEAC	F3	North	22:09:16	22:09:42	22:09:54	22:10:43	Yes	22:11:00	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
167	02/24/18	SST	3913	POSSIBLE	180224-0097	SCAC	N1	South	0:19:18	0:20:57	0:21:07	0:24:50	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
168	02/24/18	SST	3916	SINGLE	180224-0430	SEAC	H1	South	2:05:41	2:06:46	2:06:55	2:07:41	No	N/A	1	No	No	No	No	Yes	1	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
169	02/25/18	SST	3967	POSSIBLE	180225-2844	SCAC	N2	South	17:12:58	17:15:05	17:15:31	17:16:15	No	N/A	1	No	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
170	02/25/18	SST	3974	POSSIBLE	180225-3239	SEAC	H1	South	19:17:14	19:20:12	19:20:31	19:22:26	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
171	02/25/18	SST	7520	MULTIPLE	180225-0565	NEAC	F3	North	2:50:09	2:50:52	3:02:26	2:51:29	Yes	2:51:29	3	No	No	No	No	Yes	2	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
172	02/25/18	SST	7521	MULTIPLE	180225-0742	NEAC	F4	North	3:47:20	3:47:52	3:48:06	3:49:54	Yes	3:52:26	3	No	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
173	02/26/18	SST	4004	MULTIPLE	180226-4143	SEAC	H3	South	22:18:36	22:22:06	22:22:11	22:22:52	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
174	02/26/18	SST	7541	SINGLE	180226-0085	NEAC	F3	North	0:21:28	0:22:01	0:22:12	0:23:11	No	N/A	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
175	02/27/18	CAD	N/A	MISS	180227-2546	SCAC	N1	South	N/A	N/A	N/A	14:21:40	N/A	14:21:40	0	No	No	No	No	Yes	0	No	No	No	No	No	No	No	No	Yes	No	N/A
176	02/28/18	SST	4039	SINGLE	180228-0431	SCAC	N1	South	3:17:12	3:19:13	3:19:38	3:21:11	Yes	3:25:53	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
177	02/28/18	CAD	N/A	MISS	180228-1784	SCAC	N1	South	N/A	N/A	N/A	11:31:16	N/A	11:31:16	0	No	No	Yes	No	Yes	8	No	Yes	No	No	No	No	No	No	Yes	No	N/A
178	03/01/18	SST	4080	POSSIBLE	180301-2189	SCAC	N2	South	13:07:31	13:12:13	13:12:42	13:14:15	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
179	03/02/18	SST	4095	POSSIBLE	180302-0532	SEAC	H3	South	3:52:21	3:55:00	3:56:03	3:57:03	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
180	03/03/18	SST	7743	SINGLE	180303-0076	NEAC	F4	North	0:19:49	0:20:57	0:21:12	0:21:52	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
181	03/03/18	SST	7752	MULTIPLE	180303-3728	NEAC	F4	North	21:09:19	21:10:13	21:10:24	21:11:27	Yes	N/A	2	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
182	03/04/18	SST	4149	POSSIBLE	180304-0669	DTAC	C3	South	3:18:38	3:19:30	3:19:39	3:20:19	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
183	03/04/18	SST	4166	SINGLE	180304-3935	SEAC	H1	South	22:37:32	22:40:46	22:40:52	22:41:30	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
184	03/04/18	SST	7759	MULTIPLE	180304-0396	NEAC	F4	North	1:52:31	1:53:03	1:53:08	1:53:37	No	N/A	5	No	No	No	No	Yes	5	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
185	03/04/18	SST	7766	MULTIPLE	180304-1910	NEAC	F4	North	12:44:53	12:45:33	12:45:40	12:46:07	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
186	03/04/18	SST	7772	POSSIBLE	180304-3501	NEAC	F3	North	20:24:10	20:24:56	20:25:18	20:26:17	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
187	03/05/18	SST	4175	SINGLE	180305-3387	SCAC	N2	South	17:44:22	17:46:02	17:46:21	17:47:19	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
188	03/06/18	SST	4182	POSSIBLE	180306-0196	SEAC	H3	South	1:22:15	1:24:39	1:24:45	1:25:49	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
189	03/06/18	SST	4190	POSSIBLE	180306-3812	SCAC	H1	South	20:21:51	20:23:06	20:23:23	20:24:14	No	N/A	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
190	03/07/18	SST	4192	MULTIPLE	180307-0013	SCAC	N2	South	0:04:02	0:04:35	0:04:45	0:05:11	Yes	0:06:08	4	Yes	No	No	No	Yes	5	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
191	03/07/18	SST	7881	SINGLE	180307-4878	NEAC	F4	North	23:49:20	23:50:08	23:50:13	23:51:18	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
192	03/08/18	SST	7883	SINGLE	180308-0275	NEAC	F4	North	1:42:20	1:43:14	1:44:07	1:44:14	No	N/A	1	No	No	No	No	Yes	1	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
193	03/08/18	SST	7952	SINGLE	180308-3767	NEAC	F4	North	18:53:04	18:53:26	18:53:37	18:54:24	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
194	03/09/18	CAD	8012	MISS	180309-4690	NEAC	F4	North	23:38:59	23:54:52	23:54:52	23:54:52	N/A	N/A	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	No	N/A
195	03/10/18	SST	4320	SINGLE	180310-3487	SEAC	H1	South	20:02:37	20:05:07	20:05:17	20:06:05	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
196	03/10/18	SST	8020	POSSIBLE	180310-1924	NEAC	F3	North	12:23:49	12:24:54	12:25:04	12:26:06	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
197	03/10/18	SST	8030	MULTIPLE	180310-3781	NEAC	F4	North	21:14:19	21:14:41	21:15:01	21:16:22	Yes	21:17:19	4	No	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
198	03/10/18	SST	8031	MULTIPLE	180310-4060	NEAC	F4	North	22:21:29	22:22:02	22:22:22	22:23:43	Yes	10:24:33	3	No	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
199	03/10/18	CAD	N/A	MISS	180310-1885	SEAC	H3	South	N/A	N/A	N/A	12:10:52	N/A	12:10:52	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	Yes	Indoor
200	03/11/18	SST	4324	MULTIPLE	180311-0060	SEAC	H1	South	0:18:17	0:21:02	0:21:07	0:20:12	Yes	0:20:12	7	No	No	No	No	Yes	9	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
201	03/11/18	SST	8032	SINGLE	180311-0045	NEAC	F3	North	0:13:24	0:14:07	0:14:17	0:14:45	No	N/A	1	No	Yes	Yes	No	Yes	1	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
202	03/11/18	SST	8055	MULTIPLE	180311-3358	NEAC	F3	North	20:43:11	20:43:35	20:44:00	20:44:56	Yes	20:46:07	7	No	No	No	No	Yes	5	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
203	03/11/18	SST	8056	MULTIPLE	180311-3358	NEAC	F3	North	20:43:16	20:43:47	20:43:56	20:44:56	Yes	20:46:07	5	No	No	No	No	Yes	2	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
204	03/11/18	SST	8064	MULTIPLE	180311-3619	NEAC	F4	North	22:04:48	22:05:25	22:05:35	22:06:46	Yes	22:07:47	5	No	No	No	No	Yes	7	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
205	03/12/18	SST	4353	SINGLE	180312-0429	SEAC	H2	South	2:33:48	2:35:42	2:35:49	2:36:33	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
206	03/12/18	SST	4387	SINGLE	180313-0402	SCAC	N2	South	2:29:35	2:30:16	2:30:30	2:31:03	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
207	03/12/18	SST	8069	SINGLE	180312-0003	NEAC	F3	North	23:58:50	23:59:39	23:59:49	0:00:36	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A

APPENDIX A – PRIMARY DATA SET (PII REDACTED)

208	03/12/18	SST	8070	SINGLE	180312-0211	NEAC	F4	North	1:11:13	1:12:09	1:12:19	1:13:19	No	N/A	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
209	03/12/18	SST	8129	MULTIPLE	180313-0098	NEAC	F3	North	0:26:10	0:26:44	0:26:50	0:27:26	No	N/A	2	No	No	No	No	Yes	2	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
210	03/13/18	SST	8162	POSSIBLE	180313-4111	NEAC	F4	North	18:46:30	18:47:42	18:47:49	18:48:30	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
