



Traffic Stop Data Analysis Study: Year 1 Final Report

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EXECUTIVE SUMMARY

OVERVIEW

The Arizona Department of Public Safety (DPS) began voluntarily collecting data regarding traffic and pedestrian stops January 1, 2003, gathering information regarding characteristics of the stop the driver, the vehicle, and the officer. Although data collection was voluntarily initiated by DPS, as part of the 2006 settlement agreement in the class-action civil lawsuit *Arnold, et. al. v. Arizona Department of Public Safety*, which alleged racial profiling by DPS officers, DPS agreed to conduct a comprehensive evaluation of stop data collected by officers. The UC research team was awarded a three-year contract to conduct the department's "Traffic Stop Data Analysis Study." In addition to the analyses of yearly traffic stop data required by the settlement agreement, DPS voluntarily agreed to conduct additional research (e.g., officer focus groups and citizen surveys, to be completed in the second year of the contract) to complement the official stop data collection.

This report is the initial comprehensive analysis of DPS traffic stop data as part of this research partnership. This first annual report summarizes the current status of the data collection effort, describes and analyzes data regarding the initial stop as well as post-stop outcomes for all officer-initiated traffic stops in 2006, includes comparisons of 2006 data to data collected by DPS since 2003, and focuses specifically on search and seizure rates. The Executive Summary provides a brief description of the data, analyses, and major findings documented in detail within this report.

DATA AUDIT

Data auditing is an important oversight mechanism to maintain data quality and integrity. To assess the current status of the DPS data collection process, the UC research team conducted a three-phase data audit examining the validity of the 2006 data.

Phase I of the data audit evaluated the data transfer process from the paper copies completed by DPS personnel to an electronic database. Data from these two sources (paper and electronic copies) were compared across every scanned field to determine if information recorded by officers on the scan forms was accurately transferred to the electronic data files. The first phase of the date audit examined 1,000 traffic stop forms, of which 990 had an electronic match. Overall, 26.5% of the 990 hand written forms had at least one field in the electronic data with an error. The majority of errors included "system errors" and occurred in situations where the scan form simply did not match the electronic copy. This is a software/hardware and data entry problem.

Phase II of the data audit assessed the missing data and logical inconsistencies within the electronic data for all traffic stops conducted by DPS officers during 2006. An overall error rate was created based on the rate of missing data (i.e., no information entered by the officer) and logical inconsistencies within the data (i.e., fields with missing and/or incorrect entries that contradict other fields). The overall error rate calculated for Phase 2 of the data audit was 14.1%. The Police Executive Research Forum recommends less than a 10% error rate

for traffic stop data (Fridell, 2004). Our research team recommends a more stringent standard of under 5%, with a goal of 2% missing/incorrect data.

To reduce the overall error rate, it is strongly recommended that DPS fully train every officer and supervisor responsible for collecting traffic stop data on the use of the form. Second, it is recommended that DPS implement a supervisory oversight and feedback mechanism to reduce data collection errors. The UC research team's past experience with other departments has demonstrated training, supervisory oversight, and timely feedback are the most effective approaches to reducing error rates and, thereby, enhancing the reliability and validity of the data.

Phase III of the data audit examined data accuracy by comparing the number of stops in the electronic data with independent sources of information. That is, this component assessed the extent to which officers were completing forms accurately. Only the first component of the third phase of the data audit has been performed to date. Discussions with DPS personnel determined that the most appropriate data for comparison purposes were officers' activity logs. The results of this analysis indicated that in 13 of the 19 districts, there were greater numbers of stops in the activity logs compared to the electronic data set; in the remaining 6 districts, there were greater numbers of stops in the activity Research Forum (Fridell, 2004, p. 54) suggests that "correspondence of 90 percent or more between the two sources of information is quite acceptable." Using this standard, the results of this audit were positive. All of the districts, with the exception of District 15, had less than 10% errors in either dataset.

In addition to the activity log data, additional comparison data were available for contacts in which a citation or warning was issued. Specifically, stop data were compared to violation data. Unfortunately, these comparisons suggested two consistent and problematic errors. In 6,694 stops, citations or warnings in the violation file were not recorded as resulting in a citation or warning in the stop data. Conversely, in 13,793 cases, citations and warnings in the stop data did not have corresponding violation information in the violation data file. These discrepancies in the data indicate a clear need to focus on improving data accuracy to ensure that recommendations regarding policy and training are made based on the highest quality data possible.

Based on the results of comparing electronic stop data with activity logs, it appears that officers are generally recording information on the traffic stop forms when required. Depending on the nature of modifications to the data collection system, the UC research team recommends continuing this component of data auditing with routine cross-checks of electronic data and DPS activity logs. The discrepancies in the data discovered through Phase III of the data audit reiterate the need for department-wide training on the data collection form, as noted in the recommendations for Phase II. Improving data accuracy will ensure that recommendations regarding policy and training changes are made based on the highest quality data possible.

DESCRIPTION OF TRAFFIC STOP DATA

Based on the data available, Arizona Department of Public Safety (DPS) officers completed 505,519 documents regarding their contacts with citizens during 2006. To properly examine issues surrounding racial/ethnic disparities, only officer-initiated traffic stops were considered. Further, duplicate stop information (i.e., one stop is entered multiple times into the data set) was eliminated. Therefore, the following numbers of traffic stops were excluded from analyses for the reasons noted:

- 12,830 non-driver or non-traffic enforcement contacts were removed
- 1,480 contacts with missing data on the type of contact were removed
- 25,549 citizen-initiated stops (specifically, 23,065 collisions and 2,484 motorist assists) were removed
- 6,901 contacts that had secondary documents issued containing duplicate information were removed
- 1,188 contacts that listed the only outcome as voided citation were removed

The analyses in this report are based on 460,545 officer-initiated traffic stops of drivers conducted during 2006. The reasons for not including cases are not mutually exclusive; therefore, the total number of cases excluded is less than the total of cases eliminated for the various reasons.

- Highlights of the descriptive characteristics of the 460,545 stops include:
 - The majority were conducted by Highway Patrol Division officers (99.5%), occurred on a weekday (73.8%), during the daytime (65.8%), and lasted between 0-20 minutes (85.6%).
 - Stop activity at the department level was fairly consistent across months of the year.
 - Moving violations (68.0%) were the most common reason for the stop, followed distantly by equipment violations (18.5%), and non-moving violations (11.4%).
 - The racial/ethnic characteristics of stopped drivers were:
 - Caucasian (62.4%)
 - Hispanic (24.6%)
 - Native American (5.2%)
 - Black (4.4%)
 - Asian (1.7%)
 - Middle Eastern (0.9%)
 - Other/Unknown race/ethnicity (0.8%)
 - o Other relevant driver characteristics included:
 - The average age of drivers stopped was 37.6 years
 - 71.9% of driver stopped were male.
 - Approximately 30% of drivers stopped statewide did not reside in the state of Arizona, and over 60% of drivers stopped did not reside in the county in which they were stopped.

• It should be noted that some of the variation evident across organizational units in the racial and ethnic background of drivers stopped is to be expected due to differences in the demographic makeup of residents and travelers, as well as differences in traffic flow patterns in these locations.

TREND ANALYSES: STOPS

Due to the difficulty in determining an appropriate comparison group against which the traffic stop data can be compared, the UC research team conducted a series of trend analyses. A variety of methods exist for benchmark comparison analyses; however, all of the external benchmarks used in previous research have limitations in their ability to approximate the population of drivers eligible to be stopped. Based on the UC research team's review of the available benchmark comparisons, it was determined that methodologies *other than traditional external benchmarking* of traffic stop data would be initially used for the purpose of promoting effective and respectful policing. Further, it was recommended that an internal benchmarking methodology to analyze the traffic stop data be attempted. Therefore, apart from describing the 2006 traffic stop data, the UC research team also assessed the previous three years of data collected by DPS officers.

Internal comparisons are alternatives to benchmarking in which "similarly situated" officers (i.e., matched on assignment, geography, and shift) are compared against one another to identify individual officers who may be stopping particular racial/ethnic groups in a disparate manner. DPS organizational units were assessed to identify those that were appropriate for an internal benchmarking analysis. To be selected for analyses, all officers within the organizational unit must have similar assignments, patrol similar geographic areas, and work the same shifts. Upon review of the entire DPS organization, only two organizational units – Metro East and Metro West – met these criteria. In addition, however, there must be a sufficient number of officers to compare against one another. Metros East and West did not meet these criteria, therefore internal comparisons of traffic stops and post-stop outcomes are not included within this report.

Rather than comparing officers to one another, analyses were conducted that compared rates of traffic stops and post-stop outcomes across organizational units and time. Specifically, internal comparisons were examined for four years of data by focusing on trends in traffic stops between 2003 and 2006 at all organizational units across drivers' racial/ethnic groups. It is important to note that a large number of the analyses reported in this section are descriptive and strictly bivariate in nature. These findings should be interpreted with caution, as not all possible factors that might explain the results are explored. The following findings are noted:

• Between 2003 and 2006, the number of officer-initiated traffic stops increased from 438,574 in 2003 to 460,545 in 2006. The number of traffic stops in 2006 represented a slight reduction, however, from the two previous years (482,479 in 2004 and 461,962 in 2005).

- Between 2003 and 2006, Caucasian drivers consistently represented between 62% and 66% of all traffic stops. Hispanic drivers accounted for roughly one quarter of all stops, with Native American drivers representing approximately 5%, and Black drivers accounting for roughly 4% of all traffic stops.
- These levels varied increasingly as more specific organizational units were examined (i.e., divisions, bureaus, and districts/shifts); as a result, more thorough analyses were conducted at the district/shift level.
 - Binomial statistical tests were conducted for Hispanic, Native American, and Black drivers. The rate of traffic stops for each of these groups was assessed between 2003 and 2006, 2004 and 2006, and 2005 and 2006 to identify the long term trends.
 - The results of these analyses revealed that:
 - Ten districts/shifts had statistically significant increases in all three comparisons for Hispanic drivers (Kingman, Holbrook, Metro West Shift #3, Yuma, Casa Grande, District 15, Metro Motors, Canine District, Canine North squad, Canine Central & South squad).
 - Three districts/shifts reported significant increases in all comparisons for Native American drivers (Holbrook, Flagstaff, and Prescott).
 - Four districts/shifts had elevated rates of Black drivers in all three comparisons (Metro West Shift #2, Metro West Shift #3, Casa Grande, and District 16).

These units need to be monitored in upcoming data collection efforts to determine whether the findings represent anomalies in the data or continuing trends. Further, DPS officials should examine potential alternative explanations for these trends (e.g., changes in residential populations, alterations in travel patterns, modifications to Arizona legislation, etc.).

TRAFFIC STOP OUTCOMES

In addition to the initial stop, the UC research team also analyzed traffic stop outcomes (i.e., warnings, repair orders, citations, arrests, searches, seizure of contraband, and multiple citations), as racial/ethnic disparities can also arise after a traffic stop has been initiated. Both bivariate and multivariate analyses were conducted on these data. When reviewing the results, it is important to remember that the bivariate analyses only consider two variables at a time (e.g., the race of the driver and the post-stop outcome). As a result, the interpretation of these findings should be made with caution and cannot determine the existence of racial bias. The multivariate analyses are better suited to make substantive claims about the results of the post-stop outcomes due to their consideration of more than one factor simultaneously. Nevertheless, the multivariate analyses are limited by the type and amount of data collected. Thus, multivariate analyses can demonstrate racial/ethnic disparities that exist after statistically controlling for other factors that are measured with these data, which might influence officer decision making. Some of the findings of the bivariate analyses of stop outcomes are highlighted below:

- At the department level, statistically significant racial/ethnic differences are evident for the most severe outcome received.
- Warnings:
 - At the department level, Hispanic drivers were the least likely to be given a warning (32.0%) when compared to Caucasian (44.4%), Native American (46.2%), and Black (40.6%) drivers.
- Repair Orders:
 - Native Americans were the most likely to be issued a repair order (21.5%) when compared to Caucasian (12.8%), Hispanic (16.0%), and Black (10.5%) drivers.
- Citations:
 - Hispanics received the highest percentage of citations, while Native Americans (42.1%) were significantly less likely than Caucasians (45.1%), Blacks (49.7%), and Hispanics (52.8%) to be cited.
- Multiple Citations:
 - Hispanics were significantly more likely than all other racial/ethnic groups to be issued multiple citations.
- Arrests & Searches:
 - Hispanic, Native American and Black drivers were all significantly more likely than Caucasian drivers to be arrested and searched.
 - Specifically, Native Americans were the most likely to be arrested (4.9%), followed by Blacks (4.3%), Hispanics (4.2%), and Caucasians (2.4%).
 - Hispanics were the most likely to be searched (7.7% of stops) compared to Blacks (7.1%), Native Americans (6.2%), and Caucasians (3.2%).
- These patterns and trends varied somewhat at the bureau level and more so at the district/shift level.

Statistically significant bivariate differences in the *types* of violations for which citations are issued were also evident by race/ethnicity:

- Specifically, Caucasians were significantly more likely (62.4%) to be issued citations for speeding violations compared to Hispanics (46.0%), Native Americans (39.4%), and Blacks (49.8%).
- Black drivers were significantly more likely (11.4%) than other racial/ethnic groups to be issued citations for speeding over 85 mph and for violations related to vehicle registration and/or license plate.
- Alternatively, Hispanic drivers were significantly more likely than other racial/ethnic groups to be issued citations for violations related to drivers' license, seat belts/child restraints, and insurance.
 - These results suggest that minority drivers were more likely to be issued citations for violations that may be related to income.

As noted above, multivariate statistical models take many different factors into account simultaneously when attempting to explain a particular behavior, and therefore provide a

more thorough and accurate interpretation of the data. The highlights of the multivariate analyses are:

- Warnings
 - Hispanic, Black, and drivers of other race/ethnicity were significantly *less* likely compared to Caucasians to receive warnings.
 - In contrast, Native American drivers were significantly *more* likely than Caucasians to receive warnings.
 - The odds ratios of these coefficients indicate that all of these relationships, though statistically significant, are not particularly strong.
 - In addition, while gender, age, and residency significantly predicted warnings, their influence was relatively weak.
 - In contrast, the strongest predictors of whether or not drivers received warnings were the reasons for the stop.
- Repair Orders
 - Drivers stopped for equipment violations were 113.6 times *more* likely to receive a repair order compared to those stopped for moving violations.
 - Drivers of trucks/tractor trailers were 14.7 times *more* likely to be issued repair orders compared to drivers of cars.
 - o In terms of racial/ethnic differences:
 - Hispanic, Black, and drivers of other races were significantly *less* likely compared to Caucasians to be issued repair orders.
 - Native American drivers were significantly *more* likely to be issued repair orders compared to Caucasians.
 - The strength of these relationships range between 1.3 to 1.5 times more/less likely, which indicates that they are not particularly strong explanatory factors.
- Citations
 - Drivers stopped for criminal offenses were 17.2 times *more* likely to receive a citation compared to drivers stopped for moving violations.
 - Drivers found with contraband were 6.7 times *more* likely to receive a citation compared to those without discoveries of contraband.
 - All of the driver characteristics were significant predictors of whether or not citations were issued the strength of some of these relationships is larger than those from previous models.
 - Hispanic, Black, and Other drivers were significantly *more* likely to receive citations compared to Caucasian drivers, while Native Americans were significantly *less* likely, taking into consideration the reason for the stop, as well as vehicle and stop characteristics.
 - Specifically, Hispanic, Black, and Other drivers were 1.5, 1.2, and 1.3 times *more* likely, respectively, to receive citations compared to Caucasian motorists.
 - Drivers who reside in the county where the stop occurred and Arizona residents were 1.2 and 1.4 times *more* likely than non-county and non-Arizona residents, respectively, to receive citations.
- Multiple Citations

- In addition to the citations model, analyses examined whether or not drivers received multiple citations (e.g., more than one).
 - Non-moving violations, investigative reasons, or stops based on pre-existing information were all *more* likely to result in multiple citations when compared to stops conducted for moving violations.
 - Hispanic, Native American, and Black drivers were all *more* likely to receive multiple citations when compared to Caucasian drivers at the rate of 2.3, 1.4, and 1.5 times more likely, respectively.
 - Drivers who reside in the county where stopped and Arizona residents were 1.5 and 1.3 times *more* likely than non-county and non-Arizona residents, respectively, to receive multiple citations.
- Arrests
 - The strongest factor associated with arrest is the discovery of contraband: not surprisingly, drivers found with contraband were almost 63 times *more* likely to be arrested compared to drivers not found with contraband.
 - More important, however, is the strength of the driver race coefficients even after legal variables such as reason for the stop and evidence seized are taken into consideration.
 - Hispanic, Native American, and Black drivers were all significantly *more* likely to be arrested compared to Caucasian drivers given the same reasons for the stop, vehicle characteristics, and stop characteristics.
 - Specifically, Hispanic, Native American, and Black drivers are 1.7, 2.2, and 1.6 times *more* likely to be arrested, respectively, compared to Caucasians.
- Searches
 - The search model though weak in predictive power– suggests that important racial/ethnic disparities exist in whether or not searches are conducted. These racial/ethnic disparities may (or may not) be explained by other factors not included in this model.
 - Hispanic, Native American, and Black drivers were all significantly *more* likely than Caucasians to be searched during officer-initiated traffic stops.
 - Specifically, Hispanic, Native American, and Black drivers are 2.2, 2.1, and 2.1 times *more* likely to be searched compared to Caucasians given the same vehicle characteristics, stop characteristics, and reasons for the stop.
- Seizures
 - The multivariate model predicting whether or not contraband was found during searches was too weak to provide any substantive interpretation.

Racial/ethnic differences in stop outcomes may be explained by legitimate factors unmeasured by these data (e.g., the severity of the traffic offense, drivers' compliance with officers' requests, drivers' socioeconomic status, etc.) or officer bias toward specific minority groups. The reasons for racial/ethnic disparities in stop outcomes reported cannot be determined with these data. Therefore, any conclusions regarding racial/ethnic disparities in traffic stop outcomes based on the multivariate analyses must be tempered. These data analyses cannot determine if the racial/ethnic disparities found are due to legitimate or illegitimate reasons.

TREND ANALYSES: STOP OUTCOMES

As with the initial traffic stop, additional analyses were conducted on the four years of data collection by focusing on trends in traffic stop outcomes between 2003 and 2006 at all organizational units. It is important to note that these analyses are descriptive; therefore, findings should be interpreted with caution, as not all possible factors which might explain the results are included. Several findings are important to highlight:

- Warnings: Approximately 40% of all traffic stops resulted in warnings across the four years, with the 2006 rate (40.1%) similar to the 2003 rate (38.9%).
- Repair Orders: Outcome occurs in slightly more than 10% of all traffic stops, but has been increasing in the last three years.
- Citations: Slightly less than 50% of all traffic stops resulted in citations in 2006; this rate has been increasing since 2004.
- Arrests: Arrest rates has consistently hovered around 3.5% and did not demonstrate any significant pattern of change across the four years.
- Searches: In 2006, 4.6% of stops resulted in a search, which is an increase from 2003 (4.4%), and noticeably higher than the low in 2003 (3.3%).

Traffic stop outcomes were also assessed for Caucasian, Hispanic, Native American, and Black drivers throughout the four years of data collection. Generally, the pattern within racial/ethnic groups matched the overall pattern throughout the state with minor exceptions; however, there are differences in the rate of traffic stop outcomes for specific groups:

- Warnings: Caucasian and Native American drivers have higher rates of warnings, while Hispanic drivers have noticeably lower rates of warnings.
- Repair Orders: Hispanic and Native American drivers have considerably higher rates of receiving a repair order when compared to Caucasian and Black drivers across all four years.
- Citations: Hispanic and Black drivers have the highest rates of citations, followed by Caucasian drivers, and Native American drivers, who have noticeably lower rates of citations and experienced a significant decline from 2003 to 2004.
- Arrests: Native American drivers have the highest rate of arrest, followed by Hispanic and Black drivers. Caucasian drivers have noticeably lower rates of arrest.
- Searches: Hispanic, Native American, and Black drivers all have rates that exceed Caucasian drivers across all four years.

Note that the findings reported from the trend analyses cannot determine whether or not the elevated rates of minority citations, arrests, and searches are due to officer bias. There are a number of legitimate explanations for these trends that cannot be explored with these data.

SEARCHES & SEIZURES

To address the concern of potential bias in search and seizure activity, a separate set of analyses were conducted on these outcomes. In 2006, DPS officers conducted 21,218

searches of drivers, vehicles, and/or passengers during officer-initiated traffic stops. The most common reasons for searches included incident to arrest (54.7%) and vehicle inventory (30.0%), followed by consent (16.5%), probable cause (14.5%), consent only (13.4%), and Terry (10.7%). Searches resulted in the discovery of contraband in 5,014 cases; thus, the overall search success rate is 23.6%. The most frequent type of contraband seized was drugs (48.3%) followed by other contraband (33.2%), alcohol (22.2%), other property (13.4%), and vehicles (10.1%).

Searches were then analyzed by dividing into three categories based on the presumed level of officer discretion. The first search category—Type I—includes searches that are required by DPS policy and therefore, mandatory for officers to perform. Type I searches include searches incident to arrest, those based on a pre-existing warrant, and vehicle inventories. The second search category—Type II—includes searches that are not mandatory, but rather are allowed by case law or policy and, guided by legal statutes. Specifically, Type II searches include those based on probable cause, Terry, plain view, or canine alert. The third search category—Type III—includes searches based solely on drivers' consent to officers' requests to search. For analytical purposes, if a search was based on multiple reasons, it was assigned to the search category with the least officer discretion (e.g., if a search is based on a canine alert [Type II] and consent [Type III], it was defined as a Type II search. The findings below are based on these categorizations:

- At the department level, the majority of searches conducted were Type I searches (67.8%), while 18.8% and 13.4% were Type II and Type III, respectively.
- Analyses based on the type of search indicate statistically significant racial and ethnic disparities in searches across all three search type categories:
 - Blacks were least likely to be searched for mandatory reasons (Type I), while Native Americans were most likely to be searched for mandatory reasons.
 - For Type II searches, Blacks were significantly more likely and Native Americans significantly less likely to be subject to Type II searches.
 - In the case of consent only searches (Type III), Black and Hispanic motorists were significantly more likely to be asked for consent to search and ultimately searched based solely on consent compared to Caucasians and Native Americans.

Although multivariate analyses (like those performed on all traffic stop outcomes) are the most common form of testing for disparities in stop outcomes, more recently, the discussion regarding bias-based policing has also focused on examining outcomes in the form of search "hit" rates. If drivers were searched strictly based on legal factors and suspicions unrelated to race, one would expect similar percentages of searches resulting in seizures across racial groups. This has been described as the "outcome test" (Knowles, Persico & Todd, 2001; Ayres, 2001). As with other analytical techniques, limitations exist which limit the conclusions that can be drawn from the outcome test (Engel, 2007; Engel & Tillyer, 2007). The outcome test is only appropriate for an analysis of traffic stops that result in a discretionary search; therefore, mandatory and consent searches should not be considered. In addition, any racial/ethnic disparities in hit rates discovered using this method do not necessarily imply officer bias. It is recommended that no definitive conclusions about racial

bias be drawn from these comparisons based on the limitations of this technique (for details, see Engel, 2007; Engel & Tillyer, 2007). Applying the outcome test to DPS data found:

- Search success rates across the department varied by the reason for search:
 - Searches based on solely on consent (12.7%) were the least likely to be successful in terms of discovering contraband.
 - Searches most likely to produce seizures of contraband include those based on probable cause (65.9%), plain view (56.7%), and canine alerts (42.8%).
- The overall Type II (discretionary, guided by legal statue) search success rate for DPS was 44.8%, but success rates varied significantly by race/ethnicity:
 - Type II searches of Hispanic drivers were the least likely to be successful in the discovery of contraband, compared to all other racial/ethnic groups.
 - Specifically, 36.0% of Type II searches of Hispanic drivers resulted in contraband discoveries, compared to 49.6% and 51.4% of searches of Caucasian and Black drivers, respectively.
- Analyses of consent searches revealed racial/ethnic differences in those asked for consent to search as well as refusals to consent:
 - Hispanics were significantly more likely than other racial/ethnic groups to be asked for consent to search, and significantly less likely than members of other racial/ethnic groups to refuse consent when asked.
- Because consent searches are not solely dependent on officer's discretion (i.e., a citizen may refuse), analyses of consent search success rates are not recommended. These analyses, however, were conducted at the request of DPS administrators.
 - Type III (consent only) searches of Native American drivers were significantly less likely to result in contraband discovery compared to consent only searches of Blacks and Caucasians.
 - Specifically, 9.4% and 4.3% of Type III searches of Hispanic and Native American drivers resulted in contraband discoveries, compared to 16.7% and 16.5% of consent only searches of Caucasian and Black drivers, respectively.
- Undocumented aliens (the majority of whom were Hispanic) were significantly more likely to be searched compared to those with legal residency status (24.9% of UDA compared to 4.6% of legal status).
 - Type II and III searches of undocumented aliens were significantly *less* likely to result in seizures of contraband compared to searches of those in the country legally.
- Due to a number of data limitations, the information presented regarding searches and seizures cannot determine the legality of and/or the presence of discrimination in individual searches conducted by DPS officers.