211	03/13/18	CAD	N/A	MISS	180313-5011	NEAC	F3	North	N/A	N/A	N/A	23:12:59	N/A	23:12:59	0	Yes	No	No	No	Yes	1	No	No	No	No	No	No	No	No	Yes	No	N/A
212	03/14/18	SST	8204	MULTIPLE	180314-3711	NEAC	F4	North	19:23:02	19:23:36	19:23:44	19:24:41	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
213	03/15/18	SST	4463	SINGLE	180315-4962	SCAC	N2	South	23:31:10	23:32:22	23:32:39	23:33:22	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
214	03/16/18	SST	4469	POSSIBLE	180316-0899	SCAC	N2	South	6:38:13	6:39:26	6:39:33	6:40:04	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
215	03/16/18	SST	8282	MULTIPLE	180316-2310	NEAC	F4	North	13:46:37	13:47:11	13:47:25	13:48:05	No	N/A	4	No	No	No	No	Yes	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
216	03/17/18	SST	4487	MULTIPLE	180317-0591	SCAC	N2	South	3:41:34	3:45:18	3:45:46	3:48:11	Yes	3:48:11	9	Yes	No	No	Yes	Yes	5	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
217	03/17/18	SST	4488	MULTIPLE	180317-0591	SCAC	N2	South	3:41:42	3:45:22	3:45:50	3:48:11	Yes	3:48:11	9	Yes	No	No	Yes	Yes	8	No	No	No	No	No	No	No	No	Yes	Yes	N/A	N/A
218	03/17/18	SST	4486	MULTIPLE	180317-0579	SCAC	N2	South	3:41:16	3:43:29	3:43:48	3:42:40	Yes	3:44:33	6	Yes	No	No	Yes	Yes	13	No	No	Yes	No	No	No	Yes	Yes	Yes	N/A	N/A
219	03/17/18	SST	4489	SINGLE	180317-0603	SCAC	H3	South	3:52:22	3:54:39	3:54:49	3:55:29	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
220	03/17/18	SST	8315	MULTIPLE	180317-3648	NEAC	F4	North	21:08:57	21:10:10	21:10:26	21:11:58	Yes	21:11:58	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
221	03/18/18	SST	4524	SINGLE	180318-3876	SCAC	N3	South	23:02:53	23:04:36	23:04:46	23:05:28	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
222	03/18/18	SST	4530	POSSIBLE	180319-0455	SEAC	H1	South	3:02:19	3:04:29	3:04:35	3:05:19	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
223	03/18/18	SST	8316	MULTIPLE	180318-0284	NEAC	F3	North	1:20:12	1:20:43	1:20:50	1:21:30	Yes	1:23:00	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
224	03/18/18	SST	8356	POSSIBLE	180318-4018	NEAC	F3	North	23:39:00	23:40:08	23:40:14	23:40:44	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
225	03/19/18	SST	4573	MULTIPLE	180319-4092	SEAC	H1	South	21:48:41	21:49:56	21:50:02	21:51:50	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
226	03/20/18	SST	4578	MULTIPLE	180320-0003	SEAC	H1	South	23:59:33	0:00:42	0:00:48	0:00:49	Yes	0:01:06	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
227	03/20/18	SST	4586	MULTIPLE	180320-4617	SEAC	N2	South	23:13:46	23:14:11	23:14:20	23:15:03	Yes	23:17:00	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
228	03/20/18	SST	8423	POSSIBLE	180320-1315	NEAC	F3	North	9:04:09	9:05:21	9:06:31	9:06:38	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
229	03/21/18	SST	8455	POSSIBLE	180321-3734	NEAC	F3	North	18:30:00	18:31:46	18:31:57	18:32:53	Yes	18:35:35	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
230	03/22/18	SST	4624	POSSIBLE	180322-2383	SEAC	H1	South	13:59:23	14:00:48	14:00:58	14:01:35	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
231	03/22/18	SST	8467	POSSIBLE	180322-0393	NEAC	F4	North	2:42:27	2:43:02	2:43:17	2:43:58	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
232	03/22/18	SST	8472	MULTIPLE	180322-0724	NEAC	F3	North	6:28:38	6:29:16	6:29:26	6:29:59	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
233	03/23/18	SST	4638	SINGLE	180323-0531	SEAC	H1	South	3:42:20	3:43:07	3:43:14	3:43:47	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
234	03/23/18	SST	4655	MULTIPLE	180323-4034	SEAC	H3	South	21:50:45	21:52:08	21:52:18	21:53:10	No	N/A	2	No	No	No	No	Yes	2	No	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
235	03/24/18	SST	4690	SINGLE	180324-3436	SCAC	N2	South	19:39:43	19:40:21	19:40:34	19:41:09	Yes	19:41:09	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
236	03/24/18	SST	4703	MULTIPLE	180324-4314	SEAC	H3	South	23:31:27	23:32:14	23:35:09	23:32:54	Yes	23:33:45	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
237	03/24/18	CAD	8512	MISS	180324-0100	NEAC	F4	North	23:58:15	N/A	N/A	0:27:32	N/A	N/A	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	No	N/A
238	03/25/18	SST	4712	POSSIBLE	180325-1657	SEAC	H1	South	11:46:58	11:47:56	11:48:04	11:48:30	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
239	03/25/18	SST	4719	MULTIPLE	180326-0059	SCAC	N2	South	0:16:59	0:17:39	0:17:45	0:18:16	Yes	0:19:09	9	No	No	No	No	Yes	41	Yes	No	Yes	No	No	No	No	No	Yes	N/A	N/A
240	03/25/18	SST	8568	SINGLE	180325-3293	NEAC	F4	North	20:03:34	20:04:25	20:04:40	20:05:20	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
241	03/26/18	SST	8590	MULTIPLE	180326-4288	NEAC	F4	North	23:46:06	23:46:50	23:51:13	23:47:40	Yes	23:48:52	2	No	No	No	No	Yes	2	No	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
242	03/27/18	SST	8594	MULTIPLE	180327-0374	NEAC	F4	North	2:48:31	2:49:38	2:49:44	2:50:15	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
243	03/28/18	SST	4756	SINGLE	180328-2383	SCAC	N2	South	14:11:00	14:12:01	14:18:10	14:19:37	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
244	03/28/18	SST	8666	POSSIBLE	180328-4627	NEAC	F4	North	23:36:07	23:37:02	23:37:09	23:38:09	No	N/A	1	No	No	No	No	Yes	1	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
245	03/28/18	CAD	N/A	MISS	180322-1020	SEAC	N1	South	N/A	N/A	N/A	N/A	N/A	7:59:19	0	No	No	No	No	Yes	12	No	Yes	No	No	No	No	No	No	Yes	No	N/A
246	03/29/18	SST	8673	POSSIBLE	180329-0354	NEAC	F4	North	2:31:20	2:32:06	2:32:15	2:32:57	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
247	03/29/18	SST	8679	POSSIBLE	180329-0394	NEAC	F4	North	2:52:52	2:53:39	2:53:49	2:57:25	No	N/A	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
248	03/29/18	SST	8682	SINGLE	180329-0477	NEAC	F3	North	3:48:59	3:49:57	3:50:07	3:50:46	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
249	03/30/18	SST	4805	POSSIBLE	180330-0667	SEAC	H3	South	5:10:44	5:11:50	5:11:56	5:12:23	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
250	03/30/18	SST	4806	MULTIPLE	180330-0710	SCAC	N1	South	5:49:09	5:49:48	5:49:56	5:50:19	Yes	5:50:00	9	No	No	No	No	Yes	10	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
251	03/30/18	SST	4843	POSSIBLE	180330-3488	SCAC	N2	South	18:59:30	19:00:37	19:00:45	19:02:28	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
252	04/01/18	SST	4887	SINGLE	180401-0292	SCAC	N2	South	1:30:12	1:31:31	1:31:42	1:32:25	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
253	04/01/18	SST	4893	SINGLE	180401-1930	SEAC	H1	South	13:28:00	13:28:52	13:28:58	13:29:54	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
254	04/01/18	SST	8793	MULTIPLE	180401-0522	NEAC	F4	North	2:50:16	2:50:51	2:50:58	2:51:55	No	N/A	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
255	04/01/18	SST	8806	POSSIBLE	180401-1553	NEAC	F3	North	11:07:52	11:08:59	11:09:08	11:09:44	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
256	04/01/18	SST	8817	SINGLE	180401-3496	NEAC	F4	North	21:53:50	21:55:10	21:55:19	21:56:48	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