RECOMMENDATIONS

Based on the findings described above, a series of recommendations for DPS administrators related to data collection, training and policy are provided below.

Data Collection

- The data audit identified a number of recurring problems with data collection, including errors related to data transfer from hard copies to electronic data and missing and/or invalid data on data collection forms.
- The UC research team strongly recommends that a committee within DPS be formed to discuss alternative data collection options.
- Multiple analyses of these data indicate that the quality of the information gathered needs to be substantially increased. The proposed DPS committee would work directly with the UC research team to develop and implement changes to the current data collection process and the information gathered.
- The text recognition system currently in use is the primary source of errors. In the event that modifications to the current system, already under exploration, cannot provide an acceptable error rate, it is recommended that this committee identify alternative methods of data collection and transfer including, if fiscally feasible, an electronic data capture system.
- It also remains critical to continue routine data audits (similar to that conducted by the UC research team) which, along with supervisory oversight, will increase the accuracy and validity of these data.
- Training
 - Through both informal conversations with DPS officials and data analyses of 2006 traffic stops, it has become readily apparent that similar situations are coded differently on the data collection forms. That is, there is questionable consistency across officers and organizational units regarding data collection.
 - It is recommended that once the data collection committee alters the data collection system and possibly the information collected, a second committee be developed to disseminate proper training material and establish a feedback system for direct and immediate supervisory oversight.
- Alternative Methods for Benchmarking Traffic Stops
 - As noted in *Traffic Stop Data Analysis Study Interim Report: Literature Review and Review of Other Jurisdictions* (Engel, et al., 2007), there are a number of alternative methods of benchmarking that have not been conducted. The strengths and weaknesses of these various approaches have been presented to DPS. Due to the problems associated with benchmarking analyses, research teams have most recently recommended very limited attempts while focusing more directly on analyses of post-stop outcomes. This continues to be the recommendation of the UC research team.
- Further Examination of Post-Stop Outcomes
 - DPS administrators should examine the specific organizational units identified in Sections 5 – 7 as demonstrating statistically significant increases in the percentages of minority drivers stopped, cited, arrested, and searched in their jurisdictions.
 - There are a number of possible legitimate explanations for these trends.
 - It is incumbent upon DPS officials to consider the likely sources producing statistically significant increases in minority stops.

- Better understanding of the racial/ethnic disparities in post-stop outcomes is warranted.
 - Racial/ethnic disparities in citations, arrests, and searches cannot be explained by factors currently collected on the current data forms.
- The first step in understanding these disparities has been achieved through the commitment by DPS officials to continue data collection indefinitely.
- Additional information gathered in the second year of this research project (e.g., from focus groups with officers, ride-alongs, and citizen surveys) will aid DPS administrators in an effort to examine possible explanations for the reported racial/ethnic disparities, and to develop changes in policy and training where appropriate to reduce these disparities.
- DPS should continue to explore the reasons for these racial/ethnic disparities in post-stop outcomes.
 - Field supervisory staff should be made aware of racial/ethnic disparities in citation, arrest, search, and seizure rates within their jurisdictions.
 - Specific findings documented in this report should be disseminated to DPS supervisory personnel for their consideration.
- Racial/ethnic disparities in outcomes may be explained by other factors not typically collected in traffic stop data collection efforts (e.g., motorists' compliance with officers' requests, motorists' cues of suspicion and other behaviors, severity of traffic offenses, officers' characteristics, organizational characteristics, community characteristics, social-economic factors including age and condition of vehicle).
 - Many of the factors noted above that are expected to influence officer decision making *cannot* be reliability captured on traffic stop forms. Nevertheless, DPS should investigate modifications to data collection to improve the collection of details that might explain better the disparities -- even minor alterations to the data collection forms to gather additional information may at least partially explain racial/ethnic disparities.
 - DPS officials should reconsider the inclusion of officer data for examination. These data would not be used to identify any individual officers. Rather these data would allow for hierarchical linear modeling that accounts for differences across *organizational units* as a possible explanation for disparities in post-stop outcomes.
 - The UC research team will continue to pursue options for better integration of geographic location information (i.e., the location of the stop) into the analyses. Specifically, spatial analyses and hierarchical linear models will be attempted after additional information regarding geocoding of locations is acquired.
- Examination of Search and Seizure Activities
 - Analyses of 2006 data indicated that even after considering the reason for the stop and other stop characteristics that can be measured with these data, Hispanic, Native American, and Black drivers were all more than two times more likely to be searched compared to Caucasians.

- The contraband seizure rates of Type II searches suggest that the elevated search rates for Black and Native American motorists are justified in terms of contraband seizures.
- The higher rates of Hispanic searches, however, do not produce comparable rates of seizures. Although Hispanic motorists were significantly more likely to be searched during officer-initiated traffic stops compared to Caucasians, they were significantly less likely to be found in possession of contraband.
- There are a number of reasons that might account for these racial/ethnic disparities, including legitimate explanations, along with possible officer discrimination / bias.
- In an effort to better understand racial/ethnic disparities in search and seizure rates, the UC research team plans to conduct focus groups with canine handlers, officers assigned to the Highway Division that are actively engaged in search and seizure activity, and officers assigned to GITTEM.
 - The purpose of these focus groups is to provide a better understanding and context in which to interpret the statistical findings.
 - This research will explore the reasons why DPS troopers initially conduct searches, and what verbal, non-verbal, and behavioral cues (not captured on data collection forms) are perceived by troopers as the most effective in predicting criminal behavior.
 - Focus groups will also explore how troopers were trained and their perceptions regarding the usefulness and accuracy of the training they received.

Expedient implementation of these recommendations will assist in future data collection and analyses. Moreover, implementation of these recommendations will demonstrate the agency's continued commitment to providing unbiased police service to the citizens of Arizona.

1. INTRODUCTION

OVERVIEW

As outlined in the *Traffic Stop Data Analysis Study Interim Report: Literature Review and Review of Other Jurisdictions* (Engel, Cherkauskas, & Tillyer, 2007), concerns of racially biased police behavior have become increasingly pertinent to law enforcement agencies within the last fifteen years, as allegations of racial bias have been directed toward numerous agencies. These claims have often been the foundation for criminal and civil litigation with the goal of eliminating perceived racial inequalities in police enforcement. As a result of this mounting public and legal pressure, law enforcement agencies have initiated the collection of data to investigate these claims. Accompanying this increase in traffic stop data collection is an increase in the knowledge regarding racial bias across jurisdictions. Research studies examining traffic stop data collected by departments across the country have generally shown racial and ethnic disparities in rates of traffic and pedestrian stops and dispositions (e.g., citations, arrests, and searches). Particularly important is a growing body of research suggesting that minority motorists are significantly more likely to be searched by police during traffic and pedestrian stops, but less likely to be found in possession of contraband compared to Caucasian drivers.

To address these issues, the Arizona Department of Public Safety (DPS) is currently under mandate to collect data on all police-citizen interactions and has contracted with the University of Cincinnati Policing Institute to analyze the data collected. This first annual report summarizes the current status of the data collection effort, and includes an analysis of data collected by DPS between 2003 and 2006, with a specific focus on the most recent year of data. This contractual relationship is scheduled to continue through 2009 and includes several additional research methodologies to examine and provide context for the actions of DPS officers when interacting with minority racial/ethnic groups. This report is the initial comprehensive analysis of DPS traffic stop data as part of this research project. The remainder of this introductory section summarizes the history of data collection by Arizona DPS, and concludes with an overview of the report.

HISTORY OF DATA COLLECTION

This section documents the history of traffic stop data collection by Arizona DPS. First, it explains how and why DPS originally began collecting traffic stop data in 2003. Second, it details the methodological revisions in the collection and transmission of data that have occurred since 2004. Finally, it reviews the requirements of the department's 2006 settlement agreement and describes the details of the UC research team's involvement and planned research.

Initial Data Collection: 2003

The Arizona Department of Public Safety agreed to begin voluntary data collection after discussions with a Coconino County Judge pursuant to several DPS criminal cases tried in

Coconino County courts. Specifically, the cases involved allegations of racial profiling and stop data analysis performed by the defense that revealed DPS had lost traffic stop records ordered to be retained by the court in a previous case.

Prior to department-wide data collection, a short pilot test was conducted to test the data collection system. The purpose of a data collection pilot test is to perform a "dry run" for the data collection effort. These tests ensure that the research design is feasible, and the data collected are both reliable and valid. Pilot tests are typically conducted by a selected group of officers (in this case, one squad) in a limited geographic area. Based on findings from the pilot test, the data collection instrument is changed and officer training is modified, if necessary.

Voluntary traffic stop data collection by DPS began department-wide January 1, 2003. Data was initially collected on Scantron forms (see Figure 1.1) completed by officers in the field. Although a specific departmental General Order initiating data collection was not issued, the revised DPS policy prohibiting racial profiling (GO 4.2.30, March 2003) included a data collection stipulation that referenced the new Scantron forms:

All sworn DPS personnel who initiate traffic stops will complete an appropriate primary contact form (e.g., citation, warning, etc.) and an *Enforcement Contact Tracking* form (DPS 802-04227) in accordance with the *Contact Tracking System (KOTS) User Manual and Form Definition Guide (DPS 932-02065).*

As shown in Figure 1.1, the *Contact Tracking Form* initially utilized by DPS officers gathered information regarding:

- The stop: date and time, location (highway, mile post, direction of travel), type of contact and reason for contact, duration of the stop
- The driver: gender, age, race/ethnicity, last name
- The vehicle: state of registration, registration number, and type of vehicle
- The outcome of the stop: citation, warning, field interview, repair order, arrest, search (including authority for search), and property seized, if any, during the search
- Identification information: officer badge number, corresponding document type and number (i.e., number for citation issued)

Completed forms were later scanned into the DPS Contact Tracking System database at DPS headquarters in Phoenix. Field supervisors were responsible for ensuring that Scantron forms were filled out completely and accurately. No formal data auditing procedures or quality control systems, however, were in place at this time. Data collection continued in this manner from January 1, 2003 until December 31, 2003.



Figure 1.1: Scantron Data Collection Form January 1, 2003 – December 31, 2003 (p.1 of 2)

Figure 1.1 Scantron Data Collection Form January 1, 2003 – December 31, 2003 (p.2 of 2)

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Revisions to Data Collection: 2004

The use of Scantron forms concluded at the end of 2003 when the data collection process was revised in favor of traffic stop data collection forms (citations and warnings/repair orders) that allowed for automated collection of hand written data through an imaging system. That is, effective January 1, 2004 DPS began scanning the traffic stop record itself (citation/warning) and using text recognition software to populate data fields.

This process involved an operator scanning the document and performing corrections to the data fields by comparing the original with the electronic data, followed by a second operator performing "completion," where the data fields are checked a second time for accuracy. Although the forms were revised slightly in November 2004 (see current forms in Figures 1.2 and 1.3), this process of data collection has continued since 2004. The UC research team is unaware of any auditing that has been performed on these data or the data collection system prior to the data audit conducted by the UC research team (described in detail in Section 2).

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Figure 1.2: Citation Data Collection Form (Dec 1, 2004 – present)

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Figure 1.3: Warning/Repair Order Data Collection Form (Dec 1, 2004 – present)

Settlement Agreement: 2006

Beginning in 1998, several criminal defendants in DPS drug interdiction cases alleged racially-biased policing by the department. Furthermore, in 2001, eleven Coconino County criminal defendants, in conjunction with the ACLU, filed a class-action civil lawsuit against DPS alleging racial profiling by DPS officers in violation of their civil rights. Both sides voluntarily entered into the Ninth Circuit Court of Appeals Mediation Program to settle the case. On August 7, 2006, both parties agreed to a settlement in the matter of *Arnold, et. al. v. Arizona Department of Public Safety*, which resolved all claims filed by the plaintiffs.

Although DPS does not admit any wrongdoing under the terms of the settlement agreement, it has affirmatively agreed to take several proactive measures to prevent racial profiling in the future, including but not limited to:

- Maintain present policy (General Order 4.2.30) prohibiting racially biased policing, including racial/ethnic profiling¹
- Adopt and require use of forms providing written consent to search
- Require training of all sworn officers on DPS policy prohibiting racial profiling and the contents of the settlement agreement
- Require all DPS patrol and K-9 officers, and officers subsequently transferring into these units, to attend the NHTSA professional traffic stop training course
- Create a citizens' advisory board to be appointed by the Governor
- Provide a method for citizens to complain about or compliment DPS officers
- Publicize through website and other means the following: department's racial profiling policy, complaint/compliment process, and a public information brochure regarding traffic stops for citizens

DPS has indicated in their correspondence with the UC research team that it has completed and/or implemented all of these measures.

In addition to the above-described measures, under the terms of the settlement agreement the department also complied with an ongoing data collection requirement. Specifically, DPS agreed to collect traffic stop data on the following specified fields:

- 1. Reason for contact
- 2. Type of contact (driver, passenger, pedestrian, or other)
- 3. Whether a search was performed
- 4. Whether a requested search was refused

5. The legal/factual basis for the search. (For example, consent, probable cause, plain view, K-9 alert, etc.)

6. Who or what was searched (vehicle, driver, passenger)

¹ DPS has had a policy prohibiting racial/ethnic profiling since 1999. Initially issued as General Order 31.19 in November 1999, the policy now known as General Order 4.2.30 has undergone annual revisions from 2003 to 2006, including: defining racial profiling as one form of the more expansive problem of racially biased policing, providing for additional guidance regarding officers' behavior during traffic stops, and the addition of required written consent to search.

- 7. Types of items seized in the search (drugs, weapons, currency, etc.)
- 8. Duration of the stop
- 9. Direction of travel
- 10. Race/ethnicity of the person contacted, using the following categories:
 - a) Native American
 - b) Asian/Pacific Islander
 - c) Black
 - d) Hispanic
 - e) Middle Eastern
 - f) White
 - g) Other or Undetermined
- 11. Gender of the person contacted
- 12. Vehicle description (if a vehicle was involved)
- 13. Badge numbers of all officers

Furthermore, as can be seen in Figures 1.2 and 1.3 above, the DPS data collection form includes additional data fields not mandated for collection by the settlement agreement:

- 1. Time and date of stop
- 2. Location of stop
- 3. Disposition/outcome of stop
- 4. Driver age
- 5. Driver residency

The settlement agreement required that DPS generate a solicitation for an outside research team to analyze the collected traffic stop data. The details of this solicitation and the resulting partnership with the UC research team are described below.

PARTNERSHIP WITH UCPI RESEARCH TEAM: 2007-2009

In accordance with the timetable set forth in the Settlement Agreement, DPS released a Request for Proposal (RFP) in November 2006 for a research team to conduct a comprehensive evaluation of traffic and pedestrian stop data collected by DPS officers. In December 2006, the research team from the University of Cincinnati Policing Institute (UCPI) submitted a proposal to DPS. In February 2007, the UC team was awarded a three-year contract to conduct the department's "Traffic Stop Data Analysis Study." The contract for this study was signed by both parties on March 14, 2007.

In addition to the analysis of yearly traffic stop data required by the settlement agreement, DPS voluntarily agreed to conduct additional research to complement the official stop data collection and more fully understand the problems of racial and ethnic disparities in police stops. Specifically, DPS and UC will collaborate on three additional research methodologies:

- 1) Focus groups with troopers extensively involved in search and seizure activities
- 2) Focus groups and ride-alongs with officers in the gang and canine units

3) A survey of citizens previously stopped by DPS officers to assess citizens' perceptions of their encounters with DPS and examine any potential racial/ethnic differences in perceptions

Timeline and Deliverables

There are a number of project deliverables that will be generated as part of this research study, including: 1) meetings with DPS officials, 2) monthly project status reports, 3) monthly data auditing reports, 4) four formal presentations, 5) literature, expert, and jurisdiction review report 6) three traffic and pedestrian stop data analysis reports, 7) search and seizure best practices focus group report, 8) specialized units focus group report, and 9) citizen survey report.

The original proposed dates for the deliverables of the DPS Traffic Stop Data Analysis Study (based on a January 1, 2007 start date) were:

- Meetings with DPS officials: As needed, Years 1-3
- Project Status Reports: Delivered the 1st of every month, Years 1-3
- Data Auditing Reports: Delivered the 15th of every month, Years 1-3
- Formal Presentations Year 1: July 2007, November 2007
- Formal Presentation Year 2: November 2008
- Formal Presentation Year 3: November 2009
- Literature Review Interim Report (draft): June 1, 2007
- Literature Review Interim Report (final): August 1, 2007
- Stop Data Analysis Report Year 1 (draft): September 1, 2007
- Stop Data Analysis Report Year 1 (final): November 1, 2007
- Search & Seizure Best Practices Focus Group Report (draft): March 1, 2008
- Search & Seizure Best Practices Focus Group Report (final): May 1, 2008
- Specialized Units Focus Group Report (draft): March 1, 2008
- Specialized Units Focus Group Report (final): May 1, 2008
- Citizen Survey Report (draft): September 1, 2008
- Citizen Survey Report (final): November 1, 2008
- Stop Data Analysis Report Year 2 (draft): September 1, 2008
- Stop Data Analysis Report Year 2 (final): November 1, 2008
- Stop Data Analysis Report Year 3 (draft): September 1, 2009
- Stop Data Analysis Report Year 3 (final): November 1, 2009

As noted above, these projected delivery dates were based on an assumed January 1, 2007 start date. Due to the initial delay in signing the contract, the project did not officially begin until April 1, 2007. The UC research team met with DPS officials on March 28, 2007 and the following revisions to the original project timeline were agreed to by both parties:

- Meetings with DPS officials: As needed, Years 1-3
- Project Status Reports: Delivered the 1st of every month, Years 1-3
- Data Auditing Reports: Delivered the 15th of every month, Years 1-3

- Formal Presentations Year 1: March 2007, November 2007
- Formal Presentation Year 2: November 2008
- Formal Presentation Year 3: November 2009
- Literature Review Interim Report (draft): August 1, 2007²
- Literature Review Interim Report (final): October 1, 2007
- Stop Data Analysis Report Year 1 (draft): October 15, 2007
- Stop Data Analysis Report Year 1 (final): November 1, 2007
- Search & Seizure Best Practices Focus Group Report (draft): April 30, 2008
- Search & Seizure Best Practices Focus Group Report (final): July 1, 2008
- Specialized Units Focus Group Report (draft): April 30, 2008
- Specialized Units Focus Group Report (final): July 1, 2008
- Citizen Survey Report (draft): September 1, 2008
- Citizen Survey Report (final): November 1, 2008
- Stop Data Analysis Report Year 2 (draft): September 1, 2008
- Stop Data Analysis Report Year 2 (final): November 1, 2008
- Stop Data Analysis Report Year 3 (draft): September 1, 2009
- Stop Data Analysis Report Year 3 (final): November 1, 2009

The original research team also included an on-site team from Arizona State University, West Campus. Based on a mutual agreement between DPS officials and the Principal Investigator from the UC research team, ASU-West personnel will no longer be involved in this research project. The UC research team intends to hire Dr. Michael Smith, Chair of the Criminal Justice Department at the University of South Carolina to fulfill the duties originally handled by ASU-West personnel.

Due in part to these personnel changes, the following revisions are proposed to the timelines for the Search and Seizure Best Practices Focus Group Report, as well as the Specialized Units Focus Group Report:

• Search & Seizure:

- o Draft Report Revised Due Date: August 1, 2008
- o Final Report Due: September 15, 2008
- Specialized units
 - o Draft Report Revised Due Date: August 1, 2008
 - Final Report Due: September 15, 2008

In accordance with the revised timelines, the following tasks have been completed:

- Formal Presentations Year 1: March 28, 2007, and scheduled for November 6, 2007
- Data Audit:
 - o Phase I issued August 10, 2007

 $^{^2}$ Due to delays in responses from several police agencies, DPS approved extending this deadline to September 7, 2007.
- Phase II issued August 24, 2007; revised based on new information from DPS provided August 30, 2007
- Phase III issued draft September 17, 2007; final version appears in Section 2 of the current report
- Phases I and II (revised) included in the issued Literature Review Interim Report (see below)
- Complete revised data audit included in Section 2 of the current report
- Literature Review Interim Report (draft) issued September 7, 2007
- Literature Review Interim Report (final) issued October 1, 2007
- Stop Data Analysis Report Year 1 (draft) issued October 15, 2007

REPORT OUTLINE

The following report for examining data collected from January 1, 2006 through December 31, 2006 is organized into nine sections: 1) introduction and history of data collection, 2) data audit of current data collection effort, 3) description of traffic stop data, 4) internal benchmarking, 5) trend analysis of traffic stops: 2003-2006, 6) post-stop outcomes, 7) trend analyses of traffic stop outcomes: 2003-2006, 8) search and seizure analyses, and 9) conclusions and policy recommendations. The general content for Sections 2 - 9 are described below.

Section 2

Section 2 outlines the method and results of the three phases of the initial data audit and provides options and recommendations for continued data collection and auditing techniques. Phase I reports the degree of error created through the current scanning process to transfer the data collected by DPS personnel to an electronic database for storage and analysis. Phase II examines all 2006 traffic stops to assess the missing and logical inconsistencies for each field captured during a traffic stop and provides an overall assessment of the error rate within the electronic database. Phase III examines the data accuracy by comparing the number of stops in the electronic data with an independent source of information.

Section 3

Section 3 describes the final police stop dataset that includes 466,348 member-initiated traffic stops in 2006. Specifically, it provides descriptive statistics for the traffic stop data regarding the number of stops, characteristics of the stops (e.g., time, day, month, reason for the stop, vehicle registration, length of the stop), the reason for the stop (e.g., moving violation, equipment violation, non-moving violation, etc.), and the characteristics of the drivers (e.g., gender, race, age, residency). The averages for this information are reported in tables at the department, division, bureau, district/shift levels, and in the case of drivers' racial/ethnic characteristics, the county level.

Section 4

Section 4 assesses all officer-initiated traffic stops by outlining the need for a benchmark against which the traffic stop data can be compared. This discussion includes the variety of benchmarks available, and the reasoning underlying the decision to utilize an internal benchmark measure. Two types of internal benchmarking are considered - an early warning system and trend analyses. Only the latter method is employed as the organizational structure of DPS will not allow the development of an early warning system. The trend analyses are conducted on all traffic stops conducted between 2003 and 2006 by racial/ethnic groups (i.e., Caucasian, Hispanic, Native American, and Black). These analyses are provided at the department, division, bureau, and district/shift levels. Further results are graphically displayed at the district/shift level. Finally, a statistical test is conducted to highlight districts/shifts that have significant changes between years in their rates of stopping the aforementioned racial/ethnic groups.

Section 5

Post-stop outcomes (e.g., warning, repair order, citation, search, seizure of contraband, and arrest) are documented in Section 5. Information examining post-stop outcomes is presented for different drivers by race and gender across all organizational units. Information examining the types of violations for which citations and warnings are issued is also presented. At the conclusion of Section 5, several multivariate analyses are presented that predict officer decision making after the traffic stop has been made. That is, Section 5 documents the outcomes drivers receive after traffic stops are made (e.g., warnings, repair orders, citations, arrests, searches, seizures, and multiple citations), and whether these outcomes differ significantly based on a multitude of factors.

Section 6

Section 6 examines data collected over the last four years (2003 - 2006) and reports on traffic stop outcome trends. These analyses are conducted at the department, division, bureau, and district/shift levels and report on warnings, repair orders, citations, searches, and arrests. These outcomes are also reported for each racial/ethnic group (i.e., Caucasians, Hispanics, Native Americans, and Blacks).

Section 7

Section 7 focuses specifically on the post-stop outcomes of searches and seizures. This section describes the types of searches and seizures at the department, division, bureau, and district/shift levels. It further documents the search rates for minority motorists compared to Caucasians, and describes the racial/ethnic disparities in types of searches and seizures at multiple organizational levels. Comparisons of racial/ethnic differences in discretionary search success rates are also examined.

Section 8

Section 8 summarizes the information presented, and provides policy recommendations based on interpretations of collected data. Note that the findings reported in this document must be interpreted cautiously. The data collected and presented in this report cannot be used to determine whether or not DPS officers have individually or collectively engaged in "racial profiling." In addition, the legality of prior or future individual traffic stops cannot be assessed with these data. This report is designed to give feedback to DPS administrators regarding the status of the data collection process, along with exploring trends and patterns in the data that may be utilized for training purposes.

2. DATA AUDIT

OVERVIEW

Data integrity is a crucial component to effective data analyses. Even the most sophisticated statistical analyses are meaningless if the data used to generate the analyses lack reliability and validity. Data "auditing" is an important oversight mechanism to maintain data quality. Typically data audits for traffic stop data collection efforts involve a number of different procedures to check for several types of inaccuracies. Types of traffic stop data inaccuracies include:

- Incorrect copying of information from one form to another (e.g., data transfer or entry errors)
- Missing information
- Invalid information
- Missing information on all officer-initiated stops
- Data contains misstatements of facts (e.g., Black motorist is recorded as Caucasian)

In addition to increasing data quality, a data auditing system can also help ensure officer compliance with the data collection protocol. Officers will likely be more diligent in their data collection if they know it is being reviewed for comprehensiveness and quality (Fridell, 2004).

To assess the current status of the DPS data collection process, the UC research team conducted a data audit to assess the validity of the 2006 data. This process was comprised of three phases: 1) Phase I evaluates the data transfer process from the paper copies completed by DPS personnel to the electronic database; 2) Phase II assesses the missing data and logical inconsistencies within the electronic data; and 3) Phase III examines the data accuracy by comparing the number of stops in the electronic data with an independent source of information.³ This section outlines the method and results of the three phases of the initial data audit and provides options and recommendations for continued data collection and auditing techniques.

DATA AUDIT: PHASE 1

Description

Phase I evaluates the data transfer process from the paper copies completed by DPS personnel to the electronic database. This phase of the data audit was conducted on 1,000 traffic stops conducted during January 2007 and only provides information regarding the accuracy of data transfer;⁴ it does not address the validity of the information actually entered on the forms by the officers. That is, this phase of the data audit assesses the accuracy of the

 $^{^{3}}$ A second component of Phase III of the data audit, to be completed in Year 2, will compare the accuracy of specific items recorded in the stop data with external information.

⁴ This audit did not, however, evaluate how often forms were rejected by the imaging scanner and returned to officers for correction.

system of data transfer, while the true validity of the data is evaluated in Phase 2 (discussed below).

The first stage of the data audit utilized two sources of data: 1) original scan forms completed during the traffic stops and 2) electronic versions of traffic stops created through the scanning of hardcopies using Scantron software. These two data sources were compared for every field on the scan form to determine if information recorded by officers on the scan forms was accurately transferred to the electronic data files.

The data audit was conducted by manually comparing each field of information on the scan form to the corresponding information in the electronic files. The audit reported the number of times the information from both sources did not match and the reason for the match failure. Results are reported below on the accuracy of 33 data fields from 1,000 traffic stops.

Results

Of the 1,000 traffic stops, 10 stops (1.0%) had scan forms with no corresponding electronic copies. These discrepancies may be due to a number of factors including: 1) data entry errors, i.e., scan forms were not scanned, 2) electronic forms were properly scanned, but appear in a different file not given to the research team, or 3) there was a Scantron equipment malfunction. Regardless, the remaining analyses described below are based on 990 cases.

In Table 2.1 below, the first column reports the number of traffic stop forms examined, followed by the percent of forms that had at least one error (i.e., at least one field on the scan form did not match the corresponding electronic data). The final two columns report the reasons for those errors. A "System Error" refers to an error generated because the information on the scan form was not adequately captured in the electronic file. In contrast, a "Data Collection Error" is an error based on a problem with the scan form itself (double entry, stray marks, not dark enough, etc.). The rows in Table 2.1 report different fields examined: the first row reports all 33 data collection fields, followed by those classified as primary and secondary fields. A primary field is defined as information that must be collected for our team's research analyses, whereas a secondary field is information collected that will likely not be used by our research team.⁵

⁵ Primary Fields include: Document Number, Document Type, Date, Time, Badge Number, Locator Code, Citizen's DOB, Citizen's Gender, Citizen's Race, Citizen's Zip Code, State of Vehicle, Highway Name, Milemarker, Type of Contact, Reason for Stop, Search Conducted, Search Refused, Target of Search, Reason for Search, Contraband Discovered, Outcome of Stop, Duration of Stop (Total = 22). Secondary Fields include: Citizen's Last Name, Citizen's First Name, UnDocumented Alien Status, Vehicle License Plate, Vehicle Type, Direction on Highway, Court Code, Backup Officer's Agency, Backup Officer, 2nd Backup Officer's Agency, 2nd Backup Officer (Total = 11)

Table 2.1: Summary of Non-Match Rates

	Number of Traffic Stops	% Overall Errors	% System Errors	% Data Collection Errors
All 33 Fields	990	26.5%	25.7%	0.8%
Primary Fields	990	18.4%	17.8%	0.6%
Secondary Fields	990	10.2%	10.0%	0.2%

Overall, 26.5% of the 990 forms had at least one field with an error. The majority of errors found were "system errors" and occurred in situations where the scan form simply did not match the electronic copy. This is a software / hardware problem and data entry problem. The Scantron imaging system simply does not accurately capture the information on the scan forms, and the electronic images are not properly corrected by data entry personnel. In contrast, only 0.8% of the stop forms were not readable and thus created data collection errors.

When only the fields necessary for data analyses are considered (i.e., primary fields), the error rate is reduced to 18.4% of the forms. Again, the overwhelming majority of errors were related to the system of transferring information from the scan form to the electronic copy.

In Tables 2.2 & 2.3 below, the errors for the specific data fields are reported. Table 2.2 reports the error rates for primary fields, while Table 2.3 reports the error rates for secondary fields. The specific data fields are presented within the tables in order from the highest to the lowest error percentages. As shown in Table 2, highway location had the largest error percentage (3.9%), followed by citizen's DOB (2.9%) and zip code (2.3%). In all cases, the majority of the errors were related to a system error. There were also a number of fields with no errors, including duration of the stop, search conducted, and search refused.

	%	%	%
	Overall	System	Data Collection
	Errors	Errors	Errors
Highway Location	3.9	3.8	0.1
Citizen's DOB	2.9	2.8	0.1
Citizen's Zip Code	2.3	2.2	0.1
Milepost	2.2	2.2	0.0
Document Type	2.1	2.1	0.0
Time	2.1	2.1	0.0
Date	1.9	1.8	0.1
Badge Number	1.5	1.3	0.2
Outcome of Stop	0.6	0.6	0.0
State of Vehicle	0.4	0.4	0.0
Citizen's Gender	0.3	0.3	0.0
Type of Contraband Discovered	0.3	0.3	0.0
Locator Code	0.2	0.2	0.0
Reason for the Contact	0.2	0.2	0.0
Citizen's Race	0.1	0.1	0.0
Search Target	0.1	0.1	0.0
Duration of Stop	0.0		
Reason for Search	0.0		
Search was Refused	0.0		
Search Conducted	0.0		
Type of Contact	0.0		
Document Number	0.0		

 Table 2.3: Summary of Secondary Fields (n=990)

	%	%	%
	Overall	System	Data Collection
	Errors	Errors	Errors
Court Code	3.1	3.0	0.1
License Plate Number	2.4	2.4	0.0
Citizen's Last Name	1.8	1.7	0.1
Vehicle Type	1.6	1.6	0.0
Direction of Vehicle	0.7	0.7	0.0
2 nd Backup Officer's Agency	0.7	0.7	0.0
Citizen's First Name	0.2	0.2	0.0
Backup Officer's Agency	0.1	0.1	0.0
Backup Officer	0.1	0.1	0.0
2 nd Backup Officer	0.0		
Citizen is an UDA	0.0		

Recommendations

As demonstrated in Tables 2.2 and 2.3, the text recognition software currently used by DPS is a primary source of errors. The UC team strongly recommends phasing out this system and replacing it with a more effective method of data collection and transfer. There are generally two feasible options available: 6

1. Basic Scantron (different from current imaging system): Information is manually recorded on a scannable bubble form and transferred into electronic form through manual scanning; printed information is no longer captured.

- Strengths
 - o Efficient
 - o Easy to use
 - Significantly reduced error rate associated with imaging process
 - Use abbreviated form that collects only the information necessary for statistical analyses eliminate information (e.g., drivers' names) that is not currently used by DPS
- Weaknesses
 - Inability to capture information that is currently handwritten on the forms although this information is currently not used by DPS, it might be desired in the long term
 - May require court approval for changing document based on settlement agreement⁷
 - o Monetary investment in new Scantron equipment and forms
 - o Manpower / costs associated with supervisory oversight and error correction
 - Delay in transferring data from scan forms to electronic
 - Officer morale negatively affected by the introduction of paperwork collected through a new system

2. Electronic data capture: In-car drop-down menu system (or in station) that automatically transfers data to a central repository

• Strengths

⁶ A third option involves paper-based data collection, where information is manually written in and later transferred to an electronic database by manual data entry. Although one of the most popular options (see Hickman, 2005) because it does not involve additional software / hardware costs, the UC research team does not recommend this type of data collection because of the significant weaknesses associated with it, including: 1) the timely nature of data collection by hand, 2) manpower / costs associated with transfer of data into electronic form, 3) manpower / costs associated with supervisory oversight and error correction, 4) the delay in transferring data from paper forms to electronic database, and 5) the high rate of errors due to inability to read handwriting, data entry errors, etc.

⁷ As is stipulated in the settlement agreement Section IV, Paragraph 2, "For five years from the effective date of the Agreement, DPS will not implement new traffic stop forms or amend such forms in a manner which causes any of the data described below to not be collected, unless the change in question has been consented to by the Plaintiff's representative." It is important to note, however, that permission may not be necessary as long as the same required information is still collected in the new format.

- Nearly eliminates all user associated errors system can be designed to not accept invalid or incomplete information
- Significant reduction in manpower associated with scanning and supervisory review
- Eliminates delay associated with transferring data from paper-based forms to electronic database
- Improved officer morale due to less tedious and less time-consuming method of data collection
- Weaknesses
 - Costly hardware and software are necessary
 - More difficult to train officers who are unfamiliar with computer applications
 - Increased workload for IT
 - All (or most) vehicles need a MDT; alternatively, officers must enter information into computer at end of shift

The UC research team has been directly involved with both types of data collection systems and is prepared to assist DPS in moving forward with either option. If fiscally feasible, however, the UC team strongly encourages DPS to consider implementing an electronic data capture system. In jurisdictions where multiple methods have been implemented, positive feedback has resulted from electronic data capture after officers learn the new system. As noted above, electronic data capture significantly reduces the error rates and the manpower associated with scanning and review. In addition, it provides immediate access to data for analyses.

Based on the results of Phase I of the data audit, the UC research team continued with the second phase of the audit, described below.

DATA AUDIT: PHASE 2

Description

Phase II assessed the missing data and logical inconsistencies within the electronic data for all traffic stops conducted by DPS officers from January 1, 2006 – December 31, 2006. This phase of the data audit was comprised of two analysis components. First, the percentage of missing information for each field of interest was determined. "Missing data" simply indicates that there was no information entered on the form by the officer (or that the information was entered by the officer, but was not properly recorded by the Scantron software). The result is data fields with no information available. Second, the percentage of invalid information was determined. "Invalid data" refers to collected information that contains logical inconsistencies (e.g., no search, but contraband seized; search conducted but no search target identified) or inaccurate information (e.g., badge numbers that do not correspond to known employees). These two components – missing data and invalid data – are combined to produce an overall error rate. One limitation of this data audit is the inability to separate the error rates recorded in Phase 1 from the error rates recorded in Phase 2. That is, the missing and invalid data rates reported below may or may not include the Scantron error rates calculated in Phase 1 of the data audit.

The results reported below are different from the original data audit delivered to DPS in August 2007. The previous audit was based on all stops reported (n=505,519). In contrast, this updated version of the data audit only includes: 1) officer-initiated traffic stops (i.e., nontraffic, pedestrian, crash, and motorist assists were eliminated), 2) only original cases (i.e., duplicate entries discovered using the primary document number were eliminated), and 3) only stops that resulted in outcomes other than voided citations (per DPS requests to remove). That is, this data audit only examines cases that were retained for statistical analyses (n=460,545). For details regarding the elimination of cases for analyses, see Section 3. Given the differences in the number and types of cases examined, the results of this portion of the data audit differ from the results initially reported in August 2007.

Results

Table 2.4 reports the missing data rates, invalid data rates, and the overall error rates for all fields of interest. Combining the missing and invalid rates, the overall error rate is calculated and reported for individual data fields, along with a combined total. Each of the fields are categorized into stop, driver, vehicle, and officer characteristics, and their individual missing, invalid and overall error rates are reported below.

The overall error rate (14.1%) calculated for Phase 2 of the data audit is based on all fields listed in the table. The primary contributors to this rate are: driver's zip code (5.7%), location of the stop (4.9%), badge number (1.5%) and vehicle license plate (1.3%). All the steps undertaken to create these fields are provided in footnotes at the bottom of the table. For each of these fields, there are some important patterns that develop that may assist in pinpointing the cause of these error rates:

- Location of Stop This field was created by combining the following fields: direction, highway, and milepost. The DPS codebook outlines the following rules that apply to these fields:
 - o If direction is identified, a highway and milepost must also be identified.
 - If the highway field contains an entry, the milepost field must also be completed.
 - If the milepost field contains an entry, the highway field must also be completed.

Based on these rules, the missing rate on location of the stop reflects the rate of missing information on direction. The missing rates for highway and milepost are included in the overall invalid rate for location of stop. The invalid rate on location of stop reflects any violation of the aforementioned rules. When analyzing the entries for highway, any "0" was considered an "off-highway" stop and considered valid for this analysis. In addition, when highway was identified as "off-highway," there was no requirement for milepost to be identified (this rule accounted for the noticeable decrease in the error rate for this variable in comparison to the previous data audit).

• Valid Search – This field was created based on the data available. If a search was indicated, the search authority, search target, and contraband seized fields must contain a valid entry. Any deviation from these criteria resulted in an "invalid

search." If the search performed field was missing, the case was considered invalid for this analysis.

- **Result of Contact** This field is not required according to DPS policy; however, it is recommended that this field be required in future data collection efforts. In this analysis, there was no missing information on this field subsequent analyses performed however (documented in Phase 3 of the data audit), demonstrated inconsistencies in this field not captured in the data audit reported in Tables 2.4.
- One other logical inconsistency was not created due to a lack of information at this time. In future analyses, however, DPS badge number and locator code could be compared to ensure that they match one another (i.e., the correct locator code is entered for the badge number entered).

	% Missing	% Invalid	% Error Rate
<u>Valid Forms (N = 460,545)</u>			14.1 ⁹
Stop Characteristics			
Document Type	0.0	0.0	0.0
Date of Contact	0.0	0.0	0.0
Time of Contact	0.0	0.0	0.0
Duration of Stop	0.1	0.0	0.1
Location of Stop	3.6	1.3	4.9
Type of Contact	0.0	0.0	0.0
Reason for the Contact	0.0	0.0	0.0
Result of Contact	0.0	0.0	0.0
Search Performed	0.1	0.0	0.1
Search Refused	0.1	0.0	0.1
Valid Search		0.5	0.5
Driver Characteristics			
Date of Birth	0.1	0.5	0.6
Gender	0.1	0.0	0.1
Race	0.1	0.0	0.1
UDA	0.1	0.0	0.1
Zip Code	0.1	5.6	5.7
Vehicle Characteristics			
State of Vehicle Plate	1.1	0.2	1.3
Vehicle Type	0.4	0.5	0.9
Officer Characteristics			
Badge	0.0	1.5	1.5
Locator Code	0.0	0.8	0.8

 Table 2.4: Analysis of Missing Data and Logical Inconsistencies from all 2006 Officer-Initiated Traffic

 Stops⁸

Recommendations

The importance of calculating an overall data error rate (i.e., missing and logical inconsistencies) cannot be overstated. The Police Executive Research Forum recommends less than a 10% error rate for traffic stop data (Fridell, 2004). Our research team recommends a more stringent standard of under 5%, with a goal of 2% missing/incorrect data. This analysis produced an error rate of 14.1% based on the fields listed in Table 2.4, indicating that steps need to be instituted to reduce the overall error rate. Additional analyses examining the citation and warning violation data uncovered large discrepancies between violation data and traffic stop data (see Phase III for details). These errors are not

⁸ All of the fields analyzed in this data audit were assessed based on a codebook provided by the DPS. If information was entered on the traffic stop form that did not match the codebook, it would appear as invalid and contributed to the overall error rate.

⁹ This error rate is smaller than the total of all individual fields due to the possibility that one form could have more than one error. In such a situation, those errors will be reflected in the individual fields, but only counted once in the overall error rate.

included in the data audit results reported above. One likely source of these errors is the mixing of required and non-required fields in the data audit. A second (and highly likely) possibility is that DPS officers have not been consistently trained across the agency regarding data collection, data entry, coding rules, etc. No DPS personnel contacted by the UC research team could confirm that officers across the department had been trained on the use of the data collection forms.

First, it is strongly recommended that DPS fully train every officer and supervisor responsible for collecting traffic stop data on the use of the form.

Second, it is recommended that DPS implement a supervisory oversight and feedback mechanism to reduce data collection errors. As originally described in the UC research team's proposal (Engel, 2006), this process involves scrutiny of all data generated during police-citizen encounters, and implementing an associated feedback system (i.e., frequent, detailed reports) to highlight the sources of these errors and produce greater accountability for the data submitted. Specifically, DPS administrators would be provided with monthly reports for the duration of the research project that document by organizational levels of interest (e.g., bureau, district/shift, squad):

- The number of stops reported
- The percentage of forms rejected by the scanner (if using current imaging system or basic Scantron)
- The percentage of forms with missing data and/or errors of logical inconsistencies.¹⁰

Furthermore, specific data items can be singled out for missing or invalid data analysis. Examples could include items that might be more likely to reflect officers' noncompliance or sabotage of the data collection effort (e.g., race, employee identification number), or data items that have been a high source of errors or invalid data in the past.

The UC research team's past experience with other departments has demonstrated training, supervisory oversight, and timely feedback are the most effective approaches to reducing error rates and, thereby, enhancing the reliability and validity of the data (see Engel et al., 2004, 2005; Engel, Frank, Tillyer, & Klahm, 2006). Specifically, the information provided through this training, feedback and oversight process will allow DPS to address and correct data collection problems, and in so doing enhance compliance with data collection, without directly identifying individual officers. The UC research team recommends that supervisors be held accountable for their subordinates' data collection and should review data collection forms for accuracy and completeness. Finally, it is also recommended that the DPS administration reiterate its commitment to the data collection effort. It is crucial that patrol officers and supervisors understand the importance of collecting data completely and accurately.

¹⁰ These monthly data reports are contingent upon DPS's ability to provide data on a rolling basis to the UC research team.

DATA AUDIT: PHASE 3

Description

Phase III examines the data accuracy by comparing the content of the electronic data to other independent sources of information. Specifically, this phase of the data audit addresses two questions. First, are all stops recorded in external sources of information represented in the electronic data? That is, this component of the third phase ascertains the extent to which officers are completing data collection forms for all targeted stops. Second, do specific items (e.g., race of driver) in the electronic data match external sources of data? That is, this component assesses the extent to which officers are completing forms accurately. Only the first component of the third phase of the data audit has been performed to date. The methods and results are discussed below. A description of how the final component of the third phase will be conducted follows that discussion.

To determine whether information is being recorded for all eligible traffic stops, an external data source that records the same stops is necessary. Common second sources of data include: computer aided dispatch (CAD) data, citation data, written warning data, videotapes, or other departmental data (Fridell, 2004). DPS records its traffic stop data directly on the citation/warning/repair order forms, so these data sources were not usable for comparison purposes. Discussions with DPS personnel determined that the most appropriate comparison data for comparison purposes were officers' activity logs. The reporting standards are the same for the activity logs as for the stop form data collection. This data set was provided to the UC research team and the aggregate totals of stops in the DPS activity logs and electronic data set were compared. In order to ensure the greatest degree of comparability between the two data sets, 8,089 records were removed from the 505,519 total documents in the electronic data set (stop records resulting in only a voided citation and stop records with more than one completed document) as they would not be reflected in the activity logs.

Results

Table 2.5 compares at the Highway Patrol Division and district/shift level the raw number of traffic stops included in DPS activity logs with the raw number of traffic stops included in the electronic data set. The final column of the table indicates the percent of stops that correspond in both data sets. The "percent error" represents the percentage of traffic stops that do not match across the two data sources. Positive error rates indicate the percent of stops that appear in the electronic stop data but not on the activity logs. Negative error rates indicate the percent of stops that appear in the activity logs but not in the electronic stop data

The results are displayed in Table 2.5. In 13 of the 19 districts, there were greater numbers of stops in the activity logs compared to the electronic data set, while in the other 6 districts, there were greater numbers of stops in the electronic data set compared to the activity logs. As noted above, the DPS data collection is somewhat different from typical traffic stop data collection efforts where the traffic stop data are typically collected separately from the other documentation of the stop (i.e., citation, warning, etc.). The results of this phase of the data audit indicate that inclusion of information about the stop on the actual citation/warning

forms increases the likelihood that such data will be collected. The Police Executive Research Forum (Fridell, 2004, 54) suggests that "correspondence of 90 percent or more between the two sources of information is quite acceptable." Using this standard, the results of this audit are positive. All of the districts, with the exception of District 15, fall within the parameter of 10% error in either dataset.

Table 2.3. Comparison of Number of Stops in	Total Number of	of Police-Citizen	
	Interactio	ons (2006)	
	In DPS	In Electronic	Percent
	Activity Logs	Data Set	Error
Highway Patrol Division	494,537	492,486	-0.4%
Northern Bureau			
District 1—Kingman	28,703	29,058	1.2%
District 2—Flagstaff	28,005	27,973	-0.1%
District 3—Holbrook	55,416	54,885	-1.0%
District 11—Globe	25,351	25,100	-1.0%
District 12—Prescott	33,611	33,181	-1.3%
Metro West Bureau			
MW Shift 1	25,199	26,189	3.9%
MW Shift 2	28,658	28,945	1.0%
MW Shift 3	15,560	15,289	-1.7%
Southern Bureau			
District 4—Yuma	39,091	38,412	-1.7%
District 6—Casa Grande	36,945	36,408	-1.5%
District 8—Tucson	40,968	40,857	-0.3%
District 9—Sierra Vista	31,879	31,334	-1.7%
Commercial Vehicle Enforcement Bureau			
District 15	6,107	6,911	13.2%
District 16	19,848	19,894	0.2%
Metro East Bureau			
ME Shift 1	14,452	14,394	-0.4%
ME Shift 2	26,295	25,715	-2.2%
ME Shift 3	14,322	14,403	0.6%
District 7—Metro Motorcycles	17,111	16,577	-3.1%
Canine	7,016	6,961	-0.8%

Table 2.5: Com	parison o	f Number	of Stops	in Activit	ty Logs	and	Electron	ic Data Set	;
								C1	

In addition to the availability of the activity log data, additional comparison data are available for contacts in which a citation or warning was issued. In traffic stops where a citation or warning was recorded, an additional data file documenting the specific number and types of warnings and citations issued was provided to the UC research team. One way to further examine the traffic stop data is to compare the two data sets (i.e., stop data and violation details for the stop data) for internal consistency. Unfortunately, these comparisons suggested multiple errors in one or both data sources. These inconsistencies are documented below for traffic stops that resulted in citations and warnings:

- <u>Citations</u>
 - 2,967 citations that were reported in the <u>violation</u> data file did not have "citation" indicated as an outcome in the original stop data file.
 - In contrast, 5,684 citations that were reported in the original stop data file have no corresponding citation information in the <u>violation</u> data.
- <u>Warnings</u>
 - 3,727 warnings that were reported in the <u>violation</u> data file did not have "warning" indicated as an outcome in the original stop data file.
 - In contrast, 8,109 warnings that were reported in the original stop data file have no corresponding warning information in the <u>violation</u> data.

The research team proceeded with data analysis based on the assumption that if a citation or warning appears in either data set, it should be treated as a valid outcome. That is, even if the stop data – used as the basis for this report – indicated that a citation or warning was not issued, but information from the violation data indicated that one (or more) citations or warnings were issued for the stop, the stop outcome was changed in the stop data file by the research team. This resulted in changing 2,967 traffic stops that originally indicated no citation was issued, to indicate that at least one citation was issued. In addition, 3,727 stops that indicated no warning was issued were altered to indicate that at least one warning was issued.

The second data problem identified above is more problematic – that is, citations and warnings in the original stop data that did not have corresponding violation information in the violation data file. After consultation with DPS officials, it was decided to retain the original information as presented in the stop data file. These discrepancies in the data indicate that the DPS data collection and analysis study needs to focus on improving data accuracy to ensure that recommendations regarding policy and training changes are made based on the highest quality data possible.

The final component of Phase III of the data audit, to be completed at a later date, involves a comparison of specific data collection items to check for misstatements of facts. As Fridell (2004) notes, sometimes data inaccuracies may reflect officers' deliberate misstatements of facts, rather than unintentional errors. Officers may intentionally distort data based on various motivations. To attempt to identify these types of inaccuracies, data collection elements should be examined that officers believe could reflect negatively upon them (e.g., race of driver, length of stop, etc.). Following that, an independent source of information should be identified to confirm the officer-recorded data. Common data sources include Department of Motor Vehicle records, video recordings of stops, and citizen self-reported information (i.e., mail or telephone follow-up surveys).