257	04/04/18	SST	8943	SINGLE	180404-4378	NEAC	F4	North	21:28:41	21:29:26	21:29:35	21:30:46	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
258	04/05/18	SST	8975	MULTIPLE	180405-4181	NEAC	F4	North	20:57:28	20:59:13	20:59:25	21:00:24	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
259	04/05/18	SST	8980	SINGLE	180405-4322	NLV	Y9	North	21:36:15	21:36:58	21:37:07	21:38:31	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
260	04/06/18	SST	4994	MULTIPLE	180406-3662	SCAC	N1	South	19:42:59	19:43:31	19:43:42	19:44:59	Yes	19:44:58	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
261	04/06/18	SST	9018	SINGLE	180406-4403	NEAC	F3	North	22:44:42	22:45:15	22:45:22	22:46:29	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
262	04/07/18	SST	5008	SINGLE	180407-1483	SEAC	H1	South	10:17:04	10:18:22	10:18:40	10:19:49	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
263	04/08/18	SST	5029	MULTIPLE	180408-3940	SCAC	N2	South	22:49:37	22:50:39	22:50:51	22:51:45	Yes	22:57:44	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
264	04/09/18	SST	5033	MULTIPLE	180409-0566	SCAC	N2	South	4:19:59	4:20:35	4:20:43	4:21:41	No	N/A	5	No	No	No	No	Yes	4	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
265	04/09/18	SST	5058	SINGLE	180409-3987	SCAC	N2	South	20:56:05	20:57:05	20:57:22	20:57:46	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
266	04/10/18	SST	5076	SINGLE	180410-0447	SCAC	N2	South	3:39:22	3:39:59	3:40:06	3:41:46	Yes	3:42:01	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
267	04/10/18	SST	9115	SINGLE	180410-0342	NEAC	F4	North	2:45:49	2:46:25	2:46:38	2:47:21	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
268	04/10/18	SST	9117	MULTIPLE	180410-0541	NEAC	F4	North	4:28:22	4:29:01	4:29:10	4:29:57	No	N/A	2	No	No	No	No	Yes	2	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
269	04/11/18	SST	9141	SINGLE	180411-0265	NEAC	F4	North	2:03:08	2:03:41	2:03:49	2:05:03	No	N/A	1	No	No	No	No	Yes	1	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
270	04/11/18	SST	9143	MULTIPLE	180411-0311	NEAC	F4	North	2:25:39	2:26:08	2:26:15	2:27:15	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
271	04/11/18	SST	9145	POSSIBLE	180411-0368	NEAC	F4	North	2:58:26	2:59:07	2:59:14	3:00:01	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
272	04/11/18	CAD	N/A	MISS	180411-0413	NEAC	F3	North	3:26:54	3:29:43	3:29:43	3:29:43	N/A	3:29:43	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	No	N/A
273	04/12/18	SST	5140	MULTIPLE	180412-4035	SCAC	N2	South	20:16:55	20:17:52	20:18:00	20:18:52	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	No	N/A	N/A
274	04/13/18	SST	5147	MULTIPLE	180413-2030	SCAC	N2	South	11:59:22	12:00:05	12:00:17	11:59:47	Yes	X	7	Yes	Yes	Yes	Yes	Yes	7	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
275	04/13/18	SST	9253	MULTIPLE	180413-0690	NEAC	F3	North	4:50:37	4:51:06	4:51:21	4:52:38	No	N/A	13	No	No	No	No	Yes	11	No	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
276	04/13/18	CAD	N/A	MISS	180413-0589	NEAC	F3	North	3:51:08	3:53:39	3:53:39	3:53:39	N/A	3:53:39	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	No	N/A
277	04/14/18	SST	5162	MULTIPLE	180414-0827	SCAC	N2	South	4:46:55	4:47:28	4:47:39	4:48:00	Yes	4:50:06	4	No	Yes	Yes	Yes	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A

APPENDIX A – PRIMARY DATA SET (PII REDACTED)

278	04/14/18	SST	5184	SINGLE	180414-4431	SEAC	H3	South	22:30:21	22:31:04	22:31:12	22:33:27	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
279	04/19/18	SST	5278	MULTIPLE	180419-1131	SCAC	N2	South	8:24:53	8:25:46	8:33:36	8:26:11	Yes	X	3	No	No	Yes	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
280	04/20/18	SST	5299	MULTIPLE	180420-4051	SCAC	N2	South	21:03:55	21:04:38	21:05:05	21:05:15	Yes	21:05:15	10	No	No	No	No	Yes	10	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
281	04/20/18	SST	9404	SINGLE	180420-4537	NEAC	F4	North	23:13:38	23:14:38	23:48:07	23:16:09	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
282	04/20/18	CAD	N/A	MISS	180420-4115	SCAC	N2	South	21:21:11	21:21:11	21:21:11	21:21:11	N/A	21:21:11	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	No	N/A
283	04/21/18	SST	5306	POSSIBLE	180421-0021	SCAC	N2	South	0:04:17	0:05:10	0:08:56	0:06:32	No	N/A	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
284	04/21/18	SST	5309	SINGLE	180421-0274	SEAC	H1	South	1:39:12	1:40:06	1:40:16	1:40:55	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
285	04/21/18	SST	5313	POSSIBLE	180421-0427	SCAC	N1	South	2:40:10	2:40:53	2:41:47	2:43:23	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
286	04/21/18	SST	5315	SINGLE	180421-0690	SCAC	N3	South	5:10:41	5:11:36	5:11:43	5:13:00	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
287	04/21/18	SST	9405	POSSIBLE	180421-0130	NEAC	F4	North	0:48:36	0:49:14	0:49:28	0:50:04	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
288	04/21/18	SST	9423	MULTIPLE	180421-0945	NEAC	F3	North	7:52:26	7:52:53	7:53:18	7:53:37	Yes	7:53:21	3	Yes	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
289	04/21/18	SST	9424	MULTIPLE	180421-0943	NEAC	F3	North	7:52:40	7:53:58	7:54:02	7:53:21	Yes	7:53:21	2	Yes	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
290	04/22/18	SST	5349	POSSIBLE	180422-0781	SCAC	N2	South	4:22:58	4:24:15	4:24:23	4:25:48	Yes	4:27:38	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
291	04/22/18	SST	5370	SINGLE	180422-2611	SEAC	H3	South	16:24:35	16:25:29	16:25:35	16:26:13	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
292	04/22/18	SST	9459	SINGLE	180422-3453	NEAC	F4	North	20:11:36	20:12:24	20:12:38	20:13:39	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
293	04/23/18	SST	9502	MULTIPLE	180423-1376	NEAC	F4	North	9:03:39	9:04:36	9:04:41	9:05:22	No	N/A	7	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
294	04/23/18	SST	5409	SINGLE	180423-4567	SCAC	N2	South	23:58:15	23:58:59	23:59:04	23:59:57	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
295	04/24/18	SST	5422	SINGLE	180424-0703	SEAC	H3	South	5:56:02	5:56:49	5:56:55	5:58:01	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
296	04/24/18	SST	9521	SINGLE	180424-0273	NEAC	F3	North	1:45:53	1:46:35	1:46:42	1:47:54	No	N/A	1	No	No	No	No	Yes	1	No	No	No	No	No	No	No	Yes	Yes	N/A	N/A
297	04/25/18	SST	5435	SINGLE	180425-0518	SEAC	H1	South	4:19:30	4:20:43	4:20:50	4:21:56	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
298	04/25/18	SST	5437	SINGLE	180425-0586	SCAC	N2	South	5:00:18	5:01:21	5:01:33	5:02:34	Yes	5:03:00	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
299	04/25/18	SST	9547	MULTIPLE	180425-0026	NEAC	F3	North	0:08:03	0:08:50	0:08:57	0:10:37	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
300	04/25/18	SST	9567	MULTIPLE	180425-4041	NEAC	F4	North	20:40:21	20:40:52	20:41:02	20:41:41	Yes	20:44:04	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
301	04/26/18	SST	5501	MULTIPLE	180426-3884	SEAC	H1	South	20:38:26	20:38:30	20:39:00	20:39:14	Yes	20:40:33	12	No	No	No	No	Yes	11	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
302	04/26/18	SST	9586	SINGLE	180426-0045	NEAC	F3	North	0:21:35	0:22:47	0:23:01	0:23:25	No	N/A	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