As described in the UC research team's research proposal, an additional methodological component of the Traffic Stop Data Analysis Study to be completed in Year 2 is a survey of violators previously contacted by DPS troopers. The self-reported race/ethnicity of those violators contacted will be compared to officers' recordings of violators' race/ethnicity. This

comparison will provide additional verification regarding the reliability of the data collected by DPS troopers. These comparisons will not be available until Year 2 of the study. The primary weakness of this approach is that officers record the race of drivers based on their perceptions. Officers perceptions of race and citizens' self-reporting of race may legitimately differ. That is, officer perceptions may be incorrect without intentional falsification of the reports. There is no bright-line of how much discrepancy between officer perceptions and citizen's self-reported information is legitimate. Nevertheless, the audit can compare discrepancies across officers to identify potential outliers.

Recommendations

Based on the results of the comparisons of electronic stop data and activity logs, it appears that officers are generally recording information on the traffic stop forms when required. Depending on the nature of modifications to the data collection system, the UC research team recommends continuing this component of data auditing with routine cross-checks of electronic data and DPS activity logs.

The discrepancies in the data discovered through Phase III of the data audit reiterate the need for department-wide training on the data collection form, as noted in the recommendations for Phase II. Specifically, the DPS data collection effort needs to focus immediate attention on implementing training for every officer and supervisor responsible for collecting traffic stop data on the proper use of the data collection forms. Improving data accuracy will ensure that recommendations regarding policy and training changes are made based on the highest quality data possible.

It is also recommended that the final component of Phase III be implemented in the second year, as scheduled, by including questions on the citizen survey designed to assess the accuracy of specific officer-reported data items.

3. DESCRIPTION OF TRAFFIC STOP DATA

OVERVIEW

Section 3 describes the findings based on traffic stop data collected by DPS officers for the period of January 1, 2006 through December 31, 2006. This section is divided into three parts that report: 1) missing or invalid data for the traffic stops, 2) characteristics of traffic stops conducted in 2006, and 3) characteristics of vehicles and drivers stopped by DPS officers in 2006. The information reported is strictly descriptive in nature. This summary does not include analyses that examine causal influences, and any data presented at aggregate levels are solely for purposes of comparison across DPS organizational units.

The first section provides a summary in Table 3.1 of the percentages of missing or invalid data for each of the variables included in later analyses. The second section includes Tables 3.2 - 3.4, which report the characteristics of traffic stops for 2006 across the department, division, bureau, and district/shift levels. Table 3.2 reports the total number of stops, the percentage of stops by weekday and daytime hours, and the duration of the stop. Table 3.3 provides a monthly breakdown of traffic stops across the department, division, bureau, and district/shift levels in 2006. Table 3.4 reports the reasons for the stop across the department, division, bureau, and district/shift levels. The third section includes Tables 3.5 - 3.7, which report the characteristics of vehicles (the percentage of Arizona-registered vehicles and vehicle type) and drivers (e.g., age, gender, race/ethnicity, undocumented alien status, and residency) stopped by DPS officers in 2006 across the department, division, bureau, district/shift, and county levels.

DATA

Based on the data available, Arizona Department of Public Safety (DPS) officers completed 505,519 documents regarding their contacts with citizens during 2006. To properly examine issues surrounding racial/ethnic disparities, only officer-initiated traffic stops should be considered. Further, DPS collects traffic stop data on both citation and warning documents. It is imperative that only one source of information be used for each stop, so as not to duplicate stop information (i.e., one stop is entered multiple times into the data set). Therefore, the following numbers of traffic stops have been excluded from further analyses for the reasons noted:

- 12,830 non-driver or non-traffic enforcement contacts were removed
- 1,480 contacts with missing data on the type of contact were removed
- 25,549 citizen-initiated stops (specifically, 23,065 collisions and 2,484 motorist assists) were removed
- 6,901 contacts that had secondary documents issued containing duplicate information were removed¹¹

¹¹ If a primary document number was indicated on the form, the contact corresponds to another contact (and therefore results in multiple entries for the same traffic stop). In some cases, the primary document number did not match another valid document number in the data set. In other cases, the primary document number matched multiple documents numbers. There are clearly errors associated with this item on the data collection

• 1,188 contacts that listed the only outcome as voided citation were removed

Therefore, the analyses in this report are based on 460,545 officer-initiated traffic stops of drivers conducted during 2006.¹²

Of the 460,545 officer-initiated traffic stops, Table 3.1 documents the missing data percentages for the variables used in analyses. The first column lists the variables, followed by the percent of missing or invalid data, and the remaining valid number of cases.

	%	# Valid
	Missing/Invalid	Cases
Valid Traffic Stops		460,545
Stop Characteristics		
Organizational Unit (division, bureau)	0.34	459,003
Organizational Unit (district/shift)	0.62	457,693
Date of Contact (month, weekday)	0.00	460,545
Time of Contact (daytime)	0.00	460,545
Location of Contact (county)	9.42	417,172
Duration of Stop	0.01	460,518
Reason for the Contact	0.00	460,545
Result of Contact/Stop Outcome (warning, repair order, citation, arrest, search)	0.00	460,545
Vehicle Characteristics		
State of Vehicle Registration	1.28	454,638
Vehicle Type	0.91	456,370
Citizen Characteristics		
Age	0.38	458,814
Gender	0.01	460,505
Race	0.00	460,530
Zip Code (Arizona state residency, county residency)	0.00	460,527

Table 3.1: Analysis of Missing Data from all 2006 Traffic Stops

As demonstrated in Table 3.1 above, the variable with the highest percentage of missing/invalid data is location of stop (9.42%), followed by state of vehicle registration (1.28%). The remaining variables to be used in analyses have less than 1.0% cases with

form. Therefore, when making adjustments to correct for these errors, the UC team decided to eliminate all cases with primary document numbers under the assumption that they were double entries into the data set. Statistical analyses were initially performed with these cases included – the results with the cases excluded do not significantly differ from those when the cases were included. The results reported within this report are based on statistical analyses with these cases excluded.

¹² The reasons for not including cases are not mutually exclusive; therefore, the total number of cases excluded is less than the total of cases eliminated for the various reasons.

missing or invalid data. Percentages provided in Tables 3.2 - 3.7 (and in later sections) are based on data from the number of valid cases only.¹³

TRAFFIC STOP CHARACTERISTICS

Traffic Stop Descriptives

Table 3.2 documents specific information regarding traffic stops at the department, division, bureau, and district/shift levels, including: total number of stops, percent of stops occurring on weekdays, and during daytime hours, as well as the duration of the stops.

As shown in Table 3.2, stops by Highway Patrol Division officers accounted for the overwhelming majority of all DPS stops (99.5%). Within the Highway Patrol Division, the Northern Bureau and Southern Bureau conducted approximately two-thirds of all 460,545 stops. At the district/shift level, District 3 (Holbrook) performed the largest number of stops (52,405), while District 15 had the fewest stops (6,510).

The majority of the 460,545 stops for the department were initiated on a weekday (73.8%) and occurred during the daytime (65.8%). The overwhelming majority of stops lasted between zero and twenty minutes (0-10 minutes 21.1%; 11-20 minutes 64.5%). These trends are fairly consistent across divisions, bureaus, and districts/shifts. For each of the categories, the variation at the district/shift level is, as expected, most pronounced. Please refer to Table 3.2 for specific variation at these organizational levels.¹⁴

¹³ In an effort to utilize as much information as possible for statistical analyses, a number of assumptions regarding these data have been made. Specifically, for 25,951 cases (5.6%) that indicated a zero for citizen zip code, these were assumed to not be Arizona residents. Therefore, these cases are included and coded as non-Arizona residents. Furthermore, for 185 cases (0.8%) that did not indicate that a search was conducted, but a search target and search authority were listed, an assumption was made that a search was conducted. Likewise, of the 21,218 searches, 154 (0.7%) did not indicate any type of seizure (including "none"); an assumption was made by the research team that these missing cases indicated no seizures. These cases remain in the analyses. Therefore, while the data audit demonstrated larger percentages of missing data, these assumptions regarding the likely source of the errors and their subsequent correction allow the cases to be included in the analyses.

¹⁴ Please note that, beginning in Table 3.2 and continuing throughout the report, the Central and South Canine squads are collectively considered based on discussions with DPS officials, who indicated that these units often work in similar geographic areas but are significantly distinct from the area patrolled by the North squad.

		,	, , , , , , , , , , , , , , , , , , , ,		D	uration of St	op (in Minut	es)	
	Total # of Stops	% Weekday	% Daytime	% 0-10	% 11-20	% 21-30	% 31-45	% 46-60	% 60+
DPS Statewide	460,545	73.8	65.8	21.1	64.5	6.9	2.6	1.8	3.1
Criminal Investigations Division	935	72.2	57.4	23.8	61.8	9.0	2.6	0.9	2.0
Highway Patrol Division	458,068	73.7	65.8	21.1	64.5	6.9	2.6	1.8	3.1
Northern Bureau	162,250	70.0	72.0	30.4	63.4	3.0	1.0	0.6	1.6
D1-Kingman	27,596	72.6	69.6	15.9	76.5	3.1	1.0	0.7	2.5
D2-Flagstaff	26,264	71.1	69.8	37.4	55.8	3.5	0.9	0.6	1.8
D3-Holbrook	52,405	70.2	77.0	30.7	64.0	2.4	0.8	0.5	1.6
D11-Globe	24,081	66.1	70.8	52.1	42.2	3.1	0.9	0.5	1.3
D12-Prescott	31,583	69.2	68.5	20.2	73.4	3.2	1.6	0.6	1.0
Metro West Bureau	61,175	77.7	50.3	7.7	73.2	12.8	2.3	0.9	3.0
Shift #1	21,951	78.6	84.1	7.2	80.3	8.8	1.4	0.7	1.5
Shift #2	24,661	79.3	47.2	9.4	70.0	13.5	3.1	1.1	2.9
Shift #3	14,014	73.4	2.8	5.1	67.9	18.2	2.1	1.0	5.7
Southern Bureau	140,045	69.8	64.3	23.6	67.6	4.9	1.3	0.8	1.9
D4-Yuma	37,080	67.9	68.0	18.1	71.2	6.2	1.5	0.7	1.8
D6-Casa Grande	34,705	68.9	63.7	24.1	67.9	4.8	1.0	0.6	1.5
D8-Tucson	37,784	72.1	59.8	20.1	70.2	4.5	1.4	1.2	2.6
D9-Sierra Vista	30,011	70.3	66.2	34.1	58.8	4.1	1.0	0.5	1.5
Commercial Vehicle Bureau	26,088	89.8	91.4	2.2	9.5	28.1	23.4	19.5	17.3
District 15	6,510	86.7	95.3	0.6	10.9	16.5	21.9	20.4	29.9
District 16	19,432	91.0	90.1	2.6	8.9	32.1	24.1	19.3	13.1
Metro East Bureau	67,957	81.1	58.3	13.0	74.2	6.8	1.4	0.9	3.6
Shift #1	11,344	84.8	89.1	10.4	78.6	6.6	1.5	0.7	2.2
Shift #2	22,127	77.8	51.7	8.4	78.4	7.2	1.4	1.0	3.6
Shift #3	13,382	65.8	3.6	4.8	74.4	11.9	1.7	1.1	6.1
Metro Motors	14,218	96.0	82.1	18.1	76.2	2.4	0.5	0.4	2.3
Canine	6,886	85.1	86.4	37.9	49.4	5.4	2.4	1.6	3.3
Canine North	2,041	86.0	92.2	48.5	39.9	3.1	2.3	1.8	4.5
Canine Central & South	4,827	84.7	83.9	33.4	53.4	6.3	2.4	1.6	2.8

Table 3.2: 2006 Traffic Stop Characteristics – Statewide, Division, Bureaus, & Districts/Shifts

Traffic Stops By Month

Table 3.3 provides the temporal breakdown of traffic stop occurrences by month for 2006. At the department level, January accounted for the highest percentage of stops (9.5%), followed by May (9.1%), September (8.8%), and December (8.8%). The lowest percentage of traffic stops at the department level occurred in June (7.2%). Overall, however, stop activity at the department level is fairly consistent across months, with a difference of only 2.3% between the busiest and slowest months. Table 3.3 also documents the slight variation in temporal trends at the division, bureau, and district/shift levels.

	%	%	%	%	%	%	%	%	%	%	%	%
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DPS Statewide	9.5	8.5	7.8	7.4	9.1	7.2	8.2	8.2	8.8	7.9	8.5	8.8
Crim. Invest. Division	4.7	7.9	7.9	8.9	5.6	8.8	7.5	9.8	7.9	5.9	12.7	8.8
Highway Patrol Division	9.5	8.5	7.8	7.4	9.1	7.2	8.2	8.2	8.9	7.9	8.4	8.8
Northern Bureau	10.2	9.1	7.4	8.2	9.2	6.7	8.0	8.0	8.5	7.5	8.4	8.7
D1-Kingman	9.4	8.7	7.1	8.6	8.3	6.4	7.6	7.8	9.4	8.5	9.2	8.9
D2-Flagstaff	10.9	9.7	7.3	8.3	10.3	5.9	8.0	7.7	7.4	6.6	9.2	8.7
D3-Holbrook	9.9	9.5	7.3	8.2	9.8	7.6	7.9	8.4	8.1	6.8	7.5	9.1
D11-Globe	10.6	8.2	7.4	7.3	8.9	6.8	9.0	7.6	9.4	8.0	8.7	8.1
D12-Prescott	10.4	9.2	8.0	8.4	8.6	5.8	7.8	8.2	8.6	8.1	8.2	8.7
Metro West Bureau	9.5	8.8	8.8	7.0	8.8	7.2	7.9	7.3	9.5	8.2	8.1	8.9
Shift #1	9.2	8.8	8.4	7.2	9.5	7.2	7.7	7.7	8.8	7.6	8.8	9.1
Shift #2	9.6	9.2	8.6	5.9	8.5	6.7	7.8	6.9	10.7	9.2	7.7	9.1
Shift #3	10.0	8.4	9.7	8.7	8.2	8.0	8.2	7.3	8.4	7.4	7.5	8.3
Southern Bureau	9.4	8.0	8.0	7.2	9.0	7.0	8.5	8.6	8.9	8.0	8.7	8.6
D4-Yuma	9.0	7.1	7.7	6.9	10.3	7.1	8.0	9.2	9.2	8.0	8.5	9.1
D6-Casa Grande	8.8	8.6	6.8	5.9	6.9	7.5	9.4	8.3	9.6	9.0	9.8	9.3
D8-Tucson	11.1	7.9	9.1	7.7	9.8	6.9	7.9	7.9	8.2	7.6	8.1	7.7
D9-Sierra Vista	8.5	8.7	8.4	8.2	8.9	6.7	8.9	9.0	8.4	7.5	8.4	8.5
Commercial Vehicle Bureau	9.2	8.9	8.4	7.3	10.0	7.9	8.1	9.9	6.8	8.5	7.8	7.2
District 15	7.9	7.0	6.8	7.7	8.5	7.5	8.6	13.2	7.7	9.9	8.0	7.3
District 16	9.6	9.6	8.9	7.2	10.5	8.0	8.0	8.8	6.5	8.0	7.7	7.2
Metro East Bureau	8.6	7.8	7.2	6.3	8.7	8.4	8.3	8.3	9.9	8.2	8.4	9.8
Shift #1	11.1	9.0	7.4	7.2	9.3	6.9	7.3	8.3	7.9	9.0	8.5	8.2
Shift #2	8.1	7.1	6.5	6.1	8.5	8.9	8.4	7.5	11.9	8.5	8.3	10.3
Shift #3	8.0	7.1	7.4	5.4	7.8	7.0	8.6	8.6	9.2	9.0	9.3	12.4
Metro Motors	9.2	9.5	7.9	5.9	10.6	9.6	7.9	8.4	9.6	6.2	6.9	8.4
Canine	6.1	6.0	7.1	8.4	6.7	9.9	9.9	9.9	8.9	9.0	10.0	8.2
Canine North	7.3	3.4	4.0	6.6	4.8	12.8	13.8	12.1	7.0	10.8	9.6	7.9
Canine Central & South	5.6	7.1	8.4	9.1	7.5	8.6	8.3	8.9	9.7	8.3	10.1	8.3

Table 3.3: 2006 Traffic Stops by Month - Statewide, Divisions, Bureaus, & Districts/Shifts

Reason for the Stop

Table 3.4 reports the reasons for the stops by DPS officers, including: 1) moving violations, 2) non-moving violations, 3) equipment violations, 4) investigatory stops, 5) preexisting information, and 6) criminal offenses. Information for these categories is summarized at the department, division, bureau, and district/shift levels. Across the department in 2006, the most frequent reason for the stop was a moving violation (68.0%), followed distantly by equipment violations (18.5%), and non-moving violations (11.4%).

Greater variation in the reasons for stops is evident at the bureau level. For all bureaus except the Commercial Vehicle Enforcement Bureau, moving violations are the most common reason for the stop. In the Commercial Vehicle Bureau, equipment violations are the most frequent reason for the stop (56.0%); officers in this bureau also record the highest percentage of stops for investigatory purposes (12.0%) across bureaus. In the Metro West and Metro East Bureaus, the second most common reason for the stop is non-moving violations, rather than equipment violations, which ranked third in these bureaus.

The districts/shifts also exhibit variation in reasons for stops. For example, the range of stops for moving violations at the district level varied from a high of 85.5% (District 3) to a low of 17.9% (District 16). Note, however, that of the 19 districts/shifts, 17 reported moving violations as the reason for the stop for over 50% of drivers stopped. Districts/shifts also varied considerably in the other reasons for stops. For a complete description of the various categories of reasons for the stop at the lower organizational levels, please refer to Table 3.4.

	%	<u>%</u>	%	%	%	%
	Moving	Non-Moving	Equipment	Investigation	Preexisting Info	Criminal Offense
DPS Statewide	68.0	11.4	18.5	1.2	0.3	0.6
Criminal Investigations Division	67.1	13.9	17.0	1.1	0.1	0.9
Highway Patrol Division	68.0	11.3	18.6	1.2	0.3	0.6
Northern Bureau	81.3	3.7	13.5	0.4	0.3	0.7
D1-Kingman	76.0	4.9	17.9	0.6	0.3	0.2
D2-Flagstaff	78.9	3.9	16.2	0.5	0.4	0.1
D3-Holbrook	85.5	2.8	10.4	0.3	0.2	0.8
D11-Globe	80.4	3.5	13.3	0.5	0.6	1.8
D12-Prescott	81.7	4.0	12.9	0.5	0.1	0.8
Metro West	58.0	22.7	18.1	0.5	0.2	0.6
Shift #1	64.5	21.2	13.0	0.4	0.2	0.7
Shift #2	53.9	23.6	21.3	0.7	0.1	0.4
Shift #3	54.7	23.7	20.2	0.4	0.2	0.7
Southern Bureau	67.1	10.8	20.7	0.6	0.4	0.3
D4-Yuma	67.6	7.4	24.0	0.3	0.4	0.2
D6-Casa Grande	65.4	9.3	23.8	0.7	0.2	0.6
D8-Tucson	60.7	21.0	17.2	0.5	0.4	0.2
D9-Sierra Vista	76.6	3.8	17.4	1.2	0.8	0.2
Commercial Vehicle	20.3	10.8	56.0	12.0	0.7	0.1
District 15	26.7	9.4	37.3	24.2	2.0	0.4
District 16	17.9	11.3	62.5	8.0	0.2	0.1
Metro East	64.8	20.8	12.3	0.6	0.1	1.4
Shift #1	64.6	26.5	7.8	0.3	0.1	0.7
Shift #2	59.9	26.8	11.1	1.0	0.0	1.1
Shift #3	60.3	18.1	20.1	0.6	0.1	0.8
Metro Motors	74.6	13.9	7.7	0.1	0.0	3.6
Canine	69.5	11.7	18.2	0.3	0.1	0.1
Canine North	87.8	4.2	7.4	0.5	0.1	0.0
Canine Central & South	61.9	14.9	22.7	0.3	0.1	0.1

Table 3.4: Reasons for the 2006 Traffic Stops – Statewide, Division, Bureaus, & Districts/Shifts

VEHICLE AND DRIVER CHARACTERISTICS

Tables 3.5 - 3.7 report the characteristics of vehicles and drivers stopped by DPS officers during 2006. The characteristics of the vehicle are reported at the department, division, bureau, and district/shift levels in Table 3.5 and include the percent of Arizona registered vehicles and vehicle type. The characteristics of the drivers are grouped as: 1) drivers' age and gender, 2) drivers' race/ ethnicity, and 3) drivers' residency. These characteristics are described at the department, division, bureau, and district/shift levels in Table 3.6 and at the county level in Table 3.7.

Vehicle Characteristics

Table 3.5 reports the characteristics of vehicles involved in DPS traffic stops in 2006, including the percent of Arizona registered vehicles and vehicle type (e.g., car, convertible, motorcycle, van or station wagon, SUV, pickup truck, truck or tractor trailer, and other). Each of these categories is reported at the department, division, bureau, and district/shift levels.

Vehicle Registration

At the department level, the majority of vehicles stopped (74.0%) were registered in the state of Arizona. The percent of Arizona-registered vehicles, however, varied considerably by bureau and district/shift. For example, at the bureau level, the percentage of Arizona-registered vehicles ranged from a high of 87.8% (Metro East Bureau) to a low of 40.8% (Commercial Vehicle Bureau). Similar variation existed at the district/shift level, with a range from 93.1% (Metro East Shift #2) to 33.8% (District 15) of Arizona-registered vehicles. Canine officers, particularly in the North, also stopped a majority of vehicles registered outside of Arizona.

Vehicle Type

The most common vehicle types stopped at the department level were: cars (48.5%), followed by pickup trucks (23.2%), vans/station wagons (9.7%), SUVs (9.3%), and trucks/tractor trailers (7.6%). With the exception of the Commercial Vehicle Enforcement Bureau, these percentages are fairly similar at the bureau and district/shift level. Due to the nature of their assignment, Commercial Vehicle Enforcement Bureau officers stopped a much larger percentage of trucks and/or tractor trailers (89.4%) in comparison to officers in other bureaus.

		•	,		Vehicle	е Туре			
	% Arizona Registration	% Car	% Convertible	% Motorcycle	%Van or Station Wagon	% SUV	% Pickup Truck	% Truck or Tractor Trailer	% Other
DPS Statewide	74.0	48.5	0.4	0.9	9.7	9.3	23.2	7.6	0.4
Criminal Investigations Division	67.8	50.3	0.3	3.9	11.3	6.4	21.5	4.3	1.7
Highway Patrol Division	74.0	48.5	0.4	0.9	9.7	9.3	23.2	7.6	0.4
Northern Bureau	65.9	46.5	0.3	0.8	10.8	12.2	25.7	3.3	0.3
D1-Kingman	51.6	45.6	0.4	1.2	9.2	14.5	24.9	3.6	0.5
D2-Flagstaff	55.7	48.9	0.4	0.3	13.9	13.0	20.3	2.8	0.5
D3-Holbrook	63.5	44.4	0.1	0.4	10.4	13.5	28.0	3.0	0.2
D11-Globe	88.4	43.4	0.3	1.4	12.0	8.1	31.5	2.9	0.4
D12-Prescott	73.3	51.3	0.6	1.0	9.4	10.3	22.9	4.3	0.3
Metro West Bureau	85.1	57.9	0.4	1.5	8.6	6.5	22.7	2.0	0.4
Shift #1	84.1	53.8	0.4	1.6	8.9	8.2	24.4	2.3	0.4
Shift #2	83.1	56.5	0.5	1.7	8.8	6.8	23.2	2.3	0.4
Shift #3	90.7	67.0	0.4	0.9	8.1	3.2	19.2	1.0	0.2
Southern Bureau	78.1	48.7	0.4	0.6	10.9	10.5	25.7	2.8	0.3
D4-Yuma	64.6	47.1	0.5	0.4	11.2	14.0	24.2	2.1	0.4
D6-Casa Grande	87.3	47.8	0.4	0.8	10.3	10.1	27.5	2.8	0.3
D8-Tucson	85.4	53.5	0.4	0.6	10.2	8.2	24.0	2.7	0.3
D9-Sierra Vista	75.3	45.4	0.3	0.8	12.1	9.7	27.8	3.6	0.3
Commercial Vehicle Bureau	40.8	4.5	0.0	0.2	1.4	0.7	2.7	89.4	1.0
District 15	33.8	6.4	0.1	0.3	1.4	1.3	3.3	85.9	1.3
District 16	43.1	3.8	0.0	0.1	1.4	0.5	2.5	90.9	0.9
Metro East Bureau	87.8	61.4	0.5	1.6	8.5	5.7	20.3	1.6	0.4
Shift #1	91.3	58.5	0.6	1.7	9.2	5.2	22.9	1.4	0.4
Shift #2	93.1	64.1	0.6	1.1	8.2	4.8	20.5	0.4	0.3
Shift #3	92.1	67.4	0.4	1.2	7.5	3.1	19.4	0.7	0.3
Metro Motors	92.4	57.6	0.5	3.4	8.2	7.4	21.6	1.1	0.3
Canine	46.3	53.3	0.1	0.1	11.2	11.1	14.9	8.3	0.9
Canine North	10.0	56.2	0.0	0.1	10.6	15.6	8.9	7.5	0.9
Canine Central & South	61.7	52.0	0.1	0.1	11.5	9.2	17.4	8.6	1.0

Table 3.5: 2006 Vehicle Characteristics of 2006 Traffic Stops – Statewide, Divisions, Bureaus, & Districts/Shifts

Driver Characteristics

Tables 3.6 - 3.7 report the characteristics of drivers stopped by DPS officers in 2006, including their average age, percent male, percent racial/ethnic groups (e.g., Caucasian, Black, Hispanic, Native American, Asian, Middle Eastern, and other), percent undocumented alien, percent motorists that reside in Arizona, and percent of motorists stopped in the county in which they reside. Table 3.6 reports this information at the department, division, bureau, and district/shift levels, while Table 3.7 presents these percentages for each of the 15 counties in Arizona.

Drivers' Age & Gender

The average age of drivers and the percent of drivers who were male are reported at the department, division, bureau, and district/shift level in Table 3.6 and at the county level in Table 3.7. At the department level, the average age of drivers stopped was 37.6 years, which is similar to the individual averages at the bureau, and district/shift levels (see Table 3.6). Of note, the average age of drivers stopped by the Commercial Vehicle Enforcement Bureau (42.8 years) is older compared to other bureau averages; whereas drivers stopped in the Metro West and East Bureaus tended to be somewhat younger (34.9 and 33.8 years, respectively) compared to the department and other bureau averages. The average age of stopped drivers also varied by county (see Table 3.7), with a high of 42.5 years in Gila County, and a low of 34.7 years in Maricopa County. These age differences are likely based on traffic patterns and DPS assignments.

Also shown in Table 3.6, across the department, 71.9% of the stopped drivers were male; likewise, males were more likely than females to be stopped at all levels within the department, particularly within the Commercial Vehicle Enforcement Bureau. The percent male also varied at the county level (see Table 3.7), from a high of 76.8% of drivers stopped in Mohave County to a low of 67.4% of drivers stopped in Graham County.

Drivers' Race & Ethnicity

In addition to age and gender, DPS officers also recorded the racial/ethnic background of drivers. Officers visually determined the racial and ethnic composition of the drivers and these determinations were based solely on officers' perceptions. That is, no drivers were asked for their racial or ethnic category. The reliability and validity of citizens' race involves two related concerns for data collected by the police. First, police may be reluctant to indicate drivers' race or may simply report that information inaccurately. Second, officers may "disengage," or initiate fewer traffic stops overall. Both of these behaviors represent an effort by officers to protect themselves from criticism, departmental discipline, and potential litigation. From the officers' perspective, this is a reasonable response to data collection efforts that are specifically designed to identify officers who "racially profile." Unfortunately, the validity of data collected by police officers often cannot be directly assessed.

The racial and ethnic descriptions of drivers stopped by officers are reported at the department, division, bureau, and district/shift levels in Table 3.6 and at the county level in Table 3.7.

Officers recorded their perceptions of drivers' race/ethnicity in one of seven categories, with the percentage across the department indicated in parentheses:

- Caucasian (62.4%)
- Hispanic (24.6%)
- Native American (5.2%)
- Black (4.4%)
- Asian (1.7%)
- Middle Eastern (0.9%)
- Other/Unknown race/ethnicity (0.8%)

It should be noted that some variation in the racial and ethnic background of drivers stopped across division, bureau, and district/shift levels is to be expected due to differences in the demographic makeup of residents and travelers, as well as differences in traffic flow patterns in these locations. As shown in Table 3.6, variations in the racial/ethnic background of stopped drivers at the division, bureau and district/shift levels are evident. For example, at the division level, Criminal Investigations Division officers stop higher percentages of Hispanic and Black drivers compared to Highway Patrol Division officers. At the bureau level, the Northern Bureau reported the highest percentage of Caucasian drivers stopped (69.5%), while officers in the Commercial Vehicle Bureau stopped the lowest percent of Caucasian drivers (48.9%). Differences in racial composition of drivers stopped across bureaus are also pronounced for Hispanic, Native American, and Black drivers. For example, the largest percentages of Hispanic drivers were stopped in the Southern and Commercial Vehicle Bureaus (35.7 and 36.2%, respectively), while the lowest percent was in the Northern Bureau (11.9%). Native Americans accounted for 12.4% of drivers stopped in the Northern Bureau, but their percentage of drivers stopped in each of the other bureaus was 1.5% or smaller. Black drivers accounted for 7.2% of drivers stopped in the Metro East Bureau, compared to 2.6% of drivers in the Northern Bureau. The percentages of Asian, Middle Eastern, and other drivers stopped were extremely low across all organizational units.

As shown in Table 3.6, variations at the district/shift level in percentages of racial/ethnic groups stopped were also evident. The percentage of drivers stopped who were Caucasian at the district/shift level varied from a high of 79.4% in District 11 (Globe) to a low of 42.8% in the District 16. The percentages of motorists stopped recorded as Hispanic varied from 42.1% of the stops in District 16, to only 10.5% of stops in District 3 (Holbrook). Canine officers, particularly, in the Central and South (44.2%), also stopped a significantly higher percentage of Hispanic drivers. Percentages of drivers recorded as Native Americans varied from a high of 23.3% in District 3, to a low of 0.2% in District 16. Finally, Black drivers represented 9.0% of stops by the Canine district and 8.7% of stops by Metro West Shift 3, but only 1.2% of stops in District 11 (Globe).

Table 3.7 demonstrates these variations at the county level. The percentages of motorists recorded as Caucasians and Hispanics vary most dramatically. Specifically, the percentage of motorists stopped recorded as Caucasian ranged from a high of 78.6% in Gila County to a low of 22.7 in Santa Cruz County. Likewise, the percentage of motorists recorded as Hispanic varied from a high of 74.5% in Santa Cruz County, to a low of 8.8% in Apache County.

Variation is also evident in the percentages of drivers recorded as Native American and Black, although to a lesser degree. Of note, Apache County, Navajo County, and Coconino County all have considerably higher percentages of Native Americans compared to other counties, while Maricopa County and Cochise County had the highest percentages of stopped drivers recorded as Black (6.4% and 5.1%, respectively). The percentages of Asian, Middle Eastern, and other drivers stopped are extremely low across all Arizona counties. It is important to note that the differences in the percentages of racial / ethnic groups stopped across counties do not necessarily indicate that DPS officers make stopping decisions based on race / ethnicity. These variations in stopping patterns may likely reflect differences in residential and driving patterns.

Undocumented Alien Status

Tables 3.6 - 3.7 also report the percent of drivers stopped who were of undocumented alien status. As shown in Table 3.6, 0.7% of drivers stopped department-wide were undocumented aliens. At the bureau level, the highest percentage of undocumented aliens was stopped in the Metro East Bureau (1.9%), while the lowest percent was 0.1% in the Commercial Vehicle Bureau. At the district/shift level, Metro West Shift #3 (1.6%), Metro Motors (2.1%), Metro East Shift #2 (2.3%), and the Canine District (3.5%) all stopped larger percentages of undocumented aliens. As shown in Table 3.7, the percentage of drivers stopped who were undocumented aliens ranged from a low of 0.0% in Graham County to a high of 1.2% in Maricopa County. One percent of drivers stopped in Mohave and Pinal County were also undocumented aliens.

Drivers' Residency

Finally, Tables 3.6 - 3.7 report drivers' residency based on reported residential zip codes. For every traffic stop, drivers' zip codes were recorded to determine the percentage of stops that occurred in locations (i.e., state and county) where the drivers actually resided. This is important information to collect because benchmarks based on Census data assume that the driving population is similar to the residential population of an area. As shown in Tables 3.6 - 3.7, however, this is an inaccurate assumption for these data. Specifically, at the department level, approximately 30% of drivers stopped statewide did not reside in the state of Arizona, and over 60% of drivers stopped did not reside in the county in which they were stopped.

The department averages of in-state (i.e., drivers who live in Arizona) and in-county residents (i.e., drivers stopped in the county in which they reside) are 69.5% and 37.8%, respectively. However, when examined at the division, bureau, and district/shift levels, it is obvious that the percentages of out-of-state residents stopped by DPS officers varied dramatically by location and assignment (see Table 3.6). For example, officers assigned to the Criminal Investigations Division stopped 60.5% Arizona residents, compared to 69.5% by officers in the Highway Patrol Division. Furthermore, Criminal Investigations Division officers are considerably less likely to stop in-county residents (9.1%) than Highway Patrol Division officers (37.9%).

Similar variation was evident at the bureau level. Officers working in Metro West and East Bureaus were more likely to stop in-state residents (83.4% and 85.5%, respectively). Of the

drivers stopped by officers assigned to the Commercial Vehicle Enforcement Bureau, only 27.2% were Arizona residents. Of the geographic bureaus (i.e., excluding Commercial Vehicles), the Northern Bureau stopped the lowest percentage of Arizona residents (61.0%). Similarly, Metro West and East officers were the most likely to stop in-county residents (64.3 and 64.0%, respectively). Due to the nature of their assignment, Commercial Vehicle Enforcement Bureau officers were least likely to stop drivers in counties in which they are residents (11.4%).

At the district/shift levels, more dramatic differences in the percentages of non-residents stopped were reported. For example, the highest percentage of in-state drivers stopped at the district/shift level was in Metro East Shift #2 (92.4%), while the lowest percentage of in-state drivers was stopped in District 15 (25.9%). For the Canine squads, Canine officers in the Central and South were considerably more likely to stop Arizona residents (51.4%) compared to Canine officers in the North (only 13.6%). Similar differences exist for the percentages of drivers stopped in their county of residency. For example, officers assigned to Districts 15 and 16, as well as Canine officers, stop less than 12% in-county residents. Conversely, over 60% of drivers stopped by officers assigned to Metro West and East shifts are residents of the county in which the stop occurred.

Finally, Table 3.7 shows that variation in driver residency is also evident at the county level. Specifically, 84.2% of drivers stopped in Maricopa County were residents of Arizona, compared to 43.2% of drivers stopped in Mohave County. The differences in percentages of in-county residents were even more dramatic. For example, 74.8% of drivers stopped in Maricopa County were county residents, compared to only 3.7% of drivers stopped in La Paz County.

Tuble 0.00 Childen Chuldetern	Ave.	%	%	%	%	%	%	%	%	%	% AZ	% County
	Citizen Age	Male	Caucasian	Hispanic	Native Am.	Black	Asian	Mid. East.	Other	UDA	Resident	resident
DPS Statewide	37.6	71.9	62.4	24.6	5.2	4.4	1.7	0.9	0.8	0.7	69.5	37.8
Crim. Invest. Division	34.7	75.9	51.6	35.3	4.4	6.0	1.4	0.6	0.8	0.6	60.5	9.1
Highway Patrol Division	37.7	71.9	62.4	24.5	5.2	4.4	1.7	0.9	0.8	0.7	69.5	37.9
Northern Bureau	39.7	70.4	69.5	11.9	12.4	2.6	2.0	1.0	0.5	0.5	61.0	24.3
D1-Kingman	40.3	73.8	76.0	14.8	1.7	3.2	2.7	1.2	0.4	0.9	48.4	15.6
D2-Flagstaff	38.0	71.0	61.1	10.8	18.0	3.2	4.1	1.9	1.0	0.4	49.8	23.2
D3-Holbrook	40.4	68.1	61.4	10.5	23.3	2.5	1.2	0.7	0.3	0.3	59.4	23.3
D11-Globe	41.4	71.5	79.4	10.7	7.2	1.2	0.6	0.3	0.6	0.5	81.9	30.4
D12-Prescott	37.9	69.9	76.8	13.3	3.1	2.6	2.3	1.3	0.4	0.8	67.8	30.1
Metro West Bureau	34.9	71.9	60.9	28.3	0.8	6.9	1.9	0.9	0.4	0.8	83.4	64.3
Shift #1	36.0	71.1	65.2	25.4	0.8	6.0	1.5	0.7	0.4	0.6	82.1	59.6
Shift #2	34.9	71.9	60.5	28.8	0.8	6.7	1.9	0.9	0.4	0.6	82.1	64.2
Shift #3	33.0	73.0	54.8	32.0	0.8	8.7	2.2	1.0	0.5	1.6	87.9	73.0
Southern Bureau	37.4	69.6	56.6	35.7	1.5	4.0	1.3	0.6	0.4	0.5	73.4	34.2
D4-Yuma	37.6	71.0	52.6	39.6	0.8	4.1	1.8	0.7	0.4	0.3	62.5	28.7
D6-Casa Grande	37.7	69.5	61.0	29.9	2.8	4.3	1.1	0.6	0.3	0.8	82.6	25.2
D8-Tucson	36.5	69.0	52.7	40.1	1.2	3.9	1.2	0.5	0.4	0.6	78.1	48.8
D9-Sierra Vista	37.9	68.6	61.6	32.0	1.0	3.8	0.9	0.4	0.4	0.2	70.4	33.2
Comm. Vehicle Bureau	42.8	94.8	48.9	36.2	0.5	5.2	1.6	1.9	5.8	0.1	27.2	11.4
District 15	43.2	93.3	66.6	18.8	1.2	6.2	2.7	3.6	1.1	0.2	25.9	10.5
District 16	42.6	95.4	42.8	42.1	0.2	4.9	1.2	1.3	7.5	0.1	27.6	11.7
Metro East Bureau	33.8	71.1	63.9	24.0	1.5	7.2	1.7	1.0	0.8	1.9	85.5	64.0
Shift #1	34.8	69.3	69.6	20.1	1.0	6.5	1.3	1.0	0.5	1.0	89.3	70.2
Shift #2	33.2	69.0	66.6	21.7	1.3	7.0	1.8	1.1	0.6	2.3	92.4	72.5
Shift #3	32.4	71.4	64.5	22.3	1.7	7.5	2.0	1.0	0.9	0.9	89.0	64.6
Metro Motors	33.7	71.4	63.6	25.1	1.0	7.1	1.4	0.9	1.0	2.1	90.2	70.7
Canine	37.2	79.8	45.0	38.6	3.6	9.0	1.4	1.1	1.4	3.5	40.2	11.5
Canine North	38.6	80.1	56.6	24.8	1.3	11.6	2.6	1.9	1.2	2.2	13.6	2.6
Canine Central & South	36.6	79.6	40.1	44.2	4.6	8.0	0.9	0.8	1.4	4.1	51.4	15.2

Table 3.6: Citizen Characteristics of 2006 Traffic Stops – Statewide, Division, Bureaus, & Districts/Shifts

	Total # of Stops	Average Age	% Male	% Caucasian	% Hispanic	% Native Am.	% Black	% Asian	% Mid. East.	% Other	% UDA	% AZ Resident	% County resident
Arizona	460,545	37.6	71.9	62.4	24.6	5.2	4.4	1.7	0.9	0.8	0.7	69.5	37.8
Apache	20,187	41.3	69.8	58.0	8.8	29.2	1.9	1.1	0.8	0.3	0.1	57.4	25.5
Cochise	25,080	38.7	71.3	57.9	34.0	0.4	5.1	1.4	0.6	0.6	0.3	63.2	32.1
Coconino	31,948	39.0	72.7	63.5	11.3	15.0	3.5	3.7	2.0	1.0	0.4	45.0	21.0
Gila	17,214	42.5	72.6	78.6	11.0	8.2	1.1	0.5	0.4	0.2	0.2	79.7	21.7
Graham	3,654	37.3	67.4	67.0	24.8	5.0	2.4	0.5	0.3	0.1	0.0	79.1	42.7
Greenlee	1,694	38.0	70.8	67.9	28.7	1.8	1.0	0.4	0.1	0.0	0.1	75.0	31.6
La Paz	17,963	39.5	72.9	65.4	23.5	0.9	4.7	2.6	1.0	1.9	0.4	48.4	3.7
Maricopa	120,319	34.7	71.8	63.3	25.6	1.2	6.4	1.7	0.9	1.0	1.2	84.2	74.8
Mohave	20,867	40.2	76.8	71.4	17.0	1.6	4.5	3.2	1.7	0.5	1.0	43.2	20.3
Navajo	28,744	40.0	68.5	64.8	11.9	17.5	3.3	1.4	0.8	0.4	0.4	59.4	24.5
Pima	34,643	37.1	72.0	54.9	36.0	1.7	4.0	1.1	0.6	1.7	0.7	74.5	53.9
Pinal	37,936	38.2	72.1	58.9	31.3	2.6	4.9	1.2	0.7	0.4	1.0	75.1	22.8
Santa Cruz	3,483	37.9	71.1	22.7	74.5	0.1	1.0	0.4	0.7	0.5	0.5	67.4	39.8
Yavapai	34,784	38.1	71.6	74.4	15.1	2.9	3.3	2.4	1.4	0.5	0.8	65.0	28.1
Yuma	18,656	37.1	70.9	49.2	44.5	0.4	3.6	1.1	0.8	0.4	0.1	65.8	43.1

Table 3.7: Citizen Characteristics of 2006 Traffic Stops – County

SECTION SUMMARY

Section 3 described the characteristics of traffic stops and stopped drivers at the department, Division, bureau, and district/shift levels based on data collected from January 1, 2006 through December 31, 2006. The trends in these descriptive findings are summarized below.

- At the department level, 460,545 traffic stops were conducted in 2006. The majority of these stops had the following characteristics:
 - Conducted by Highway Patrol Division officers (99.5%)
 - Occurred on a weekday (73.8%)
 - Occurred during the daytime (65.8%)
 - Lasted between 0-20 minutes (0-10 minutes 21.1%; 11-20 minutes 64.5%)
 - January accounted for the largest percentage of traffic stops (9.5%); overall, stop activity at the department level was fairly consistent across months, with a difference of only 2.3% between the busiest and slowest months
 - Trends were generally consistent across divisions, bureaus, and districts/shifts
- At the department level, the most frequent reasons for the stop included:
 - Moving violations (68.0%)
 - Equipment violations (18.5%)
 - Non-moving violations (11.4%)
- Department-wide, DPS officers stopped vehicles and drivers with the following characteristics:
 - Vehicles:
 - Arizona-registered vehicle (74.0%)
 - Types of vehicles: cars (48.5%), pickup trucks (23.2%), vans/station wagons (9.7%), SUVs (9.3%), and trucks/tractor trailers (7.6%)
 - As expected, Commercial Vehicle Enforcement Bureau officers stopped a much larger percentage of trucks and/or tractor trailers (89.4%) compared to officers in other bureaus
 - Drivers:
 - Average age of 37.6 years
 - o 71.9% male
 - Caucasian (62.4%), Hispanic (24.6%), Native American (5.2%), Black (4.4%), Asian (1.7%), Middle Eastern (0.9%), Other/unknown race/ethnicity (0.8%)
 - 0.7% Undocumented alien status
 - o 69.5% Arizona resident
 - o 37.8% County resident
- Drivers' characteristics, particularly race and residency, varied considerably by bureau, district/shift, and county

- The variation in residency of drivers stopped indicates that it is inappropriate to assume residential populations are similar to driving populations i.e., Census data are not appropriate comparisons for benchmark analyses
- Some variation in the racial and ethnic background of drivers stopped across bureaus, districts/shifts, and counties is to be expected due to differences in the demographic makeup of residents and travelers, along with differences in traffic flow patterns in these locations
4. BENCHMARKING ANALYSES

OVERVIEW

As described in the Traffic Stop Data Analysis Study Interim Report: Literature Review and Review of Other Jurisdictions report (Engel, Cherkauskas, & Tillyer, 2007), one of the primary challenges in analyzing traffic stop data is the difficulty in determining an appropriate comparison group against which the traffic stop data can be compared. In other words, determining how often minorities are stopped by police is not particularly meaningful until those percentages are compared to some "expected probability" of actions toward minorities (Fridell, 2004; Rojek, Rosenfeld, & Decker, 2004; Smith & Alpert, 2002). These expected probabilities are often referred to by academics as "benchmarks," "base rates," "baselines," or "denominators." In this report, internal comparisons were examined for possible use as benchmarks. Internal comparisons essentially use data collected by the agency as the denominator – comparisons can be made across officers working in the same areas, shifts, and assignments, or across time periods for the agency as a whole. Specifically, two types of internal comparisons for benchmarking purposes were explored. One method compared rates of traffic stops by racial/ethnic group for each officer against the "normal" stopping rate for each group based on data collected by similarly situated officers. The other method used the rates of racial/ethnic stops in previous years as the benchmark against which the 2006 data was compared. This section provides a general overview of benchmarking, including the strengths and weaknesses of each type of benchmark, while specifically focusing on internal comparisons and the results of the analyses conducted on the 2006 data.

BENCHMARKING

To assess whether racially biased policing is occurring in a jurisdiction, the racial/ethnic characteristics of drivers actually stopped by police must be compared to the racial/ethnic characteristics of a benchmark population representing the "expected" rate of stops of minorities assuming that no racial discrimination or prejudice exists by police. The difficulty of this is that the driving population eligible to be stopped by police is unknown. If comparisons of the two rates (i.e., the observed vs. the expected) indicate that the observed exceeds the expected, then a racial/ethnic disparity exists.

The most frequent sources of external comparison data used by researchers in traffic stop studies include: 1) Census data; 2) adjusted Census data; 3) drivers' license data, 4) observations of roadway usage; 5) official accident data; 6) blind enforcement mechanisms, 7) assessments of traffic violating behavior; and 8) motorist surveys of roadway usage and driving patterns (for a thorough review of each of the benchmark techniques, Engel et al., 2007; Engel & Calnon, 2004; Fridell, Lunney, Diamond & Kubu, 2001; Fridell, 2004; Smith & Alpert, 2002). While there is some consensus in the research community that residential Census populations are the least reliable of the benchmarks available, there is no such consensus regarding the validity of other techniques (Engel, Calnon & Bernard, 2002; Farrell, McDevitt, Cronin, & Pierce, 2003; Fridell et al., 2001; Fridell, 2004). Indeed, analyses of DPS data from 2006 documented in Section 3 demonstrate that the majority of drivers stopped (62.2%) do not reside in the county in which they are stopped and 30.5% of

drivers are non-Arizona residents. This readily demonstrates that comparisons of DPS traffic stop data to Census data would provide invalid comparisons and conclusions.

An accurate benchmark must take into consideration driving location, time of travel, driving quantity, vehicle type and condition, driving behavior, and driver characteristics. All of these factors are believed to potentially influence a driver's likelihood of being stopped for traffic offenses, and therefore must be measured to assess similarly situated people for purposes of accurate statistical comparisons. Unfortunately, all of the benchmarks have limitations in terms of their ability to approximate the population of drivers eligible to be stopped. Specifically, limitations associated with design, implementation, and costs make it clear that some benchmarks better approximate this group than others (for review, see Engel & Calnon, 2004; Fridell, 2004; Fridell, et al., 2001; Walker, 2001).

The utility and quality of a benchmark is dependent upon how well it accounts for the factors that influence drivers' risk of being stopped (Engel & Calnon, 2004; Fridell 2004, 2005). The selection and measurement of the benchmark is critical to the statistical analyses and subsequent conclusions of racial/ethnic disparities in traffic stop studies. As demonstrated by Engel et al. (2004, 2005), using the same traffic stop data and changing the benchmark can substantially alter the conclusions regarding potential racial disparity.

Despite social scientists' best efforts, however, no benchmark has been able to successfully measure all of the risk factors associated with the likelihood of being stopped (Fridell et al., 2001; Fridell, 2004; Engel et al., 2004; Tillyer, Engel & Wooldredge, forthcoming). As a result, some scholars have abandoned the use of benchmark comparisons to estimate racial/ethnic disparities in traffic stops (e.g., see Walker, 2001; Ridgeway, 2006; Ridgeway et al., 2007). Indeed, based on the research team's review of the available benchmark comparisons, it was determined that methodologies *other than traditional external benchmarking* of traffic stop data be initially used for the purpose of promoting effective and respectful policing.

Internal benchmarking refers to a comparison of stops by individual officers to stops by other officers, or stops by a group of officers to stops by other groups of officers (i.e., shifts, units, geographic areas, etc.) (Walker, 2001). Therefore, the primary difference between the previously mentioned benchmarks and internal benchmarking is the use of data already available to police within their traffic stop studies, thus eliminating the need to collect additional comparison data. Internal benchmarking is explored in this report using two methods: internal comparisons and trend analyses.

INTERNAL BENCHMARKS

Internal benchmarks compare "matched" sets of officers or groups of officers. These officers are matched based on the likelihood of encountering similar situations and citizens. For instance, one might assume that officers working on the same shift, geographic area, and assignment would be exposed to a similar population of drivers. If these selected officers do police similar driving populations, all of the factors related to the alternate hypotheses (e.g., driving quantity, driving quality, and driving location) are held constant. Thus, officers'

rates of stopping, citing, searching, and arresting minority citizens are compared to other officers working in the same or similar assignments, areas, and shifts. If a particular officer stops proportionately more minority citizens than does his or her matched peers, further exploration of this officer's policing activities and decisions would be warranted. These comparisons are often part of larger management tools, called "early intervention" or "early warning" systems, which are utilized by police departments to identify problem officers (Walker, 2001). Walker (2001: 84) has argued that early warning systems are a "promising but not fully proven" tool for achieving police accountability that can easily be utilized to examine rates of police-citizen contacts.