303	04/26/18	SST	9588	SINGLE	180426-0190	NEAC	F3	North	1:36:18	1:38:06	1:38:13	1:39:05	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
304	04/27/18	SST	5522	SINGLE	180427-3367	SEAC	H1	South	6:25:30	6:26:23	6:27:43	6:27:43	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
305	04/27/18	SST	9663	MULTIPLE	180427-1375	NEAC	F4	North	9:43:26	9:44:48	9:45:07	9:45:49	Yes	9:47:29	3	Yes	No	No	No	Yes	4	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
306	04/27/18	SST	9670	SINGLE	180427-4443	NEAC	F3	North	22:48:27	22:49:09	22:55:46	22:55:46	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
307	04/28/18	SST	5529	POSSIBLE	180428-0667	SEAC	H3	South	4:09:48	4:10:36	4:10:42	4:11:54	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
308	04/28/18	SST	5530	MULTIPLE	180428-0707	SCAC	N1	South	4:30:03	4:30:34	4:30:46	4:31:23	Yes	4:32:16	3	No	No	No	No	Yes	2	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
309	04/28/18	SST	5535	SINGLE	180428-3469	SEAC	H3	South	20:05:38	20:06:19	20:07:27	20:07:27	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
310	04/29/18	SST	5543	SINGLE	180429-0474	SCAC	N3	South	2:10:38	2:11:34	2:11:41	2:13:01	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
311	04/29/18	SST	5550	MULTIPLE	180429-1668	SCAC	N2	South	11:06:38	11:07:16	11:07:32	11:08:04	Yes	11:12:25	6	No	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
312	04/30/18	SST	9695	MULTIPLE	180430-4226	NEAC	F4	North	21:40:41	21:41:06	21:41:17	21:41:54	Yes	21:41:52	3	No	No	No	No	Yes	3	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
313	05/02/18	SST	5637	MULTIPLE	180502-0238	SEAC	H3	South	1:40:12	1:41:04	1:41:13	1:41:45	Yes	1:42:58	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
314	05/02/18	SST	9759	MULTIPLE	180502-3871	NEAC	F3	North	20:52:58	20:53:48	0:51:21	20:55:17	Yes	21:01:00	4	No	No	No	No	Yes	4	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
315	05/03/18	SST	5726	POSSIBLE	180503-3963	SCAC	N2	South	21:08:28	21:09:23	23:58:30	21:11:59	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
316	05/04/18	SST	5735	MULTIPLE	180504-0165	SCAC	N1	South	1:02:53	1:03:29	1:03:35	1:04:20	No	N/A	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
317	05/04/18	SST	9828	MULTIPLE	180504-0438	NEAC	F4	North	3:31:17	3:32:23	3:32:31	3:33:12	Yes	3:42:40	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
318	05/04/18	SST	9844	MULTIPLE	180504-3041	NEAC	F3	North	17:46:05	17:46:43	17:47:00	17:47:58	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
319	05/04/18	SST	9849	SINGLE	180504-4352	NEAC	F4	North	23:08:08	23:08:47	0:34:02	23:10:02	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
320	05/05/18	CAD	5786	MISS	180505-3998	SCAC	N2	South	N/A	N/A	N/A	N/A	N/A	21:53:12	0	Yes	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	No	N/A
321	05/05/18	SST	9850	SINGLE	180505-0195	NEAC	F4	North	1:00:33	1:01:10	1:01:17	1:02:22	Yes	1:04:05	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
322	05/05/18	SST	9863	MULTIPLE	180505-0766	NEAC	F3	North	4:40:19	4:43:00	4:43:04	4:44:36	Yes	4:47:16	20	Yes	No	No	No	Yes	19	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
323	05/06/18	SST	5798	SINGLE	180506-0386	SEAC	H3	South	1:52:54	1:53:58	1:54:05	1:54:56	Yes	1:54:57	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
324	05/06/18	SST	5819	SINGLE	180506-3759	SCAC	N2	South	21:02:07	21:03:17	21:03:24	21:03:58	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
325	05/06/18	SST	9901	SINGLE	180506-2795	NEAC	F4	North	16:33:11	16:33:56	16:34:01	16:35:00	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
326	05/07/18	SST	9937	MULTIPLE	180507-4321	NEAC	F3	North	22:45:00	22:46:24	22:46:30	22:45:48	No	N/A	7	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
327	05/07/18	SST	5826	SINGLE	180507-0259	SCAC	N2	South	1:35:58	1:36:40	1:36:46	1:37:09	No	N/A	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
328	05/07/18	SST	9906	POSSIBLE	180507-0398	NEAC	F3	North	2:42:11	2:42:58	2:43:05	2:43:36	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
329	05/07/18	SST	9934	MULTIPLE	180507-3923	NEAC	F4	North	20:50:25	20:50:57	20:51:06	20:51:59	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
330	05/07/18	SST	9936	MULTIPLE	180507-4321	NEAC	F3	North	22:44:10	22:44:55	22:45:03	22:45:48	No	N/A	7	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
331	05/08/18	SST	5842	SINGLE	180507-0298	SCAC	N2	South	2:07:09	2:07:53	2:08:02	2:08:08	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
332	05/09/18	SST	5866	MULTIPLE	180509-3599	SEAC	H1	South	17:51:45	17:52:30	17:52:37	17:53:38	Yes	18:04:45	3	No	No	No	No	Yes	3	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
333	05/09/18	SST	9973	SINGLE	180509-0306	NEAC	F4	North	1:56:23	1:57:14	1:57:20	1:57:53	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
334	05/10/18	SST	5877	MULTIPLE	180510-3832	SCAC	N2	South	20:14:47	20:15:28	20:16:40	20:15:28	No	N/A	7	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
335	05/11/18	SST	5880	SINGLE	180511-0426	SEAC	H3	South	2:57:14	2:57:57	2:58:11	3:00:11	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
336	05/11/18	SST	5882	SINGLE	180511-0501	SCAC	N2	South	3:38:06	3:38:50	3:38:56	3:40:05	Yes	4:09:11	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
337	05/11/18	SST	10031	SINGLE	180511-0156	NEAC	F4	North	0:47:38	0:48:32	0:48:44	0:49:58	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
338	05/12/18	SST	10061	MULTIPLE	180512-3165	NEAC	F4	North	18:13:14	18:14:18	18:14:41	18:15:47	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
339	05/12/18	SST	10068	MULTIPLE	180512-4481	NEAC	F4	North	23:06:17	23:07:24	23:07:38	23:09:15	No	N/A	11	No	No	No	No	Yes	10	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
340	05/13/18	SST	5923	MULTIPLE	180513-0653	SEAC	H1	South	3:44:40	3:45:11	3:45:20	3:45:53	Yes	3:47:28	5	No	No	No	No	Yes	3	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
341	05/14/18	SST	10112	SINGLE	180514-0497	NEAC	F4	North	3:30:34	3:31:21	3:31:34	3:33:22	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
342	05/14/18	SST	10125	MULTIPLE	180514-4012	NEAC	F4	North	21:10:03	21:10:42	21:10:48	21:11:26	Yes	21:18:28	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
343	05/15/18	SST	5952	SINGLE	180515-1329	SEAC	H1	South	8:53:01	8:53:18	8:54:26	8:54:26	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
344	05/15/18	SST	10144	SINGLE	180515-5030	NEAC	F4	North	23:55:39	23:56:34	23:56:42	23:57:24	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
345	05/16/18	SST	10159	MULTIPLE	180516-0735	NEAC	F4	North	7:00:19	7:00:55	7:01:07	7:02:06	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
346	05/17/18	SST	5969	SINGLE	180517-0624	SCAC	N2	South	5:02:11	5:02:50	5:02:59	5:03:43	No	N/A	1	No	No	No	No	Yes	1	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
347	05/18/18	SST	5993	MULTIPLE	180518-0491	SEAC	H1	South	3:40:13	3:41:00	3:41:13	3:42:30	No	N/A	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A

APPENDIX A – PRIMARY DATA SET (PII REDACTED)