The process of developing an internal benchmark to assess the rate of traffic stops by individual officers is contingent on assessing officers that are "similarly situated" based on at least three criteria: 1) assignment, 2) geography, and 3) shift. Once these three criteria were applied to DPS, it became apparent that there were not enough officers with a reasonable amount of traffic stops in each organizational unit to complete an analysis. That is, due to the nature of officers' work and DPS organizational structure, many geographic locations only have a handful of officers working the same shift and assignment. In these locations, internal benchmarking analysis of this type is not possible.

Only two areas within the organization – Metro West and East Bureaus – were large enough to consider for internal benchmarking purposes. Unfortunately, these units have considerable turnover of personnel throughout the year for training and assignment reasons. The inconsistency of similar officers working in these units was problematic for developing a valid baseline of behavior necessary to conduct the analysis. In addition, officers assigned within these Bureaus are actually deployed to different interstates and roadways, where traffic patterns may differ. Finally, internal benchmarking does not consider individual officer preferences for particular types of work. Some officers prefer to respond to crashes, others take pleasure in pursuing DUI violations, while still others are interested in criminal indicators related to drug trafficking, excessive speeding, equipment violations, etc. While all DPS officers are required to respond to calls for service, their proactive encounters with the public may differ based simply on work preferences, supervisory preferences, etc. These preferential differences may result in varying percentages of contact with racial/ethnic groups.

Despite these limitations, the UC research team examined Metro West and East Bureaus for the purposes of internal benchmarking. The results were relatively unstable – there were a number of statistical problems with the analyses. Therefore, the results of these analyses are not provided in this report. It is the conclusion of the UC research team that although internal comparisons may be a good alternative to external benchmarking in order to examine racial/ethnic disparities in police-citizen encounters in large municipal agencies, its applicability to state police agencies such as DPS is extremely limited.

TREND ANALYSES

A second type of statistical analysis – trend analysis – may be considered a form of benchmarking. For trend analysis, previous years' rates of stopping behavior are used as a

baseline to measure more current stopping rates. The limitation of using trend analyses is that racial/ethnic discrimination cannot be determined. Rather, the information simply provides a description of whether or not stopping patterns within organizational units are consistent across time. If inconsistencies are found, the cause of the inconsistencies cannot be determined with these data. Rather, these areas are flagged for further consideration by DPS officials.

Trend analysis offers several advantages for analyzing traffic stop data. First, it allows for an assessment of the long term trends in traffic stops and traffic stop outcomes by racial/ethnic group. By comparing current data to previous data, patterns become apparent. Second, it can be used at multiple organizational units, allowing the agency to assess potential problems and the location of those problems. In this section, trends at the department, division, bureau, and district/shift levels are reported. Third, it does not require the collection of additional data, thereby minimizing the cost to the agency. Finally, the analyses are not complex and provide for a relatively easy interpretation of the results (i.e., changes in the pattern of traffic stops over time).

These advantages are offset by some limitations to this method. The most common reason trend analysis is not conducted more frequently by agencies is the necessity of data collection across multiple time periods. In this case, DPS has four years of data to assess which alleviates this concern. Another shortcoming of this method is the failure to account for other potential explanations during the analysis. For example, one organizational unit may be identified as consistently increasing their rate of minority stops, leading to a disproportionate rate in the most recent year when compared to the prior years. This type of result does not directly indicate a problem with that unit, as it is possible that other explanations are responsible for changes over time including:

- Changes in the racial/ethnic composition of residential populations altering the racial/ethnic composition of drivers eligible to be stopped.
- Other changes in travel patterns which differentially impact the percentages of minority drivers on particular roadways.
- Changes in DPS deployment patterns and manpower allocation to address changes in reported criminal patterns and calls for service that result in higher concentrations of officers in areas where minorities are more likely to travel and/or violate the law.
- Changes in officer bias toward minority drivers.
- Changes in Arizona law regarding the policy for vehicles with no insurance or unlicensed drivers.
- Changes in the data collection system.

Clearly, multiple explanations exist which may explain why patterns of racial/ethnic disparities are discovered, and trend analysis cannot distinguish between these alternative explanations. Notwithstanding these limitations, trend analysis offers a simple, yet important description of traffic stopping trends and traffic stop outcomes over time. This technique is most effective when used in combination with other analytical tools, and should **not** be used as a definitive indicator of racial bias.

Given the availability of four years of data and acknowledging the limitations of this method, this section uses the previous years' data as a benchmark against which to compare current data. Specifically, using the baseline figures of racial/ethnic traffic stops established in 2003, 2004, and 2005, traffic stops in 2006 will be assessed across the department, divisions, bureaus, and districts/shifts to determine if racial/ethnic trends in stopping patterns have changed in a significant manner. That is, analyses will examine whether Hispanic, Native American, and Black drivers are significantly more or less likely to be stopped by DPS officers in 2006 when compared to the previous three years.¹⁵

Reporting data over time and across organizational units allows for two interpretations: 1) within organizational units over time, and 2) across organizational units. As noted previously, it can be somewhat misleading to compare traffic stops across organizational units due to likely differences in traffic patterns, driver behavior, and officer deployment. Therefore, the strength of the comparisons reported below is within organizational units across time. In other words, the following tables should be examined for trends over time to evaluate the continuity or change in behavior of each organizational unit. Substantial changes in the patterns of traffic stops within organizational units over time should be identified and further examined by DPS officials to identify the cause of these changes. This section is descriptive in nature and should be used to highlight potential areas of concern for future study, but not to conclude any particular organizational unit is engaging in racially biased traffic stop behavior.

The trends reported are based only on officer-initiated traffic stops and are primarily focused on the actions of the Highway Patrol Division, with only brief reporting of the actions of the Criminal Investigations Division. The tables in this section report activity by the Criminal Investigations Bureau and the Highway Patrol Bureau; however, the accompanying text for each of these tables will focus exclusively on the Highway Patrol Bureau, as the vast majority of all traffic stops are conducted by the Highway Patrol Division. In cases where the percent of activity is noticeably different for the Criminal Investigations Division, further discussion will be provided regarding those differences. In the tables throughout this section, percentages that are based on less than 50 traffic stops are identified because rates calculated from small numbers of traffic stops may be unstable.

Comparison of Traffic Stop Data: 2003 – 2006

The following information documents the stopping trends of DPS officers across all organizational units between 2003 and 2006. This information is presented in four formats: 1) Table 4.1 reports the total number of officer-initiated traffic stops per year by organizational unit, 2) Table 4.2 summarizes the stop rates for Caucasian, Hispanic, Native American and Black drivers across all organizational units between 2003 and 2006, 3) Figures 4.1 - 4.15 visually document the comparison of stopping patterns for Hispanic,

¹⁵ Again, while it is possible that some racial disparities observed in traffic stops may be the result of individual officers targeting racial minorities, it is important to note that this hypothesis cannot be directly tested with the data available. That is, it cannot determine if officers make traffic stops based on drivers' race/ethnicity, as the factors related to individual officer decision making have not been measured. Rather, only trends in the traffic stop data over time, based on initial comparisons to benchmark data came be examined.

Native American, and Black drivers across all districts/shifts within their respective bureaus, and 4) Tables 4.3 - 4.5 provide the results of binomial significance tests comparing rates of minority stops from 2003, 2004, and 2005 with rates in 2006.

Traffic Stops Across Organizational Levels: 2003 – 2006¹⁶

Table 4.1 reports the total number of traffic stops by year at the department, division, bureau, and district/shift levels. All analyses in this section are based on information collected during officer-initiated traffic stops with drivers. In 2003, there were 438,574 officer-initiated traffic stops. In 2004, that number increased to 482,479 before a slight downturn in 2005 and 2006. As demonstrated in Table 4.1, few traffic stops were associated with the Criminal Investigations Division, although there was a noticeable increase in 2006. Generally, this pattern is evident across all organizational units throughout the four years of data collection.

The majority of traffic stops were initiated by officers assigned to the Highway Patrol Division. At the bureau level, the Northern Bureau conducted the most traffic stops across all years, with the highest level of traffic stops occurring in 2004 (181,253). The Southern Bureau recorded the second most traffic stops across the four years with their peak also in 2004 at 151,825 officer-initiated stops. Metro West Bureau recorded 85,713 traffic stops in 2004 prior to a dramatic reduction in 2005 and 2006. Conversely, the Metro East Bureau saw a substantial increase in officer initiated traffic stops in 2005 and 2006. The shift in total traffic stops between Metro West and Metro East was considerable; furthermore, there were noticeably fewer stops reported at the district/shift level in 2004 – and hardly any in 2003 – within the Metro East Bureau. It is possible that the locator codes for these organization units were switched after 2004 and this information has not been provided to the research team. Alternatively, it may be that an organizational redeployment or redesign may be part of the explanation and this finding may be of no surprise to DPS officials; however, the research team is unaware of any potential explanation for such a change in the trends. If an organizational change is not the explanation, it would be worthwhile to explore other possibilities. Further analyses in this section do not include 2003 data for the three shifts in Metro East due to the low number of traffic stops.

¹⁶ Note that the total number of stops reported does not always total the overall total for the higher organizational unit. For instance, adding the total number of traffic stops at the Criminal Investigations Division and the Highway Patrol Division level does not equal the departmental total. This is due to missing or invalid locator codes recorded on the traffic stop forms. In addition, in some instances, the locator codes indicate that stops belong in particular districts, but lower levels of organizational unit affiliation are not provided. For example, 148 traffic stops in the Commercial Vehicle Bureau did not indicate an assignment to District 15 or District 16. These stops were likely initiated by the Bureau Commander, Administrative or Operations Staff, or officers assigned to Special Projects. Due to the fact that these locator codes were not associated with either District 15 or District 16, these traffic stops were not reported at the district level. These types of discrepancies occur throughout the tables reported below; thus, totaling the traffic stops at lower levels may not provide an exact match to all traffic stops associated with the higher organizational unit.

The number of traffic stops initiated by the Canine District ranged from a low of 5,520 in 2005 to a high of 8,546 in 2004. This information is further specified by geographic area, with the North contributing approximately 2,000 traffic stops in 2005 and 2006, and the Central and South squads accounting for 3,430 and 4,827 traffic stops, respectively.

Within the district/shift level, District 3-Holbrook consistently engaged in more traffic stops than any other district within the Northern Bureau. This trend has become more pronounced in the last two years and is currently demonstrating a roughly 2:1 ratio. As expected in the Metro West Bureau, Shifts #1 and #2 comprised the majority of traffic stops conducted in this area, but this is a more recent trend; the early years of data collection suggest a more even split of traffic stops across the three shifts. The Southern Bureau has consistently reported relatively equivalent stops across all four of its districts, whereas the Commercial Vehicle Bureau was primarily driven by District 16 across all four years. As mentioned, the first two years of data collection in the Metro East Bureau were not consistent, but in 2005 and 2006, Shift #2 accounted for the highest number of traffic stops. Finally, the Central and South Canine squads consistently engaged in more traffic stops than their northern counterparts. Many of the differences across organizational units are likely due to deployment / manpower allocation, and the geographic area patrolled.

	Total Number of Officer-Initiated Traffic Stops								
	2003	2004	2005	2006					
DPS Statewide	438,574	482,479	461,962	460,545					
Investigations Division	428	392	393	935					
Highway Patrol Division	437,739	481,224	459,716	458,068					
Northern Bureau	162,428	181,253	169,341	162,250					
D1-Kingman	33,940	33,370	27,682	27,596					
D2-Flagstaff	30,295	34,106	33,802	26,264					
D3-Holbrook	40,109	49,895	49,903	52,405					
D11-Globe	24,234	28,768	26,892	24,081					
D12-Prescott	33,720	34,958	30,809	31,583					
Metro West	82,834	85,713	60,933	61,175					
Shift #1	25,360	25,867	24,177	21,951					
Shift #2	33,920	34,497	24,471	24,661					
Shift #3	23,293	25,067	11,755	14,014					
Southern Bureau	137,248	151,825	144,388	140,045					
D4-Yuma	28,142	31,161	30,233	37,080					
D6-Casa Grande	39,797	42,894	36,962	34,705					
D8-Tucson	35,690	46,124	44,808	37,784					
D9-Sierra Vista	33,509	31,438	31,826	30,011					
Commercial Vehicle	24,245	24,761	23,602	26,088					
District 15	8,243	7,535	7,024	6,510					
District 16	15,863	17,152	16,451	19,432					
Metro East	30,478	37,122	61,093	67,957					
Shift #1	2	4,649	12,798	11,344					
Shift #2	69	3,709	16,271	22,127					
Shift #3		3,537	11,932	13,382					
Metro Motors	22,514	16,681	14,572	14,218					
Canine	7,893	8,546	5,520	6,886					
Canine North	2,630	3,574	2,051	2,041					
Canine Central & South	5,243	4,949	3,430	4,827					

Table 4.1: Total Traffic Stops - Statewide, Division, Bureau, & District – 2003-2006

Racial/Ethnic Composition of Traffic Stops Across Organizational Levels: 2003 – 2006

Table 4.2 reports the percentage of traffic stops by racial group across all organizational units between 2003 and 2006. Four racial/ethnic groups are examined: Caucasian, Hispanic, Native American, and Black. Traffic stops involving drivers of other racial/ethnic groups are excluded from this section; therefore, totaling the percent of stops for these four racial/ethnic groups in any one data collection year will not equal 100%.

Caucasian drivers are consistently stopped most frequently across all four years. The rate of stops ranges from a low of 62.4% of stops in 2006 to a high of 66.2% of stops in 2003. Across the department and at the bureau levels, the trend is a steady decrease in the percent of drivers who are Caucasian over the four year period. Although there is general consistency in these trends at the district/shift level, there is also more variation compared to the bureau and department levels. Eleven of sixteen districts/shifts reflect this general downward trend in Caucasian stops.¹⁷

Table 4.2 also documents that Hispanic drivers represent the second largest racial/ethnic group of stopped drivers. Between 2003 and 2006, the rate of drivers stopped who were Hispanic increased slightly from 21.8% to 24.6%. This trend was consistent across all bureaus with the exception of a slight reduction between 2004 and 2005 in the Northern and Metro East Bureaus. At the district/shift level, twelve of sixteen district/shifts increased the percentage of stopped motorists who were Hispanic from 2003 to 2006. The Canine District dramatically increased their percentage of stopped drivers who were Hispanic, from 19.5% in 2003 to 38.6% in 2006. Both the North and Central/South squads reflected this trend.

The percent of motorists stopped who were Native American remained relatively stable across the four years of data collection, ranging from a low of 5.2% in 2003 to a high of 5.6% in 2005. There was much greater variation at the bureau level due to the relatively small number of overall traffic stops and the geographic areas these bureaus patrol. Of the traffic stops in the Northern Bureau, between 11.8% (2003) and 13.0% (2005) were of Native American drivers. No other bureau reported percentages above 1.8% in any year. At the district/shift level, the variation was more pronounced. For example, District 3-Holbrook reported Native American stops in the mid-20 percent range. See Table 4.2 for more specific results.

There is an increasing trend of percent drivers stopped who were Black across the department from 2003 to 2006. As reported in Table 4.2, 3.7% of all traffic stops in 2003 were of Black motorists, compared to 4.4% in 2006. This trend is replicated across all bureaus. At the district/shift level, eleven of the sixteen organizational units reflect this upward trend in Black stops. In 2003, the Canine District had its highest rate of Black stops (9.9%) prior to dropping to its lowest rate of 8.4% in 2005. In 2006, 9.0% of all traffic stops conducted by the Canine District were of Black motorists.

¹⁷ Shifts 1- 3 of the Metro East Bureau were excluded in this analysis due to the instability of their rates in 2003.

	<u>% Caucasian</u>				<u>% Hispanic</u>			% Native American				<u>% Black</u>				
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006
DPS Statewide	66.2	65.6	63.0	62.4	21.8	22.2	23.8	24.6	5.2	5.3	5.6	5.2	3.7	3.9	4.1	4.4
Investigations Division	61.0	58.1	65.1	51.6	31.8	30.5	27.5	35.3	2.6	2.5	2.8	4.4	3.7	5.5	3.1	6.0
Highway Patrol Division	66.2	65.5	63.0	62.4	21.8	22.3	23.7	24.5	5.2	5.3	5.6	5.2	3.7	3.9	4.1	4.4
Northern Bureau	71.6	70.4	69.1	69.5	10.8	11.6	11.4	11.9	11.8	11.9	13.0	12.4	2.5	2.6	2.6	2.6
D1-Kingman	78.8	77.4	76.8	76.0	12.8	13.9	13.6	14.8	1.4	1.3	1.6	1.7	3.1	3.2	3.4	3.2
D2-Flagstaff	65.0	65.6	62.6	61.1	9.7	11.0	10.9	10.8	17.2	15.1	17.0	18.0	3.3	3.0	3.1	3.2
D3-Holbrook	59.7	59.8	59.0	61.4	8.7	9.4	9.8	10.5	27.6	26.3	26.4	23.3	2.4	2.6	2.7	2.5
D11-Globe	79.2	79.3	79.1	79.4	11.1	11.0	10.7	10.7	6.3	6.6	6.9	7.2	1.2	1.4	1.3	1.2
D12-Prescott	79.2	76.2	77.0	76.8	12.0	13.3	13.2	13.3	2.5	2.7	2.4	3.1	2.2	2.8	2.5	2.6
Metro West	68.4	68.1	62.7	60.9	22.4	22.4	27.1	28.3	1.0	1.0	0.8	0.8	5.4	5.6	6.0	6.9
Shift #1	63.6	66.8	66.3	65.2	26.3	23.5	24.6	25.4	1.0	1.0	0.8	0.8	6.7	6.1	5.4	6.0
Shift #2	70.4	68.2	61.1	60.5	21.7	22.9	28.8	28.8	0.8	0.8	0.8	0.8	4.5	5.0	5.7	6.7
Shift #3	70.8	69.4	58.4	54.8	19.2	20.5	28.9	32.0	1.2	1.2	1.0	0.8	5.5	6.0	7.9	8.7
Southern Bureau	59.9	59.8	56.8	56.6	33.0	33.1	35.4	35.7	1.6	1.5	1.5	1.5	3.4	3.6	3.9	4.0
D4-Yuma	61.6	58.2	54.5	52.6	30.7	34.5	37.1	39.6	1.0	0.9	0.9	0.8	3.5	3.6	4.0	4.1
D6-Casa Grande	66.4	68.7	63.4	61.0	26.3	23.9	27.9	29.9	2.4	2.2	2.6	2.8	3.3	3.6	3.9	4.3
D8-Tucson	50.5	51.8	50.3	52.7	42.7	41.4	42.3	40.1	1.8	1.7	1.2	1.2	3.1	3.4	3.9	3.9
D9-Sierra Vista	60.6	61.2	60.7	61.6	32.3	32.4	32.5	32.0	0.8	1.0	1.1	1.0	3.8	3.8	3.8	3.8
Commercial Vehicle	56.9	56.7	50.7	48.9	31.1	31.8	35.0	36.1	0.6	0.6	0.6	0.5	4.6	4.6	4.7	5.2
District 15	72.9	70.1	67.3	66.6	13.8	15.9	17.1	18.8	1.0	1.1	1.3	1.2	5.6	6.0	6.5	6.2
District 16	48.5	50.9	43.6	42.8	40.2	38.8	42.7	42.1	0.4	0.4	0.3	0.2	4.0	4.0	3.9	4.9
Metro East	67.6	65.3	65.5	63.9	21.1	23.2	22.7	24.0	1.8	1.7	1.4	1.5	6.6	6.7	6.6	7.2
Shift #1	50.0*	72.4	68.5	69.6	50.0*	18.5	21.2	20.1	0.0*	1.4	1.1	1.0	0.0*	5.0	6.0	6.5
Shift #2	87.0	73.3	69.3	66.6	10.1	17.4	19.9	21.7	0.0	1.1	1.1	1.3	2.9	5.4	6.2	7.0
Shift #3		63.7	63.9	64.5		24.6	23.4	22.3		2.0	1.8	1.7		6.8	7.1	7.5
Metro Motors	68.7	66.0	65.0	63.6	21.6	22.9	23.0	25.1	1.2	1.4	0.9	1.0	5.5	6.3	6.7	7.1
Canine	64.2	57.3	52.0	45.0	19.5	28.0	32.4	38.6	3.4	2.8	3.4	3.6	9.9	8.9	8.4	9.0
Canine North	68.3	64.2	61.6	56.6	13.7	19.3	21.4	24.8	1.9	1.2	0.8	1.3	11.4	11.3	10.8	11.6
Canine Central & South	62.2	52.3	46.5	62.6	22.4	34.4	38.9	44.2	4.1	4.0	4.8	4.6	9.1	7.2	7.1	8.0

Table 4.2: Traffic Stops By Driver's Race - Statewide, Division, Bureau, & District - 2003-2006

* - Based on less than 50 traffic stops

Racial/Ethnic Composition of Traffic Stops for Districts/Shifts: 2003 – 2006

It is important to identify those bureaus and districts with significant increases (or decreases) in the percentages of minority drivers stopped. As previously noted, the reasons for these changes may be legitimate (e.g., changes in traffic patterns, deployment patterns, etc.) or illegitimate (e.g., officer bias) and definitive conclusions regarding the reasons for these patterns cannot be identified based solely on analyses of these data. Figures 4.1 - 4.15 are included to graphically display the percentages of Hispanic, Native American, and Black stop rates across bureaus and districts/shifts within the state. These figures do permit an assessment of the overall trend for each unit. There is expected variation in traffic stops rates when comparing across districts/shifts, as diverse areas with different demographic compositions and travel patterns exist within each bureau. Any bureau or district/shift with percentages of minority stops that are trending upward in 2006 should be monitored in the 2007 data; however, as noted previously, an upward trend does not necessarily indicate police bias. An upward trend in the percentage of minority drivers stopped within a district/shift simply indicates that the reasons for this trend need to be explored by DPS administrators. Note that the scales of the individual figures vary. Comparisons should not be made across figures because each display is based on different levels of activity. Bureau totals are represented in each figure with a black line, while the lower organizational units are represented by a variety of colors.

Northern Bureau

The stopping patterns for all districts in the Northern Bureau are reported for Hispanic drivers in Figure 4.1. This figure demonstrates that increases occurred between 2005 and 2006 in Kingman, Holbrook and Prescott, which contributed to the overall increase throughout the Bureau. Kingman and Holbrook each contributed an increase of roughly 2% respectively. Globe did not demonstrate a substantial change, decreasing only 0.3% from 2003 to 2006, while Flagstaff saw an increase of approximately 1% in drivers who were Hispanic from 2003 to 2006. Overall, the Northern Bureau had an increase of nearly 1% in stops of drivers who were Hispanic between 2003 and 2006, which was primarily driven by Kingman and Holbrook.





In Figure 4.2, the stopping patterns of Native American drivers are reported for the Northern Bureau. When comparing 2005 to 2006, Kingman, Flagstaff, Globe, and Prescott had slight increases, while Holbrook had a reduction in its rate. Across the four years, four of the districts (i.e., Kingman, Flagstaff, Globe, and Prescott) were relatively unchanged despite some minor fluctuations year to year. Holbrook demonstrated a reduction in the rate of Native American drivers stopped between 2003 and 2006. Overall, the rate of Native American stops in the Northern Bureau is relatively consistent across the four years, despite a slight increase in 2005.





Figure 4.3 reports the stopping patterns for Black drivers in the Northern Bureau. Throughout the bureau, the trend for Black stops was extremely consistent – ranging between 2.5% and 2.6% of all traffic stops. At the district level, slight increases occurred from 2005 to 2006 in Flagstaff and Prescott; each of which was one-tenth of a percent. Three other districts, Kingman, Holbrook, and Globe reported slight decreases between 2005 and 2006. Globe also had a noticeably lower rate of Black stops when compared to the bureau and other districts. It should also be noted that all decreases and increases, except the 2003-2004 period for Prescott, were less that 0.5%.





Metro-West Bureau

Figure 4.4 reports the stopping trends of Hispanic drivers in the Metro West Bureau. Between 2005 and 2006, Shift 1 and Shift 3 reported increases in the percent of drivers stopped who were Hispanic, while Shift 2's rate remained unchanged. Shift 1's rate increased approximately 1% in both 2005 and 2006, following a nearly 3% decrease reported for 2004. Shift 2 demonstrated an increase of more than 7% between 2003 and 2006. Importantly, Shift 3 reported an increase of more than 3% in 2006, and this follows an increase of more than 8% between 2004 and 2005. This pattern needs continual monitoring in 2007 to assess if it is maintained. Overall, the Metro West Bureau reported slightly less than a 6% increase in stops of Hispanic drivers between 2003 and 2006.



Figure 4.4: Percent of Drivers Stopped – Recorded as Hispanic – Metro West Bureau: 2003-2006

For Native American drivers in the Metro West Bureau, Figure 4.5 demonstrates declining or unchanged trends for Shifts 1 and 3 between 2003 and 2006. In 2006, Shift 1 and Shift 2 were unchanged from 2005 levels, and Shift 3 had a slight reduction. Overall, the Metro West Bureau reported a reduction of 0.2% percent between 2003 and 2006.



Figure 4.5: Percent of Drivers Stopped – Recorded as Native American – Metro West Bureau: 2003-2006

NOTE: Metro West and Shift 1 have the same trend line - only Shift 1 is displayed.

Figure 4.6 reports the stopping trends for Black drivers between 2003 and 2006 in the Metro West Bureau. All three shifts reported increases in percentage of stops of Black drivers between 2005 and 2006. The most dramatic change over the four year period was reported by Shift 3; after a slight increase from 2003 to 2004, the percent increased nearly 2% in 2005 and 0.8% the following year. In contrast, Shift 1 reported substantial decreases in the percentage of stops involving Black drivers (over 1%) between 2003 and 2005 before increasing in 2006. Finally, Shift 2 reported a pattern of increasing approximately 0.5% across each of the reporting periods. These individual shift patterns contributed to the overall increasing trend throughout the Metro West Bureau.



Figure 4.6: Percent of Drivers Stopped - Recorded as Black - Metro West Bureau: 2003-2006

Southern Bureau

Figure 4.7 reports the stopping trends for drivers who were Hispanic between 2003 and 2006 in the Southern Bureau. Yuma and Casa Grande both demonstrated increases in their rates in 2006 compared to 2005. Conversely, Tucson and Sierra Vista had lower rates of Hispanic stops in 2006 compared to the previous year. Over the four year period, Yuma and Casa Grande increased their rate of Hispanic stops by 9% and 4%, respectively, while Tucson demonstrated a slight reduction and Sierra Vista was virtually unchanged. Overall, the Southern Bureau increased its rate of Hispanic stops by approximately 3% between 2003 and 2006. This trend should be continually monitored in 2007.



Figure 4.7: Percent of Drivers Stopped – Recorded as Hispanic – Southern Bureau: 2003-2006

Figure 4.8 reports the stopping trends for Native American drivers between 2003 and 2006 in the Southern Bureau. In 2006, Casa Grande was the only district that had an increase in stops of this group when compared to 2005 – all other districts were either unchanged or reported slight decreases. Across the four years, Casa Grande and Sierra Vista reported increases in the percent of drivers stopped who were Native American, while Yuma and Tucson reported decreases. Overall, the trend for stopping Native American drivers in the Southern Bureau is fairly stable.



Figure 4.8: Percent of Drivers Stopped – Recorded as Native American – Southern Bureau: 2003-2006

Figure 4.9 reports the stopping trends for Black drivers in the Southern Bureau. Yuma and Casa Grande experienced increases in the percent of stopped drivers who were Black between 2005 and 2006. For the remaining two districts, Tucson and Sierra Vista, there were no changes in the percent of drivers stopped who were Black between 2005 and 2006. Across all four years, Yuma, Casa Grande, and Tucson all had higher rates in 2006 when compared to 2003. Overall, the Southern Bureau demonstrated an increasing trend between 2003 and 2006 due to the consistent increases in all its districts (except Sierra Vista), though this increase is only approximately 0.5%.



Figure 4.9: Percent of Drivers Stopped – Recorded as Black – Southern Bureau: 2003-2006

Commercial Vehicles Bureau

Figure 4.10 reports the stopping trends for Hispanic drivers between 2003 and 2006 in the Commercial Vehicles Bureau. During this time period, District 15 reported a fairly consistent increase in the percent of Hispanic drivers stopped across all of the time periods. District 16 reported a reduction of approximately 0.5% in 2006. This however, was preceded by a 4% increase in 2005. Overall, the Commercial Vehicle Bureau reported a 5% increase in their rate of Hispanic stops across the four year period.

Figure 4.10: Percent of Drivers Stopped – Recorded as Hispanic – Commercial Vehicle Bureau: 2003-2006



Figure 4.11 reports the stopping patterns for Native Americans in the Commercial Vehicle Bureau. Lower rates of motorists stopped who were Native American were reported in both District 15 and District 16 in 2006 compared to 2005. In District 15, this reversed the increasing trend of the previous two years, while this result in District 16 is consistent with the previous years. Overall, the Commercial Vehicle Bureau reported a lower rate of drivers stopped who were Native American in 2006 when compared to any previous year.



Figure 4.11: Percent of Drivers Stopped – Recorded as Native American – Commercial Vehicle Bureau: 2003-2006

Figure 4.12 reports the stopping trends for Black drivers between 2003 and 2006 by the Commercial Vehicle Bureau. During this time period, District 16 reported an increase of 1% between 2005 and 2006. Prior to this period, the percent of drivers stopped who were Black was relatively constant and only fluctuated slightly. In contrast, District 15 reported a decrease between 2005 and 2006 in the percent of drivers stopped who were Black. This decrease followed increases during the prior time periods within District 15. Overall, the rate of Black stops by the Commercial Vehicle Bureau increased slightly between 2003 and 2006.



Figure 4.12: Percent of Drivers Stopped – Recorded as Black – Commercial Vehicle Bureau: 2003-2006

Metro-East Bureau

Figure 4.13 reports the stopping trends for Hispanic drivers between 2003 and 2006 in the Metro East Bureau. In 2006, both Shift 2 and Metro Motors reported increases (1.8% and 2.1% respectively). Shift 1 and Shift 3 both reported a reduction of at least 1% in 2006 in the percent drivers stopped who were Hispanic. Throughout all years, the Canine District demonstrated noticeable increases from below 20% to almost 40%. This pattern should be examined in future analyses. Overall, the Metro East Bureau had a slight increase in percent of stops of drivers (2.9%) who were Hispanic in 2006.



Figure 4.13: Percent of Drivers Stopped – Recorded as Hispanic – Metro East Bureau: 2003-2006

NOTE: Shifts 1 and 3 are not shown for 2003 due to unstable rates.

Figure 4.14 reports the stopping trends for Native American drivers in the Metro East Bureau across the four years. In 2006, Shift 2, Metro Motors, and the Canine District reported increases in the percentages of Native American drivers stopped compared to 2005, while Shift 1 and Shift 3 had slight decreases. Without considering 2003 (due to the low number of traffic stops reported), Shift 1 and Shift 3 had lower rates of Native American drivers stopped in 2006 compared to 2004. Shift 2 is trending upward across these years. The Canine District has a noticeable upward trend since 2004 after an initial reduction from 2003. Overall, the Metro East Bureau has a lower rate of drivers stopped who were Native American in 2006 when compared to 2003 or 2004; however, there is a slight increase when compared to 2005.



Figure 4.14: Percent of Drivers Stopped – Recorded as Native American – Metro East Bureau: 2003-2006

NOTE: Shifts 1 and 3 are not shown for 2003 due to unstable rates.

Figure 4.15 reports the stopping trends for Black drivers by the Metro East Bureau between 2003 and 2006. Due to the small number of stops reported by this Bureau in 2003, the rates in 2003 are slightly unstable. Between 2005 and 2006, each Shift and the Metro Motors District reported slight increases in the percent of drivers stopped who were Black. The largest increase (0.8%) was reported by Shift 2; Shift 1, Shift 3 and Metro Motors each reported increases of 0.6% or less during this same time period. All four districts also reported increases in their percent of Black drivers stopped across the prior time periods. The Canine District reported increases in their rate of Black stops in 2006 compared to 2005, after consistent reductions in the rate of stopping this minority group. Overall, the Metro East Bureau had a slightly increasing rate of Black drivers who were stopped from 2004 and 2006.

Metro Motors Canine

Figure 4.15: Percent of Drivers Stopped – Recorded as Black – Metro East Bureau: 2003-2006

NOTE: Shifts 1 and 3 are not shown for 2003 due to unstable rates.

<u>Statistical Analysis of Minority Groups' Traffic Stops at the District/Shift Level: 2003 – 2006</u>

As demonstrated in Figures 4.1 - 4.15, trends of stopping Hispanic, Native American, and Black drivers varied considerably by district/shift between 2003 and 2006. While these figures are useful for descriptive purposes, they do not examine if there are statistically significant differences in the rates of stopping Hispanic, Native American, and Black drivers. To address this issue, a statistical test, the binomial, was calculated at the district/shift level based on the four years of data and assesses the patterns of traffic stops for Hispanic, Native American, and Black drivers.

The binomial significance test was used for this analysis because it allows for a comparison of two proportions to determine if there is a statistically significant difference in the two values. In addition, it considers the sample size (i.e., the number of traffic stops) when determining if there is a statistical difference between the two proportions. The result of the binomial test is a value that is interpretable as the probability of that outcome occurring by chance alone. In other words, the value produced by the binomial is the confidence that the difference between the two proportions is in fact a real statistical difference and not an artifact of the data. For example, if a 0.0001 confidence level is used, the binomial statistic should be interpreted as reflecting a statistically significant difference between the proportions 9,999 times out of 10,000. Alternatively, only 1 out of 10,000 times will this result occur due to chance alone.

Importantly, the binomial is particularly appropriate for examining percentages across time periods when the total number of events change across those time periods. In this case, there is a fluctuating number of traffic stops across years, both when considering all traffic stops and traffic stops of only minority drivers. The binomial considers these varying numbers of cases when determining statistical significance. Moreover, because the binomial considers the number of cases, it also accounts for locations that have a small number of stops. In other words, the result of the binomial has taken into account areas that have small numbers of stops and has corrected for any bias that may be associated with such conditions. Simply put, this statistical technique takes into account the small number of stops in some locations when calculating measures of statistical significance.

Prior to computing the binomial, a stringent confidence level was selected (0.0001), which allows for an extremely high degree of confidence in the result. That is, for each district/shift, an independent binomial value is produced, and only if that value reaches the .0001 level is that district/shift identified as having a statistically significant difference in their rate of stopping the racial/ethnic group of interest during the selected time period. Based on these criteria, binomial analyses were conducted for all district/shifts and reported in Tables 4.3 - 4.5.

In these tables, the first four columns report the number of traffic stops of the minority group. In the next four columns, the percent of stops of the minority group are reported for all four years. Finally, three columns report whether there was a significant change in the rate of stops in previous years when compared to 2006. Importantly, these columns reflect the analysis between the rate of traffic stops in 2003 and 2006, the rate of traffic stops in 2004 and 2006, and the rate of traffic stops in 2005 and 2006, respectively. The results are characterized by the following symbols:

- "No" = indicates that no statistically significant change occurred between the years analyzed
- "+" = indicates that there was a statistically significant **increase** in the rate of traffic stops in the earlier year when compared to 2006
- "-" = indicates that there was a statistically significant **decrease** in the rate of traffic stops in the earlier year when compared to 2006
- "n/a" = indicates no comparison was conducted due to an unstable rate of traffic stops

Based on these categorizations, each district/shift was compared in three independent analyses. In this manner, the change in rates of traffic stops for each minority group from year to year is compared with the most recent year (i.e., 2006). This analysis reports the trends in each district/shift and whether any change is statistically significant.

Importantly, a statistically significant increase in the rate of stopping a minority group cannot be used to conclude the existence of officer bias. As previously mentioned, there are a variety of potential explanations for a change in the rate of minority stops that include but are not limited to racial bias. Changes in the residential population, alterations in the driving patterns of the minority group, organizational shift in deployment patterns, or officer bias are all **potential** explanations, but the simple identification of an elevated rate cannot be used to prove racial bias. These analyses are useful to identify trends across time and areas that may need further examination to assess the validity of the aforementioned explanations.

Hispanic Drivers

Table 4.3 reports the rate of traffic stops for Hispanic drivers between 2003 and 2006 at the district/shift level.¹⁸ Based on the eighteen units that were analyzed in all four years, two units (i.e., Globe and Sierra Vista) had no statistically significant change in any of the three comparisons, while two other units reported a statistically significant change in only one of the three years. Flagstaff and Prescott had significant increases in their rate of Hispanic traffic stops when comparing 2003 to 2006, but neither their 2004 nor their 2005 rate was significantly different from the rate in 2006.

Three units experienced statistically significant increases in two of the three years compared using the binomial analysis. Metro West Shift #2, and District 16 each had one year in which there was no significant difference from 2006 and two years in which their rate of traffic stops with Hispanic drivers was statistically lower than their rate of stops in 2006. Metro West Shift #1 demonstrated fluctuation showed a decrease in 2006 when compared to 2003, but an increase when compared to 2004.

The remaining eleven units had significant changes in all three comparisons. Tucson experienced a statistically significant decrease in the rate of Hispanic traffic stops when comparing 2003, 2004, and 2005 to 2006. The other ten units reported the inverse result as all comparisons indicated an increase in 2006 when compared with each prior year. Although all ten units exhibited statistically significant increases, some of these changes are more substantial than others. See Table 4.3 for the specific rates of stops and the results of the comparison by organizational unit.

¹⁸ Throughout Tables 4.3 - 4.5, comparisons are reported for all organizational units of interest except for Metro East Shifts 1-3 in 2003. These units did not have enough traffic stops of the minority group of interest during this year thus leading to unstable rates of stops in 2003. As a result, no binomial analyses were conducted comparing the rates of stops in 2003 to rates of stops in 2006 for these units. The subsequent summaries of these tables will be focused on the eighteen organizational units in which all three analyses were completed (i.e., 2003 to 2006, 2004 to 2006, and 2005 to 2006). Please refer to Tables 4.3 - 4.5 for binomial results for Metro East Shifts 1-3.

	<u># Hispanic Stops</u>					<u>% Hispa</u>	nic Stops	Significant	Significant	Significant	
	2003	2004	2005	2006	2003	2004	2005	2006	Change 2003-2006	Change 2004-2006	Change 2005-2006
D1-Kingman	4,335	4,650	3,767	4,093	12.8	13.9	13.6	14.8	+	+	+
D2-Flagstaff	2,950	3,758	3,681	2,832	9.7	11.0	10.9	10.8	+	No	No
D3-Holbrook	3,493	4,711	4,897	5,520	8.7	9.4	9.8	10.5	+	+	+
D11-Globe	2,700	3,166	2,873	2,567	11.1	11.0	10.7	10.7	No	No	No
D12-Prescott	4,038	4,634	4,073	4,213	12.0	13.3	13.2	13.3	+	No	No
Metro West Shift #1	6,664	6,082	5,937	5,575	26.3	23.5	24.6	25.4	-	+	No
Metro West Shift #2	7,344	7,896	7,059	7,099	21.7	22.9	28.8	28.8	+	+	No
Metro West Shift #3	4,476	5,142	3,392	4,484	19.2	20.5	28.9	32.0	+	+	+
D4-Yuma	8,653	10,761	11,203	14,698	30.7	34.5	37.1	39.6	+	+	+
D6-Casa Grande	10,470	10,237	10,322	10,364	26.3	23.9	27.9	29.9	+	+	+
D8-Tucson	15,249	19,075	18,974	15,151	42.7	41.4	42.3	40.1	-	-	-
D9-Sierra Vista	10,831	10,176	10,344	9,590	32.3	32.4	32.5	32.0	No	No	No
District 15	1,138	1,198	1,198	1,222	13.8	15.9	17.1	18.8	+	+	+
District 16	6,373	6,652	7,027	8,178	40.2	38.8	42.7	42.1	+	+	No
Metro East Shift #1	1	862	2,708	2,277	50.0*	18.5	21.2	20.1	n/a	+	-
Metro East Shift #2	7	646	3,245	4,802	10.1	17.4	19.9	21.7	n/a	+	+
Metro East Shift #3	0	869	2,788	2,989		24.6	23.4	22.3	n/a	-	-
Metro Motors	4,873	3,822	3,350	3,562	21.6	22.9	23.0	25.1	+	+	+
Canine	1,536	2,397	1,788	2,656	19.5	28.0	32.4	38.6	+	+	+
Canine North	359	688	438	507	13.7	19.3	21.4	24.8	+	+	+
Canine Central/South	1,173	1,703	1,333	2,135	22.4	34.4	38.9	44.2	+	+	+

Table 4.3: Statistical Comparison of Hispanic Stops between 2003 & 2006 at the District/Shift Level

* = Based on less than 50 traffic stops
 -- = No calculation conducted due to low number of stops
 + = A statistically significant increase in the percent of stops
 - = A statistically significant decrease in the percent of stops
 No = No statistically significant change in the percent of stops

Native American Drivers

Table 4.4 reports the statistical analysis of Native American drivers stopped between 2003 and 2006 at the district/shift level. Of the eighteen units analyzed, five reported no statistically significant changes in their rate of drivers stopped who were Native American. Three other units reported a significant change in only one comparison and no difference in the other two comparisons. Specifically, Yuma had a decrease between 2003 and 2006, but not in the other comparisons, Metro Motors had a decrease between 2004 and 2006, and the Canine District collectively had an increase between 2004 and 2006, but not in the other comparisons.

Seven units had statistically significant changes in two of the three comparisons. Metro West Shift #1, Metro West Shift #3, Tucson, and District 16 all reported reductions in their 2006 rate of Native American drivers stopped when compared to their rates in 2003 and 2004. Conversely, Kingman, Globe, and Casa Grande reported statistically significant increases in their 2006 rate of Native American drivers stopped when compared with 2003 and 2004.

Three units had significant changes across all comparisons. Holbrook reported a decline in the rate of Native American traffic stops in 2006 compared to 2003, 2004, and 2005. Flagstaff and Prescott demonstrated an increase in the rate of drivers stopped who were Native American in 2006 when compared to 2003, 2004, and 2005. This pattern needs to be monitored in future years of data collection. See Table 4.4 for the specific rates of stops and the results of the comparison by organizational unit.

	<u># Native American Stops</u>				<u>0</u>	% Native An	nerican Stop	Significant	Significant	Significant	
	2003	2004	2005	2006	2003	2004	2005	2006	Change 2003-2006	Change 2004-2006	Change 2005-2006
D1-Kingman	467	442	450	464	1.4	1.3	1.6	1.7	+	+	No
D2-Flagstaff	5,215	5,160	5,760	4,736	17.2	15.1	17.0	18.0	+	+	+
D3-Holbrook	11,051	13,119	13,161	12,215	27.6	26.3	26.4	23.3	-	-	-
D11-Globe	1,532	1,899	1,864	1,723	6.3	6.6	6.9	7.2	+	+	No
D12-Prescott	857	938	753	985	2.5	2.7	2.4	3.1	+	+	+
Metro West Shift #1	261	264	183	165	1.0	1.0	0.8	0.8	-	-	No
Metro West Shift #2	277	293	204	191	0.8	0.8	0.8	0.8	No	No	No
Metro West Shift #3	284	286	112	118	1.2	1.2	1.0	0.8	-	-	No
D4-Yuma	276	268	258	305	1.0	0.9	0.9	0.8	-	No	No
D6-Casa Grande	969	964	962	989	2.4	2.2	2.6	2.8	+	+	No
D8-Tucson	644	772	536	446	1.8	1.7	1.2	1.2	-	-	No
D9-Sierra Vista	258	302	342	290	0.8	1.0	1.1	1.0	No	No	No
District 15	84	84	92	75	1.0	1.1	1.3	1.2	No	No	No
District 16	64	68	50	44	0.4	0.4	0.3	0.2	-	-	No
Metro East Shift #1	0	65	145	116	0.0*	1.4	1.1	1.0	n/a	-	No
Metro East Shift #2	0	39	183	278	0.0	1.1	1.1	1.3	n/a	No	No
Metro East Shift #3	0	69	211	227		2.0	1.8	1.7	n/a	No	No
Metro Motors	274	232	134	136	1.2	1.4	0.9	1.0	No	-	No
Canine	266	241	186	249	3.4	2.8	3.4	3.6	No	+	No
Canine North	51	42	17	26	1.9	1.2	0.8	1.3	No	No	No
Canine Central/South	214	199	166	223	4.1	4.0	4.8	4.6	No	No	No

Table 4.4: Statistical Comparison of Native American Stops between 2003 & 2006 at the District/Shift Level

* = Based on less than 50 traffic stops
 n/a = No calculation conducted due to low number of stops
 + = A statistically significant increase in the percent of stops
 - = A statistically significant decrease in the percent of stops
 No = No statistically significant change in the percent of stops

Black Drivers

The analyses reported in Table 4.5 focus on Black drivers and indicate that in nine of the eighteen districts/shifts there were no statistically significant changes in the rate of stops for 2006 compared to previous years. One unit – Prescott –demonstrated statistically significant changes in one year compared to 2006.

Four of the remaining eight units had two years that were statistically different from 2006. Yuma, Tucson, and Metro Motors all exhibited statistically significant increases in the percentage of Black drivers stopped in 2006 compared to 2003 and 2004. The percent of stopped motorists who were Black in Metro West Shift #1 in 2006 (6.0%) was significantly greater than the percent stopped in 2005 (5.5%), but significantly lower than the percent stopped in 2003 (6.7%). The final four units had statistically significant increases in their rate of Black stops across all three comparisons. Metro West Shift #2, Metro West Shift #3, Casa Grande, and District 16 all had statistically higher rates of Black motorists stopped in 2006 compared to every year since 2003. For example, the rates in Metro West Shift #2 increased from 4.5, to 5.0, to 5.7, to 6.7 in 2006. These trends should be monitored and reassessed using 2007 data. See Table 4.5 for the specific rates of stops and the results of the comparison by organizational unit.

	<u># Black Stops</u>					<u>% Blac</u>	ck Stops	Significant	Significant	Significant	
	2003	2004	2005	2006	2003	2004	2005	2006	Change 2003-2006	Change 2004-2006	Change 2005-2006
D1-Kingman	1,042	1,070	938	875	3.1	3.2	3.4	3.2	No	No	No
D2-Flagstaff	987	1,010	1,052	828	3.3	3.0	3.1	3.2	No	No	No
D3-Holbrook	976	1,305	1,360	1,334	2.4	2.6	2.7	2.5	No	No	No
D11-Globe	302	399	351	298	1.2	1.4	1.3	1.2	No	No	No
D12-Prescott	749	976	759	824	2.2	2.8	2.5	2.6	+	No	No
Metro West Shift #1	1,693	1,582	1,316	1,315	6.7	6.1	5.4	6.0	-	No	+
Metro West Shift #2	1,520	1,737	1,398	1,650	4.5	5.0	5.7	6.7	+	+	+
Metro West Shift #3	1,276	1,493	932	1,216	5.5	6.0	7.9	8.7	+	+	+
D4-Yuma	999	1,127	1,218	1,513	3.5	3.6	4.0	4.1	+	+	No
D6-Casa Grande	1,314	1,555	1,445	1,490	3.3	3.6	3.9	4.3	+	+	+
D8-Tucson	1,100	1,588	1,727	1,463	3.1	3.4	3.9	3.9	+	+	No
D9-Sierra Vista	1,275	1,189	1,201	1,148	3.8	3.8	3.8	3.8	No	No	No
District 15	464	450	457	402	5.6	6.0	6.5	6.2	No	No	No
District 16	638	694	641	946	4.0	4.0	3.9	4.9	+	+	+
Metro East Shift #1	0	233	763	739	0.0*	5.0	6.0	6.5	n/a	+	No
Metro East Shift #2	2	202	1,004	1,543	2.9	5.4	6.2	7.0	n/a	+	+
Metro East Shift #3		241	846	1,000	n/a	6.8	7.1	7.5	n/a	+	No
Metro Motors	1,236	1,056	972	1,003	5.5	6.3	6.7	7.1	+	+	No
Canine	778	759	464	620	9.9	8.9	8.4	9.0	No	No	No
Canine North	300	403	221	236	11.4	11.3	10.8	11.6	No	No	No
Canine Central/South	478	354	242	384	9.1	7.2	7.1	8.0	No	No	No

Table 4.5: Statistical Comparison of Black Stops between 2003 & 2006 at the District/Shift Level

* = Based on less than 50 traffic stops
 n/a = No calculation conducted due to low number of stops
 + = A statistically significant increase in the percent of stops
 - = A statistically significant decrease in the percent of stops
 No = No statistically significant change in the percent of stops

SECTION SUMMARY

Section 4 reports analyses of officer-initiated traffic stops by DPS personnel in 2006. When assessing traffic stops, one of the primary challenges is the difficulty in determining an appropriate comparison group against which the traffic stop data can be compared. A variety of methods exist for such analyses; however, all of the benchmarks have limitations in terms of their ability to approximate the population of drivers eligible to be stopped. Based on the UC research team's review of the available benchmark comparisons, it was determined that methodologies *other than traditional external benchmarking* of traffic stop data would be initially used for the purpose of promoting effective and respectful policing. Further, it was recommended that an internal benchmarking methodology to analyze the traffic stop data be attempted.