348	05/19/18	SST	6014	SINGLE	180519-0958	SEAC	H1	South	5:27:50	5:28:48	5:29:02	5:29:52	Yes	6:09:30	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
349	05/19/18	SST	10231	MULTIPLE	180519-0070	NEAC	F4	North	0:12:26	0:13:02	0:13:06	0:13:54	Yes	0:26:10	2	No	No	No	No	Yes	5	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
350	05/19/18	SST	10249	MULTIPLE	180519-0993	NEAC	F4	North	5:39:54	5:41:31	5:41:40	5:42:22	Yes	5:43:02	14	No	No	No	No	Yes	11	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
351	05/20/18	SST	10267	MULTIPLE	180520-4164	NEAC	F4	North	21:09:53	21:10:39	21:10:48	21:10:54	Yes	21:10:54	7	No	No	No	No	Yes	5	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
352	05/20/18	SST	10268	SINGLE	180520-4758	NEAC	F4	North	23:32:55	23:34:01	23:34:09	23:34:50	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
353	05/22/18	SST	6081	SINGLE	180522-0539	SEAC	H1	South	4:11:51	4:12:31	4:12:37	4:13:21	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
354	05/23/18	SST	6127	MULTIPLE	180523-4422	SCAC	N2	South	22:19:25	22:19:55	22:20:12	22:21:00	No	N/A	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
355	05/24/18	SST	6130	MULTIPLE	180524-0212	SEAC	H1	South	1:30:16	1:31:02	1:31:08	1:32:17	Yes	2:20:25	2	No	Yes	Yes	No	Yes	2	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
356	05/24/18	SST	6132	MULTIPLE	180524-0283	SCAC	N1	South	1:59:11	1:59:53	2:00:02	2:01:23	Yes	2:08:29	21	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
357	05/24/18	SST	6133	SINGLE	180524-0326	SEAC	H1	South	2:13:19	2:13:55	2:14:02	2:16:47	Yes	2:20:25	1	No	Yes	Yes	No	Yes	1	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
358	05/25/18	SST	10366	SINGLE	180524-4655	NEAC	F4	North	23:02:33	23:03:05	23:04:50	23:03:52	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
359	05/26/18	SST	10422	MULTIPLE	180526-1034	NEAC	F4	North	7:05:31	7:06:37	7:07:46	7:07:22	Yes	7:10:00	5	No	No	No	No	Yes	5	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
360	05/26/18	SST	10438	SINGLE	180526-4537	NEAC	F4	North	23:01:28	23:02:26	23:02:39	23:03:53	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
361	05/27/18	SST	6193	MULTIPLE	180527-4107	SCAC	N1	South	23:21:46	23:22:11	23:22:31	23:23:13	Yes	23:25:12	7	No	No	No	No	Yes	5	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
362	05/27/18	SST	10450	MULTIPLE	180527-2981	NEAC	F4	North	18:04:31	18:05:11	18:05:20	18:05:41	No	N/A	2	No	No	No	No	Yes	2	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
363	05/28/18	SST	6199	SINGLE	180528-0155	SEAC	H3	South	0:54:34	0:55:29	0:55:40	0:56:25	No	N/A	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
364	05/28/18	SST	6208	SINGLE	180528-0456	SCAC	N2	South	3:18:51	3:20:17	3:20:28	3:19:28	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
365	05/28/18	SST	6234	MULTIPLE	180528-4319	SCAC	N2	South	22:28:01	22:28:45	22:28:51	22:29:32	Yes	22:31:16	23	Yes	No	No	No	Yes	23	No	Yes	Yes	No	No	No	No	No	Yes	N/A	N/A
366	05/28/18	SST	10489	MULTIPLE	180528-3858	NEAC	F3	North	20:36:17	20:37:18	20:37:23	20:37:53	No	N/A	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
367	05/28/18	SST	10502	SINGLE	180528-4535	NEAC	F4	North	23:22:25	23:23:03	23:23:16	23:24:18	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
368	05/29/18	SST	10503	MULTIPLE	180529-0180	NEAC	F3	North	1:12:53	1:13:46	1:13:54	1:14:42	Yes	1:15:38	6	Yes	No	No	Yes	Yes	15	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
369	05/29/18	SST	10510	SINGLE	180529-0491	NEAC	F4	North	4:11:28	4:12:07	4:12:15	4:13:09	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
370	05/30/18	SST	10538	MULTIPLE	180530-0347	NEAC	F4	North	2:22:22	2:23:39	2:23:48	2:23:12	Yes	2:26:07	11	No	No	No	No	Yes	7	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
371	05/31/18	SST	6295	SINGLE	180531-4101	SEAC	H1	South	21:28:00	21:28:28	21:30:00	21:30:22	No	N/A	1	No	No	No	No	Yes	1	No	No	No	Yes	No	No	No	Yes	N/A	N/A
372	06/02/18	SST	6322	SINGLE	180602-0793	SEAC	H1	South	4:07:07	4:08:02	4:08:08	4:09:09	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
373	06/02/18	SST	6327	MULTIPLE	180602-0914	SCAC	N1	South	5:32:06	5:33:33	5:33:42	5:35:00	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
374	06/03/18	SST	10644	MULTIPLE	180603-0764	NEAC	F4	North	4:01:15	4:01:50	4:02:01	4:03:10	Yes	4:02:33	16	No	No	No	No	Yes	16	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
375	06/03/18	SST	10656	SINGLE	180603-3960	NEAC	F4	North	22:12:29	22:13:06	22:13:18	22:14:26	Yes	22:21:52	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
376	06/03/18	SST	10657	MULTIPLE	180603-3960	NEAC	F4	North	22:13:21	22:13:54	22:14:28	22:14:26	Yes	22:21:52	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
377	06/04/18	SST	6397	SINGLE	180604-0615	SCAC	N3	South	5:00:14	5:00:58	5:01:05	5:02:21	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
378	06/06/18	SST	10772	MULTIPLE	180606-4705	NEAC	F4	North	23:31:12	23:31:46	23:32:41	23:32:41	Yes	23:33:48	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
379	06/07/18	SST	6444	SINGLE	180607-0106	SCAC	N1	South	0:33:44	0:34:27	0:34:33	0:35:17	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
380	06/08/18	SST	6476	MULTIPLE	180608-2982	SCAC	N1	South	17:03:52	17:04:33	17:05:45	17:05:45	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
381	06/08/18	SST	6483	SINGLE	180608-3931	SCAC	N1	South	20:56:33	20:57:42	20:57:47	20:58:53	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
382	06/09/18	SST	6512	MULTIPLE	180609-4484	SCAC	N2	South	23:49:29	23:50:03	23:50:11	23:49:54	Yes	23:51:11	4	Yes	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
383	06/10/18	SST	6586	MULTIPLE	180610-3513	SCAC	N1	South	20:34:38	20:35:35	20:35:45	20:36:25	No	N/A	5	Yes	No	No	No	Yes	6	No	Yes	No	No	No	No	No	Yes	Yes	N/A	N/A
384	06/10/18	SST	10905	MULTIPLE	180610-0311	NEAC	F4	North	1:30:20	1:30:50	1:30:56	1:31:45	Yes	1:33:00	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
385	06/11/18	SST	6633	POSSIBLE	180611-4522	SCAC	N2	South	23:56:50	23:58:07	23:58:15	23:59:06	Yes	23:59:06	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
386	06/11/18	SST	10927	SINGLE	180611-0346	NEAC	F3	North	2:14:48	2:15:20	2:15:35	2:16:37	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
387	06/13/18	SST	6655	SINGLE	180613-0091	SCAC	N2	South	0:26:31	0:27:14	0:27:23	0:28:06	No	N/A	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
388	06/13/18	SST	6657	MULTIPLE	180613-0300	SCAC	N2	South	1:44:42	1:45:21	1:45:27	1:46:40	No	N/A	5	No	No	No	No	Yes	5	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
389	06/13/18	SST	6660	SINGLE	180613-0600	SCAC	N2	South	4:24:30	4:25:21	4:25:29	4:26:39	No	N/A	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
390	06/13/18	SST	6661	MULTIPLE	180613-0654	SCAC	N2	South	5:08:05	5:08:42	5:08:48	5:09:26	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
391	06/13/18	SST	11000	MULTIPLE	180613-0251	NEAC	F4	North	1:24:21	1:25:01	1:25:09	1:25:57	Yes	1:30:34	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
392	06/13/18	SST	11128	MULTIPLE	180613-4788	NEAC	F4	North	23:12:14	23:12:51	23:13:42	23:14:29	No	N/A	2	No	No	No	No	Yes	2	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
393	06/15/18	SST	6706	MULTIPLE	180615-0429	SCAC	N2	South	2:48:52	2:49:28	2:49:33	2:50:28	Yes	2:53:12	10	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
394	06/15/18	SST	6721	MULTIPLE	180615-4555	SCAC	N2	South	23:46:14	23:46:54	23:47:13	23:48:21	Yes	23:48:41	9	No	No	No	No	Yes	7	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
395	06/15/18	SST	11183	MULTIPLE	180615-2018	NEAC	F4	North	13:09:59	13:10:53	13:11:00	13:12:24	No	N/A	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
396	06/16/18	SST	11201	MULTIPLE	180616-0371	NEAC	F4	North	1:38:41	1:39:27	1:39:35	1:40:27	Yes	1:40:27	7	Yes	No	No	No	Yes	9	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
397	06/16/18	SST	11206	POSSIBLE	180616-0735	NEAC	F4	North	3:50:36	3:51:29	3:51:35	3:52:37	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
398	06/17/18	SST	6769	SINGLE	180617-0434	SCAC	N2	South	2:31:33	2:32:15	2:32:36	2:32:56	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
399	06/18/18	SST	6841	SINGLE	180618-4270	SCAC	N2	South	23:43:10	23:44:22	23:44:31	23:44:43	Yes	23:44:43	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
400	06/18/18	SST	11311	SINGLE	180618-0223	NEAC	F4	North	1:42:40	1:43:21	1:43:28	1:44:35	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
401	06/18/18	SST	11312	MULTIPLE	180618-0280	NEAC	F4	North	2:15:32	2:16:15	2:16:24	2:16:53	No	N/A	2	No	No	No	No	Yes	2	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
402	06/19/18	SST	6859	SINGLE	180619-0435	SCAC	N1	South	2:46:41	2:47:26	2:47:32	2:48:10	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
403	06/19/18	SST	6860	SINGLE	180619-0479	SCAC	N2	South	3:11:19	3:12:32	3:12:39	3:13:35	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
404	06/19/18	SST	6880	SINGLE	180619-3516	SCAC	N2	South	19:10:46	19:11:31	19:11:35	19:12:30	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
405	06/19/18	SST	11386	SINGLE	180619-0493	NEAC	F4	North	3:18:21	3:19:07	3:19:12	3:19:52	Yes	3:20:46	1	No	No	No	No	Yes	5	No	No	No	No	Yes	No	No	No	Yes	N/A	N/A
406	06/21/18	SST	6976	SINGLE	180621-3350	SEAC	H1	South	18:28:53	18:29:49	18:29:58	18:30:59	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
407	06/23/18	SST	7024	MULTIPLE	180623-1019	SCAC	N2	South	7:30:39	7:31:23	7:31:30	7:32:02	Yes	7:34:00	7	No	No	No	No	Yes	7	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
408	06/23/18	SST	7039	MULTIPLE	180623-3752	SCAC	N1	South	21:12:58	21:13:25	21:13:31	21:14:21	Yes	21:18:19	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
409	06/24/18	SST	7097	POSSIBLE	180624-3654	SCAC	N2	South	22:13:53	22:14:33	22:14:42	22:15:22	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
410	06/26/18	SST	7138	SINGLE	180626-0224	SCAC	N2	South	1:28:35	1:29:34	1:29:43	1:31:12	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
411	06/26/18	SST	11883	SINGLE	180626-0013	NEAC	F4	North	0:03:39	0:04:48	0:04:56	0:06:02	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
412	06/27/18	SST	7211	SINGLE	180627-0101	SCAC	N3	South	0:37:24	0:38:13	0:38:20	0:39:06	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
413	06/27/18	CAD	7218	MISS	180627-0363	SCAC	N3	South	2:46:46	N/A	N/A	2:48:24	Yes	2:48:24	1	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	No	N/A
414	06/27/18	SST	12012	SINGLE	180627-4302	NEAC	F3	North	23:10:34	23:11:11	23:11:20	23:12:20	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
415	06/29/18	SST	12161	MULTIPLE	180629-3415	NEAC	F4	North	19:09:10	19:09:34	19:09:43	19:10:13	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
416	06/30/18	SST	7567	SINGLE	180630-4837	SEAC	H1	South	23:38:37	23:39:16	23:39:23	23:40:29	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
417	06/30/18	SST	12242	MULTIPLE	180630-0150	NEAC	F4	North	0:35:49	0:36:29	0:36:31	0:41:00	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A

APPENDIX A – PRIMARY DATA SET (PII REDACTED)

418	06/30/18	SST	12266	MULTIPLE	180630-0876	NEAC	F4	North	4:21:33	4:22:07	4:22:12	4:22:43	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	Yes	N/A	N/A
419	07/01/18	SST	7641	SINGLE	180701-4018	SEAC	H1	South	21:22:43	21:23:22	21:23:27	21:24:06	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	N/A	N/A
420	07/01/18	SST	12676	SINGLE	180701-0038	NEAC	F4	North	0:07:21	0:08:33	0:08:38	0:09:29	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	N/A	N/A
421	07/01/18	SST	12693	MULTIPLE	180701-0283	NEAC	F3	North	1:15:30	1:16:07	1:16:13	1:17:26	No	N/A	16	No	No	No	No	Yes	12	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
422	07/01/18	SST	12701	MULTIPLE	180701-0463	NEAC	F3	North	2:05:37	2:06:27	2:06:39	2:07:43	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	N/A	N/A
423	07/02/18	SST	7874	SINGLE	180702-4184	SEAC	H1	South	21:12:50	21:13:32	21:13:38	21:14:47	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	N/A	N/A
424	07/03/18	SST	7979	POSSIBLE	180703-0670	SCAC	N2	South	4:52:59	4:54:09	4:54:17	4:55:25	No	N/A	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	N/A	N/A
425	07/03/18	SST	8120	MULTIPLE	180703-4328	SCAC	N3	South	21:21:12	21:22:29	21:22:38	21:23:33	Yes	21:25:22	3	No	No	No	No	Yes	15	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
426	07/03/18	SST	8223	MULTIPLE	180703-4917	DTAC	C4	South	23:36:30	23:37:26	23:37:33	23:38:32	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
427	07/03/18	SST	13191	SINGLE	180703-0397	NEAC	F4	North	2:22:27	2:23:21	2:23:35	2:24:46	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
428	07/04/18	SST	8237	SINGLE	180704-0016	SEAC	H3	South	0:01:43	0:03:16	0:03:22	0:04:11	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
429	07/04/18	SST	13823	MULTIPLE	180704-2975	NEAC	F4	North	16:24:04	16:24:52	16:25:03	16:25:46	No	N/A	11	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
430	07/04/18	CAD	N/A	MISS	180704-5754	NEAC	F3	North	N/A	N/A	N/A	22:59:08	Yes	22:59:08	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	Yes	Indoor
431	07/05/18	SST	9965	MULTIPLE	180705-4806	SCAC	N2	South	22:36:44	22:37:15	22:37:20	22:36:58	Yes	22:48:34	5	No	No	No	No	Yes	5	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
432	07/05/18	SST	8990	MULTIPLE	180705-0128	SCAC	N2	South	0:06:05	0:20:47	0:20:56	0:22:09	No	N/A	8	No	No	No	No	Yes	6	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
433	07/05/18	SST	9509	MULTIPLE	180705-0686	SCAC	N2	South	3:26:01	3:26:34	3:26:41	3:27:49	No	N/A	3	No	No	No	No	Yes	2	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
434	07/05/18	SST	9536	MULTIPLE	180705-0837	SCAC	N2	South	4:46:41	4:47:17	4:47:22	4:48:05	No	N/A	7	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
435	07/05/18	SST	9961	MULTIPLE	180705-4806	SCAC	N2	South	22:34:49	22:35:29	22:35:46	22:36:58	Yes	22:48:34	5	No	No	No	No	Yes	5	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
436	07/05/18	SST	14571	MULTIPLE	180705-0169	NEAC	F3	North	23:59:04	0:26:55	0:27:03	0:28:33	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
437	07/05/18	SST	14735	MULTIPLE	180705-0169	NEAC	F3	North	0:23:12	0:35:10	0:35:16	0:28:33	Yes	12:28:33	8	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
438	07/05/18	SST	14787	MULTIPLE	180705-0223	NEAC	F4	North	0:31:36	0:37:04	0:37:07	0:39:00	No	N/A	9	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
439	07/05/18	SST	15064	MULTIPLE	180705-0424	NEAC	F4	North	1:27:08	1:27:32	1:27:42	1:28:26	No	N/A	7	No	No	No	No	No	7	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
440	07/05/18	SST	15335	MULTIPLE	180705-4182	NEAC	F4	North	20:21:39	20:22:53	20:23:00	20:23:41	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
441	07/06/18	SST	15700	MULTIPLE	180706-3039	NEAC	F2	North	16:56:09	16:56:45	16:56:55	16:58:00	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
442	07/07/18	SST	10157	SINGLE	180707-3249	SCAC	N2	South	17:53:55	17:55:37	17:55:45	17:56:30	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
443	07/08/18	SST	15939	MULTIPLE	180708-0400	NEAC	F4	North	1:41:18	1:41:38	1:41:46	1:43:06	No	N/A	3	No	No	No	No	Yes	3	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
444	07/09/18	SST	16123	POSSIBLE	180709-3977	NEAC	F4	North	20:25:25	20:27:23	20:27:27	20:28:19	Yes	20:20:52	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
445	07/09/18	SST	16173	SINGLE	180709-4784	NEAC	F4	North	23:33:53	23:35:08	23:35:16	23:35:56	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
446	07/10/18	SST	10485	MULTIPLE	180710-4167	SCAC	N1	South	20:32:42	20:32:43	20:32:48	20:33:28	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
447	07/11/18	SST	16275	MULTIPLE	180711-0060	NEAC	F3	North	0:18:26	0:19:38	0:19:47	0:20:28	No	N/A	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
448	07/13/18	SST	16409	MULTIPLE	180713-0085	NEAC	F2	North	0:26:17	0:27:23	0:27:23	0:28:21	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
449	07/13/18	SST	16414	SINGLE	180713-0238	NEAC	F3	North	1:18:04	1:18:36	1:20:21	1:19:39	No	N/A	1	No	No	No	No	Yes	5	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
450	07/13/18	SST	16467	POSSIBLE	180713-4321	NEAC	F4	North	21:44:41	21:45:30	21:45:40	21:46:32	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
451	07/14/18	SST	10748	MULTIPLE	180714-0949	SEAC	H1	South	5:21:51	5:22:57	5:23:10	5:24:35	No	N/A	10	No	No	No	No	Yes	9	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
452	07/15/18	SST	10844	MULTIPLE	180715-4219	SCAC	N2	South	23:53:40	23:54:04	23:54:14	23:55:31	Yes	23:58:31	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
453	07/15/18	SST	16604	MULTIPLE	180715-3720	NEAC	F3	North	21:36:09	21:36:50	21:36:55	21:38:08	No	N/A	6	No	Yes	Yes	No	Yes	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
454	07/16/18	SST	10860	MULTIPLE	180716-4421	SCAC	N1	South	22:07:42	22:08:00	22:08:11	22:09:05	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
455	07/17/18	CAD	N/A	MISS	180717-0002	SCAC	N2	South	N/A	N/A	N/A	0:00:59	No	N/A	0	Yes	No	No	No	No	0	Yes	No	No	No	No	No	No	No	Yes	Yes	22 Caliber
456	07/18/18	SST	10929	POSSIBLE	180718-4064	SCAC	N2	South	20:05:06	20:05:50	20:06:02	20:07:08	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
457	07/19/18	SST	10938	MULTIPLE	180719-0150	SCAC	N2	South	0:52:23	0:53:07	0:53:17	0:54:23	Yes	0:55:09	9	No	No	No	No	Yes	9	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
458	07/19/18	SST	16800	SINGLE	180719-4581	NEAC	F3	North	22:54:05	22:54:35	22:54:43	22:56:42	Yes	22:56:57	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
459	07/20/18	SST	11062	SINGLE	180720-0290	SCAC	N1	South	1:35:06	1:35:43	1:35:52	1:37:35	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
460	07/20/18	SST	11107	MULTIPLE	180720-4704	SCAC	N1	South	23:36:41	23:37:07	23:37:15	23:40:22	Yes	23:41	7	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
461	07/20/18	SST	16817	SINGLE	180720-0314	NEAC	F4	North	1:41:53	1:42:47	1:42:56	1:46:11	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
462	07/20/18	SST	16843	MULTIPLE	180720-3104	NEAC	F4	North	17:19:57	17:20:45	17:20:53	17:21:39	No	N/A	2	No	No	No	No	Yes	2	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
463	07/20/18	CAD	N/A	MISS	180720-3930	SEAC	N2	South	N/A	N/A	N/A	21:02:26	Yes	21:02:26	0	No	Yes	No	Yes	No	0	No	No	No	No	No	No	No	No	Yes	No	N/A
464	07/22/18	CAD	N/A	MISS	180722-0029	SEAC	H1	South	N/A	N/A	N/A	0:05:15	Yes	0:05:15	0	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	No	N/A
465	07/23/18	SST	11196	MULTIPLE	180723-0431	SCAC	N2	South	2:18:47	2:19:14	2:19:21	2:20:42	Yes	2:23:35	4	No	No	No	No	Yes	4	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
466	07/23/18	SST	11230	MULTIPLE	180723-4217	SCAC	N2	South	22:36:12	22:36:42	22:36:49	22:37:27	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
467	07/25/18	SST	11259	SINGLE	180725-0248	SCAC	N2	South	1:46:22	1:46:49	1:46:55	1:47:24	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
468	07/25/18	SST	11263	MULTIPLE	180725-0426	SEAC	H3	South	3:15:56	3:16:29	3:16:37	3:18:05	Yes	3:17:46	2	No	No	No	No	Yes	2	No	No	No	Yes	No	No	No	No	Yes	N/A	N/A
469	07/26/18	SST	11310	MULTIPLE	180726-4530	SCAC	N2	South	23:28:34	23:29:04	23:29:08	23:29:48	Yes	23:30:56	4	No	No	No	No	Yes	4	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
470	07/26/18	SST	17306	SINGLE	180726-0144	NEAC	F4	North	1:07:50	1:08:22	1:08:27	1:09:09	Yes	1:21:08	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	Yes	N/A	N/A
471	07/27/18	SST	11317	POSSIBLE	180727-0485	SEAC	H3	South	3:12:58	3:13:43	3:13:51	3:14:35	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
472	07/27/18	SST	11318	POSSIBLE	180727-0725	SCAC	N2	South	5:37:51	5:38:31	5:38:37	5:39:55	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
473	07/28/18	SST	11360	MULTIPLE	180728-4507	SCAC	N2	South	23:10:52	23:11:32	23:11:39	23:12:31	No	N/A	5	No	Yes	Yes	No	Yes	6	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
474	07/28/18	SST	17428	SINGLE	180728-1304	NEAC	F3	North	8:42:35	8:43:19	8:43:50	8:44:56	Yes	8:49:42	1	No	No	No	No	Yes	1	No	No	No	No	No	No	No	Yes	Yes	N/A	N/A
475	07/29/18	SST	11365	MULTIPLE	180729-0411	SCAC	N2	South	2:09:26	2:09:57	2:10:02	2:10:45	Yes	2:12:33	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
476	07/29/18	SST	11367	SINGLE	180729-0437	SCAC	N2	South	2:17:21	2:17:58	2:18:03	2:19:10	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
477	07/29/18	SST	11413	MULTIPLE	180729-4301	SEAC	H1	South	23:26:20	23:26:53	23:27:00	23:28:10	No	N/A	5	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
478	07/29/18	SST	17439	POSSIBLE	180729-0287	NEAC	F4	North	1:28:33	1:29:18	1:29:23	1:30:46	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
479	07/30/18	SST	11423	MULTIPLE	180730-0217	SCAC	N1	South	0:56:11	0:56:34	0:56:43	0:57:41	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
480	07/30/18	SST	11424	SINGLE	180730-0445	SEAC	H1	South	2:19:00	2:19:37	2:19:55	2:21:05	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
481	07/30/18	SST	11439	SINGLE	180730-4133	SCAC	N1	South	21:55:39	21:56:03	21:56:08	21:57:01	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
482	08/01/18	SST	11465	SINGLE	180801-2581	DTAC	C3	South	15:00:51	15:01:48	15:01:55	15:06:16	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
483	08/02/18	SST	11479	SINGLE	180802-0509	SCAC	N2	South	3:17:39	3:18:16	3:18:23	3:19:39	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
484	08/03/18	SST	17665	MULTIPLE	180803-4174	NEAC	F4	North	22:40:44	22:41:20	22:41:42	22:44:51	No	N/A	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
485	08/04/18	SST	17680	MULTIPLE	180804-3201	NEAC	F4	North	18:57:08	18:58:33	18:58:41	19:00:09	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
486	08/05/18	SST	17701	MULTIPLE	180805-0329	NEAC	F4	North	1:36:41	1:37:30	1:37:37	1:38:08	No	N/A	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
487	08/06/18	SST	11621	MULTIPLE	180806-4442	SEAC	H3	South	23:26:48	23:27:10	23:27:17	23:28:49	Yes	23:30:00	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A

APPENDIX A – PRIMARY DATA SET (PII REDACTED)

488	08/06/18	SST	17799	MULTIPLE	180807-3862	NEAC	F4	North	20:06:01	20:06:49	20:07:02	20:08:04	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
489	08/08/18	SST	17822	SINGLE	180808-2276	NEAC	F3	North	13:24:16	13:25:18	13:25:23	13:25:58	No	N/A	1	No	No	No	No	Yes	2	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
490	08/10/18	SST	17891	MULTIPLE	180810-2287	NEAC	F4	North	13:20:41	13:21:31	13:21:40	13:22:27	Yes	13:25:29	4	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
491	08/12/18	SST	11893	SINGLE	180812-0151	SCAC	N1	South	0:39:19	0:39:50	0:39:56	0:40:50	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
492	08/12/18	SST	11896	SINGLE	180812-0996	SCAC	N1	South	6:44:40	6:45:11	6:45:18	6:45:56	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
493	08/13/18	CAD	17989	MISS	180813-0062	NEAC	F3	North	0:26:09	N/A	N/A	0:28:30	Yes	0:28:30	N/A	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
494	08/13/18	SST	18052	POSSIBLE	180813-4120	NEAC	F4	North	20:47:08	20:47:58	20:47:59	20:49:27	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
495	08/14/18	SST	18069	SINGLE	180814-0607	NEAC	F4	North	4:07:08	4:08:46	4:08:52	4:09:46	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
496	08/17/18	SST	18161	MULTIPLE	180817-3808	NEAC	F3	North	20:08:22	20:08:53	20:09:04	20:09:27	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
497	08/17/18	SST	18162	POSSIBLE	180817-3874	NEAC	F4	North	20:26:13	20:26:55	20:27:06	20:27:46	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
498	08/18/18	SST	12041	SINGLE	180818-0640	SCAC	N2	South	3:18:29	3:18:56	3:19:11	3:24:42	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
499	08/18/18	SST	18165	MULTIPLE	180818-0415	NEAC	F4	North	1:59:36	2:00:13	2:00:16	2:02:35	No	N/A	3	No	No	No	No	Yes	3	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
500	08/19/18	SST	18236	MULTIPLE	180819-3985	NEAC	F4	North	22:07:44	22:09:29	22:09:32	22:10:06	No	N/A	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
501	08/19/18	SST	18239	SINGLE	180819-4103	NEAC	F3	North	22:41:34	22:42:30	22:42:36	22:43:13	No	N/A	1	No	No	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
502	08/19/18	SST	18243	MULTIPLE	180819-4291	NEAC	F3	North	23:25:15	23:25:39	23:25:46	23:27:14	No	N/A	2	No	No	No	No	Yes	2	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
503	08/20/18	SST	12111	POSSIBLE	180820-0173	SCAC	N2	South	0:52:54	0:53:58	0:54:04	0:55:00	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
504	08/20/18	SST	12112	SINGLE	180820-0248	SCAC	N2	South	1:25:36	1:26:50	1:26:58	1:27:52	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
505	08/20/18	SST	12113	MULTIPLE	180820-0368	SCAC	N2	South	2:07:06	2:08:33	2:08:40	2:09:52	Yes	2:14:10	12	Yes	No	No	No	Yes	10	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
506	08/20/18	SST	18246	MULTIPLE	180820-0073	NEAC	F4	North	0:21:14	0:21:53	0:22:01	0:23:13	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
507	08/20/18	SST	18273	MULTIPLE	180820-3710	NEAC	F4	North	19:09:17	19:09:48	19:09:57	19:10:52	Yes	19:12:30	5	No	No	No	No	Yes	5	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
508	08/21/18	SST	18284	SINGLE	180821-2026	NEAC	F4	North	12:08:52	12:09:54	12:10:10	12:10:10	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
509	08/22/18	SST	12138	MULTIPLE	180822-0403	SEAC	H1	South	2:30:32	2:31:00	2:31:06	2:31:43	No	N/A	2	No	No	No	No	Yes	2	No	No	Yes	No	No	No	No	No	Yes	N/A	N/A
510	08/22/18	SST	12151	SINGLE	180822-4235	SCAC	N2	South	20:36:34	20:37:09	20:37:21	20:38:50	Yes	20:42:14	1	No	Yes	No	No	Yes	1	No	Yes	No	No	No	No	No	No	Yes	N/A	N/A
511	08/23/18	SST	12155	SINGLE	180823-0037	SCAC	N1	South	0:12:08	0:12:28	0:12:37	0:13:16	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
512	08/23/18	SST	18325	SINGLE	180823-0129	NEAC	F3	North	0:59:40	1:00:22	1:00:28	0:48:22	Yes	1:02:34	1	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
513	08/24/18	SST	12172	SINGLE	180824-0059	SCAC	N2	South	0:18:20	0:18:56	0:19:04	0:20:14	No	N/A	1	Yes	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
514	08/24/18	SST	18370	MULTIPLE	180824-0167	NEAC	F3	North	1:03:51	1:04:18	1:04:26	1:05:24	No	N/A	2	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
515	08/25/18	SST	12237	POSSIBLE	180825-4369	SCAC	N2	South	23:52:02	23:52:52	23:52:59	23:54:08	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
516	08/25/18	SST	12202	SINGLE	180825-0730	SEAC	H1	South	4:32:22	4:32:55	4:33:06	4:34:15	Yes	4:35:32	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
517	08/25/18	SST	12210	MULTIPLE	180825-1564	SCAC	N2	South	10:47:11	10:47:48	10:48:15	10:49:05	Yes	10:49:53	3	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
518	08/25/18	SST	12229	MULTIPLE	180825-3661	SCAC	N2	South	21:08:42	21:09:13	21:09:25	21:09:56	Yes	21:10:56	3	No	Yes	Yes	No	Yes	2	Yes	No	No	No	No	No	No	No	Yes	N/A	N/A
519	08/25/18	SST	18481	POSSIBLE	180825-3719	NEAC	F3	North	21:19:27	21:20:44	21:20:50	21:21:54	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
520	08/27/18	SST	18508	POSSIBLE	180827-0139	NEAC	F4	North	0:42:31	0:43:18	0:43:43	0:44:39	No	N/A	6	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
521	08/28/18	SST	12285	SINGLE	180828-0389	SCAC	N2	South	2:13:03	2:13:44	2:13:55	2:14:33	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
522	08/28/18	CAD	18559	MISS	180828-3110	NEAC	F3	North	N/A	N/A	N/A	16:47:05	Yes	N/A	1	Yes	Yes	Yes	No	No	0	No	No	No	No	No	No	No	No	Yes	No	N/A
523	08/29/18	SST	12302	SINGLE	180829-0037	SCAC	N2	South	0:11:28	0:12:16	0:12:23	0:13:11	Yes	0:14:55	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
524	08/29/18	SST	12310	POSSIBLE	180829-0502	SCAC	N2	South	2:57:07	2:57:47	2:57:56	3:00:43	Yes	3:40:01	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
525	08/29/18	SST	12311	SINGLE	180829-0571	SCAC	N1	South	3:44:18	3:44:46	3:44:55	3:46:19	No	N/A	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	No	N/A	N/A
526	08/30/18	SST	12352	SINGLE	180830-0119	SCAC	N2	South	0:33:06	0:34:08	0:34:40	0:36:15	Yes	0:39:53	1	No	No	No	No	No	0	No	No	No	No	No	No	No	No	Yes	N/A	N/A
527	08/31/18	SST	18651	MULTIPLE	180831-3939	NEAC	F4	North	21:20:23	21:20:43	21:20:55	21:21:46	Yes	21:24:56	3	No	No	No	No	Yes	3	Yes	No	No	No	No	No	No	No	Yes	N/A	N/A