Internal comparison is an alternative to benchmarking in which "similarly situated" officers (i.e., matched on assignment, geography, and shift) are compared against one another to identify individual officers who may be stopping particular racial/ethnic groups in a disparate manner. DPS organizational units were assessed to identify those that were appropriate for an internal benchmarking analysis. To be selected for analyses, all officers within the organizational unit must have similar assignments, patrol similar geography, and work the same shifts. Upon review of the entire DPS organization, no organizational units met this criteria and this type of internal benchmarking was not conducted.

Internal comparisons were examined for four years of data by focusing on trends in traffic stops between 2003 and 2006 at all organizational units across drivers' racial/ethnic groups. It is important to note that a large number of the analyses reported in this section are descriptive, and when based on statistical testing, are strictly of the bivariate nature. These findings should be interpreted with caution, as not all possible factors that might explain the results are explored (see Section 4 for more detailed analyses). The following findings are noted:

Traffic Stop Data: 2003-2006

- Between 2003 and 2006, the number of officer-initiated traffic stops increased from 438,574 in 2003 to 460,545 in 2006. The number of traffic stops in 2006 represented a slight reduction, however, from the two previous years (482,479 in 2004 and 461,962 in 2005).
- Between 2003 and 2006, Caucasian drivers consistently represented between 62% and 66% of all traffic stops. Hispanic drivers accounted for roughly one quarter of all stops, with Native American drivers representing approximately 5%, and Black drivers accounting for roughly 4% of all traffic stops.
- These levels varied increasingly as more specific organizational units were examined (i.e., divisions, bureaus, and districts/shifts); as a result, more thorough analyses were conducted at the district/shift level.
 - Binomial statistical tests were conducted for Hispanic, Native American, and Black drivers. The rate of traffic stops for each of these groups was assessed

between 2003 and 2006, 2004 and 2006, and 2005 and 2006 to identify the long term trends.

- The results of these analyses revealed that:
 - Ten districts/shifts that had statistically significant increases in all three comparisons for Hispanic drivers (Kingman, Holbrook, Metro West Shift #3, Yuma, Casa Grande, District 15, Metro Motors, Canine District, Canine North squad, Canine Central & South squad)
 - Three districts/shifts that reported significant increases in all comparisons for Native American drivers (Holbrook, Flagstaff, and Prescott)
 - Four districts/shifts had elevated rates of Black drivers in all three comparisons (Metro West Shift #2, Metro West Shift #3, Casa Grande, and District 16)
- These units need to be monitored in upcoming data collection efforts to determine whether the findings represent continuing trends. Further, DPS officials should examine potential explanations for these trends (e.g., changes in residential populations, alterations in travel patterns, modifications to Arizona legislation, etc.).
5. ANALYSES OF TRAFFIC STOP OUTCOMES

OVERVIEW

In this section, differences in post-stop outcomes (e.g., warnings, citations, arrests, and searches) are examined in greater detail. Specifically, Section 5 includes: 1) a descriptive overview of traffic stop outcomes across DPS organizational units and Arizona counties, as well as by severity of outcomes, 2) a descriptive overview of the types of violations for which citations and warnings are issued, 3) differences in post-stop outcomes across types of drivers, and 4) multivariate statistical analyses predicting post-stop outcomes.

Initially, Figure 5.1 and Table 5.1 report the percent of each type of stop outcome at the department, division, bureau, and district/shift levels for 2006. Table 5.2 reports the same information at the county level. Table 5.3 displays the percentages of each of the most severe stop outcomes for motorists. Tables 5.4 and 5.5 report the percentages of the types of violations for which citations and warnings are issued. Thereafter, post-stop outcomes for officer-initiated traffic stops conducted during 2006 are examined by drivers' race/ethnicity and gender at the department, division, bureau, and district/shift levels. Figure 5.2 displays the racial/ethnic differences in most severe outcome received. Tables 5.6 and 5.7 document statistically significant differences across racial/ethnic and gender groups for warnings, citations, arrests, and searches across all organizational units. These relationships are then further explored in multivariate statistical analyses presented in Tables 5.8 - 5.11. These multivariate analyses are designed to examine the independent effect of drivers' race/ethnicity over the likelihood of receiving warnings, repair orders, citations, arrests, searches, seizures, and multiple citations. A description of the multivariate analyses is provided, and the findings are explained that predict these officer actions. Further analysis of racial/ethnic differences in citations is provided by examining the racial/ethnic differences in types of violations for which citations are issued (Figure 5.3) as well as differences in the number of citations received (Figure 5.4).

TRAFFIC STOP OUTCOMES

Analyses of post-stop outcomes are an important consideration of any data collection effort because the potential exists for differential treatment based on the drivers' race, ethnicity, gender, and/or age *after* the initial stop has been made. Therefore, in addition to comparisons of traffic stop data, analyses of post-stop outcomes must be conducted. These analyses should examine racial/ethnic differences in outcomes and include warnings, citations, arrests, searches and/or seizures of contraband (Fridell, 2004, 2005). A major advantage of examining post-stop outcomes is that, unlike traffic stops where the comparison population is unknown and can only be estimated, the comparison population for post-stop outcomes is known. That is, having information on the population of all stopped drivers renders the benchmark comparison unnecessary. Because the comparison population is known (i.e., all stopped drivers), more rigorous statistical and methodological techniques can be applied to understanding disparity in post-stop outcomes.

Within social science, studying a behavior, condition, or outcome invariably involves the collection of multiple pieces of information. Often several data sources are used in an effort to collect as much information as possible regarding the topic of study with the assumption

that more information on the topic will provide greater understanding. Regardless of the topic of study, it is believed that any outcome is the product of numerous factors/variables coalescing to produce the result. This approach to studying post-stop outcomes is grounded in the scientific method. In short, to understand a phenomenon, all potential, reasonable explanations need to be examined and all factors that could contribute to the outcome need to be represented in the analysis.

Upon the discovery of a racial disparity in outcomes, several explanations could exist for such a scenario, including but not limited to, racial bias. Just as with disparity in traffic stops, a number of other reasons could explain disparate outcomes beyond officer bias toward minorities. For each stop that occurs, there are a multitude of characteristics or variables that can be measured, such as the outcome of the stop (e.g., warning, citation, search, and/or arrest), the characteristics of the driver (e.g., race/ethnicity of the driver, age of the driver, etc.), legal considerations (e.g., the reason for the stop, seriousness of the offense, discovery of contraband, etc.), the characteristics of the geographic location where the stop occurred (e.g., crime rate of the neighborhood, racial composition of the neighborhood, etc.). Each of these factors has the potential to have some explanatory power in understanding the complex nature of police-citizen interactions and specifically, post-stop outcomes.

There are several methods for assessing post-stop outcomes described in *Traffic Stop Data Analysis Study Report: Final Literature Review and Review of Other Jurisdictions* (Engel et al., 2007) including: multivariate analyses, outcome tests, propensity scores, trend analyses, spatial analyses, and hierarchical linear modeling. Due to data limitations, only multivariate analyses, outcome test analyses, and trend analyses are conducted for this report. This section describes the use of multivariate analyses. Prior to these analyses, the frequency of post-stop outcomes and bivariate analyses of outcomes by racial/ethnic groups are presented.

Post-Stop Outcomes

As with previous analyses, the examination of post-stop outcomes is based on 460,545 officer-initiated traffic stops conducted in 2006. As noted in Phase III of the data audit (Section 2), however, changes were made by the UC research team for some stops based on additional information from the violation data file. Specifically, 2,967 traffic stops that originally indicated no citation was issued were changed to indicate that at least one citation was issued. In addition, 3,727 stops that indicated no warning was issued were altered to indicate that at least one warning was issued. It is believed that these changes accurately reflect the outcomes for these stops. Note, however, that results reported for the multivariate statistical models (described in detail at the end of this section) did not significantly differ when these cases were altered.

Table 5.1 reports at the department, division, bureau, and district/shift level the percentage of *drivers* receiving each of the following stop outcomes: 1) DVER (Driver Vehicle Examination Report, used to inspect trucks/commercial carriers/drivers), 2) field interview, 3) repair order, 4) tribal citation, 5) warning, 6) citation, 7) arrest, and 8) search. Table 5.2 documents the same information at the county level. Note that drivers may receive multiple

outcomes (e.g., warnings and citations) during a single traffic stop. Therefore, the percentages across stop outcome categories may exceed 100%.

Tables 5.1 and 5.2, as well as Figure 5.1 report that the most frequent outcome for stopped drivers in 2006 was being issued citations (47.2% of all drivers received at least one citation). In addition, over 40% of drivers stopped were issued warnings, while 13.7% were issued repair orders. Occurring rarely were the most serious stop outcomes – specifically, arrests (3.0% of drivers stopped) and searches of the drivers, occupants, or vehicles (4.6% of the stops). Stops resulting in DVERs, field interviews, and tribal citations were statistically infrequent events across the department, and are not examined in detail within this report. Figure 5.1 displays the percentage of stops in 2006 that resulted in each of these outcomes.



Figure 5.1: Percentage of Traffic Stops Resulting in Various Outcomes: 2006 (n=460,545)

Post-Stop Outcomes by Organizational Level

Table 5.1 provides information about the outcomes of officer-initiated traffic stops at the division, bureau, and district/shift levels. At the division level, officers assigned to the Criminal Investigations Division were more likely to issue warnings, arrests, and searches drivers, while officers assigned to Highway Patrol Division were more likely to issue citations and DVERs. At the bureau level, the Southern Bureau issued the highest percentage of repair orders (19.2%), while the Commercial Vehicle Bureau issued the fewest (1.6%). At the bureau level, the Northern Bureau issued the highest percentage of warnings (48.2%), while the Commercial Vehicle Enforcement Bureau issued the fewest (5.5%). There was also variation at the bureau level in the percentages of drivers that were issued citations. Metro East had the highest percentage with 56.5 % of stops resulting in citations, while the Commercial Vehicle Enforcement Bureau had the lowest, with 28.0% of stops resulting in a driver citation. These lower percentages of repair orders, warnings, and citations for the Commercial Vehicle Enforcement Bureau are likely due to their high percentage of stops resulting in DVERs (89.3%).

When compared to the bureau level, traffic stop outcomes at the district/shift level demonstrated greater variation, with warnings ranging from a high of 84.6% of stops by the Canine District to a low of only 3.1% of stops in District 16. The range of repair orders issued is narrower, with a high of 22.1% in District 6 (Casa Grande) and a low of 1.0% in District 16. Finally, the percentage of citations issued varies widely, with a range from 78.0% by Metro Motors to a low of 6.2% by the Canine District.

Table 5.1 also reports the percent of traffic stops that resulted in arrests and searches across organizational units. At the division level, Table 5.1 demonstrates noticeable differences in

the patterns of arrest, search, and seizure activity between the Criminal Investigations and Highway Patrol Divisions. Most likely due to the nature of their assignment, officers assigned to the Criminal Investigations Division were more than twice as likely to arrest drivers they stopped, and over three times as likely to search drivers they stopped compared to Highway Patrol Division officers. At the bureau level, the Metro East Bureau conducted the highest percentages of arrests and searches (4.9% and 7.1%, respectively), while the Commercial Vehicle Bureau conducted the fewest (0.7% and 3.0%, respectively).

At the district/shift level, Metro East Shift #3 performed the highest percentages of arrests and searches (8.3% and 9.6%, respectively), while District 16 conducted the fewest (0.4% and 1.1%, respectively). The Canine District also performed a high percentage of searches, conducting searches during 16.7% of stops.

	Total #	%	% Field	% Repair	% Tribal	%	%	%	%
	of Stops	DVER	Interview	Order	Citation	Warned	Cited	Arrested	Searched
DPS Statewide	460,545	6.2	0.4	13.7	0.6	40.9	47.2	3.0	4.6
Criminal Investigations Division	935	0.1	1.6	14.3	0.1	48.8	44.5	7.3	16.5
Highway Patrol Division	458,068	6.2	0.4	13.8	0.6	40.9	47.2	3.0	4.6
Northern Bureau	162,250	1.5	0.7	13.2	1.6	48.2	44.7	2.4	3.4
D1-Kingman	27,596	1.6	0.7	15.7	0.1	46.7	46.2	3.4	3.9
D2-Flagstaff	26,264	0.9	0.9	14.1	1.5	49.4	40.3	2.6	3.6
D3-Holbrook	52,405	1.2	0.8	12.3	4.0	50.5	43.9	1.9	3.0
D11-Globe	24,081	2.0	0.2	13.3	0.1	49.8	43.2	1.6	2.0
D12-Prescott	31,583	1.8	0.6	11.7	0.1	43.6	49.7	2.6	4.3
Metro West Bureau	61,175	0.7	0.4	14.1	0.0	38.6	52.8	3.7	5.3
Shift #1	21,951	0.7	0.2	11.9	0.0	38.2	56.7	2.1	3.4
Shift #2	24,661	1.0	0.5	15.5	0.0	35.4	53.8	3.4	5.0
Shift #3	14,014	0.2	0.4	14.9	0.0	45.5	44.7	6.9	8.9
Southern Bureau	140,045	1.5	0.3	19.2	0.1	41.7	46.6	2.9	4.8
D4-Yuma	37,080	1.2	0.2	21.6	0.1	43.8	44.4	2.0	3.8
D6-Casa Grande	34,805	1.3	0.4	22.1	0.0	45.7	39.5	2.4	4.0
D8-Tucson	37,784	1.2	0.3	15.2	0.0	40.8	50.1	4.6	7.4
D9-Sierra Vista	30,011	2.4	0.5	17.7	0.0	35.4	53.2	2.5	3.4
Commercial Vehicle Bureau	26,088	89.3	0.2	1.6	0.0	5.5	28.0	0.7	3.0
District 15	6,510	84.7	0.4	3.2	0.0	12.3	37.1	1.6	8.5
District 16	19,432	91.2	0.1	1.0	0.0	3.1	24.9	0.4	1.1
Metro East Bureau	67,957	0.3	0.2	8.4	0.0	37.7	56.5	4.9	7.1
Shift #1	11,344	0.4	0.1	4.8	0.0	38.1	58.9	3.4	4.7
Shift #2	22,127	0.2	0.1	6.3	0.0	33.8	62.2	4.6	5.8
Shift #3	13,382	0.4	0.1	16.1	0.1	39.0	48.3	8.3	9.6
Metro Motors	14,218	0.2	0.6	5.0	0.0	19.6	78.0	3.8	4.2
Canine	6,886	0.4	0.1	13.4	0.0	84.6	6.2	3.5	16.7
Canine North	2,041	0.3	0.6	7.2	0.1	90.3	6.1	3.7	13.2
Canine Central & South	4,827	0.5	0.2	16.1	0.0	82.1	6.3	3.4	18.2

Table 5.1: 2006 Traffic Stop Outcomes – Statewide, Division, Bureaus, & Districts/Shifts

<u>NOTE</u>: Stops may result in multiple outcomes; therefore the percentages across categories may exceed 100%.

Post-Stop Outcomes by County

Table 5.2 documents the percentage of traffic stops that resulted in particular outcomes across 15 Arizona counties. At the county level, the percentage of particular post-stop outcomes varied dramatically. The percentage of stops resulting in repair orders ranged from a high of 19.3% in Pinal County, to a low of 10.7% in Greenlee County. At the county level, Apache County had the highest percentage of drivers that were issued warnings (60.3%), while Cochise County had the fewest (30.7%). The percentage of stops resulting in citations varied at the county level from a high of 56.6% in Maricopa County and a low of 32.7% in Apache County. Likewise, arrests varied from a high of 3.9% in Pima County to a low of 1.5% in Gila County. Finally, the percentage of searches conducted was also highest in Pima County (6.9%), while the lowest percentage was 1.9% in Gila County.

It is important to note that some variation across geographic areas is to be expected based on spatial differences in traffic patterns and criminality. These analyses cannot determine whether or not the reported differences across counties reflect or exceed these expectations. That is, these analyses cannot determine whether the differences in post-stop outcomes across geographic areas are due to normal variations in driver behavior, or represent differential responding patterns across DPS organizational units.

	Total # of Stops	% DVER	% Field Interview	% Repair Order	% Tribal Citation	% Warned	% Cited	% Arrested	% Searched
Arizona	460,545	6.2	0.4	13.7	0.6	40.9	47.2	3.0	4.6
Apache	20,187	4.0	1.0	12.4	7.4	60.3	32.7	1.6	2.6
Cochise	25,080	11.6	0.4	15.8	0.0	30.7	52.9	2.1	2.9
Coconino	31,948	5.8	0.6	11.8	1.2	48.0	41.3	2.3	4.0
Gila	17,214	4.1	0.3	17.1	0.2	51.8	37.9	1.5	1.9
Graham	3,654	1.9	0.2	17.2	0.1	41.4	47.8	2.7	3.7
Greenlee	1,694	4.7	1.1	10.7	0.2	42.3	50.4	2.1	2.6
La Paz	17,963	5.4	0.2	17.5	0.1	48.1	43.2	2.1	3.8
Maricopa	120,319	3.8	0.3	11.2	0.0	33.9	56.6	3.8	5.0
Mohave	20,867	8.9	0.8	15.3	0.1	42.4	44.3	3.4	4.5
Navajo	28,744	2.5	0.6	11.7	1.2	43.2	50.3	2.0	3.3
Pima	34,643	7.7	0.3	15.7	0.0	39.7	44.5	3.9	6.9
Pinal	37,936	8.2	0.3	19.3	0.0	45.1	36.0	2.2	4.7
Santa Cruz	3,483	17.8	0.5	14.2	0.1	37.3	39.9	1.9	5.0
Yavapai	34,784	3.8	0.5	11.8	0.1	43.6	49.2	2.3	4.3
Yuma	18,656	8.3	0.1	15.8	0.1	41.3	45.5	1.8	3.2

 Table 5.2: 2006 Traffic Stop Outcomes – County

NOTE: Stops may result in multiple outcomes; therefore the percentages across categories may exceed 100%

Post Stop Outcomes by Severity

As noted previously, a single traffic stop often results in multiple outcomes. In terms of official sanctions by DPS, it is important to consider traffic stop outcomes as rank ordered by severity. In this section, the categories of outcomes described are rank ordered and the categories are mutually exclusive¹⁹. Each traffic stop is categorized based on the most severe sanction received by the motorist. The rank ordering is as follows (from least severe to most severe):

- Level 1: Warning
- Level 2: Repair Order or DVER
- Level 3: Citation or Tribal Citation
- Level 4: Arrest

For example, if a driver received both a warning and a citation, they would be included in the citation category. Table 5.3 below displays the total number of traffic stops and the percentages of each of the most severe consequences for motorists. As documented, at the department level, for 35.3% a warning was the most severe outcome received. For 16.9% of stops, a repair order or DVER was the most severe outcome received. For nearly half of all traffic stops (44.6%), a citation was the most severe outcome a motorist received. Finally, 3.0% of all stops resulted in an arrest being the most severe outcome received.

At the division level, a higher percentage of drivers received a warning (40.3%) as the most severe outcome, as compared to citations (38.7%). In addition, during stops by CID officers, over twice the percentage of drivers received arrests (7.3%) as the most severe outcome when compared to 3.0% by Highway Patrol Division. The overall department trends are fairly consistent at the bureau and district level with the exceptions of the Commercial Vehicle Bureau and Canine District. Specifically, the majority of stops (68.9%) by the Commercial Vehicle Bureau resulted in a repair order or DVER as the most severe outcome. The majority of stops by the Canine District (78.8%) resulted in a warning being the most severe outcome issued.

¹⁹ 1,198 contacts (0.3%) resulting in field interviews were excluded due to their statistical infrequency. Therefore, the total number of stops analyzed for severity of outcomes is 459,347, rather than 460,545.

	Total # of Stops	% Warning	% Repair Order or DVER	% Citation or Tribal Citation	% Arrest
DPS Statewide	459,347	35.3	16.9	44.8	3.0
Criminal Investigations Division	930	40.5	13.4	38.7	7.3
Highway Patrol Division	456,881	35.3	17.0	44.8	3.0
Northern Bureau	161,678	41.9	12.7	43.1	2.4
D1-Kingman	27,513	38.6	14.6	43.4	3.4
D2-Flagstaff	26,129	45.0	13.9	38.4	2.6
D3-Holbrook	52,213	44.0	11.1	42.9	1.9
D11-Globe	24,055	42.9	13.6	41.9	1.6
D12-Prescott	31,449	37.8	11.9	47.7	2.6
Metro West Bureau	61,007	33.2	13.4	49.6	3.8
Shift #1	21,925	32.0	10.9	55.0	2.1
Shift #2	24,561	30.7	14.9	51.1	3.4
Shift #3	13,974	40.0	14.6	38.4	6.9
Southern Bureau	139,748	34.8	18.1	44.3	2.9
D4-Yuma	37,032	35.2	19.9	42.9	2.0
D6-Casa Grande	34,618	38.2	21.6	37.8	2.4
D8-Tucson	37,709	35.3	14.0	46.0	4.6
D9-Sierra Vista	29,926	29.4	16.9	51.2	2.5
Commercial Vehicle Bureau	26,056	2.9	68.9	27.5	0.7
District 15	6,492	4.5	58.1	35.8	1.6
District 16	19,418	2.2	72.7	24.6	0.4
Metro East Bureau	67,839	34.8	8.1	52.2	4.9
Shift #1	11,334	35.9	4.9	55.8	3.4
Shift #2	22,118	31.5	6.0	58.0	4.6
Shift #3	13,311	35.2	15.8	40.7	8.4
Metro Motors	14,212	17.4	4.4	74.5	3.8
Canine	6,864	78.8	13.5	4.1	3.6
Canine North	2,029	85.0	7.1	4.1	3.7
Canine Central & South	4,817	76.2	16.3	4.1	3.4

Table 5.3: 2006 Most Severe Traffic Stop Outcome Received – Statewide, Division, Bureaus, & Districts/Shifts

Citations & Warnings by Types of Violations

In addition to data regarding the traffic stop, if a citation or warning was issued, information linking to the original stop regarding the number of citations/warnings issued and the specific violations was collected. Tables 5.4 - 5.5 report the percentages of the types of violations for which citations (Table 5.4) and warnings (Table 5.5)²⁰ are issued. The types of violations included are not an exhaustive list of all possible violations; rather they represent the most frequent types of violations for which citations and warnings are issued. Furthermore, multiple violations may be included on citation and warning forms; therefore, the percentages across violation categories exceed 100%.

As shown in Table 5.4, at the department level, there are 211,712 citations for which we have corresponding violation data. The most common types of violations were speeding (56.6%), insurance (21.6%), and drivers' license (15.2%). These are the three most common types of violations across most organizational units.

As shown in Table 5.5, at the department level, there are 180,411 warnings for which we have corresponding violation data. Over half of all violations were for speeding (60.2%), 17.7% were for registration/license plate violations, and violations related to drivers' license and insurance violations were 3.1% and 3.0%, respectively.

²⁰ The following violations were excluded from the warning table due to less than 0.1% of department-wide warnings being issued for those violations: speeding greater than 85 mph, DUI or reckless driving, and drug offenses.

	Total # of Citation Violations	% Speeding	% Speeding over 85 mph	% Registration / License Plate	% Drivers License	% Seat belt / Child restraint	% Required Equipment	% Insurance	% DUI / Reckless driving	% Drug offense
DPS Statewide	211,712	56.5	9.2	9.9	15.2	8.7	1.1	21.6	2.0	0.4
Criminal Investigations Division	399	18.3	1.5	9.8	33.6	3.5	1.3	22.1	4.3	2.3
Highway Patrol Division	210,437	56.6	9.2	9.9	15.1	8.7	1.1	21.6	2.0	0.3
Northern Bureau	70,815	72.8	13.0	3.4	9.5	6.6	0.4	12.4	1.4	0.5
D1-Kingman	12,328	67.7	5.7	3.8	9.2	10.9	0.8	12.6	1.5	0.6
D2-Flagstaff	10,364	73.1	18.4	3.0	9.8	3.9	0.1	12.6	1.2	0.8
D3-Holbrook	22,509	71.5	14.6	2.7	7.9	5.7	0.1	8.9	0.9	0.2
D11-Globe	10,166	79.5	8.2	3.6	8.6	9.3	0.4	11.9	1.2	0.0
D12-Prescott	15,316	74.3	16.0	4.1	12.6	4.6	0.9	17.4	2.0	0.7
Metro West Bureau	31,465	40.7	6.2	17.8	25.4	7.1	2.3	33.3	2.9	0.0
Shift #1	12,082	47.3	8.5	16.0	20.1	7.1	1.5	27.8	0.8	0.0
Shift #2	12,888	39.8	4.7	18.3	25.7	8.3	3.3	34.6	1.8	0.0
Shift #3	6,181	29.5	4.9	20.4	35.3	4.5	1.7	41.9	9.2	0.0
Southern Bureau	63,245	63.5	9.6	8.0	12.8	12.2	0.7	20.3	1.8	0.6
D4-Yuma	15,845	60.6	14.5	5.0	10.6	14.3	0.6	22.6	1.2	0.7
D6-Casa Grande	13,459	66.6	5.1	5.9	12.9	11.9	0.8	15.6	2.2	0.0
D8-Tucson	18,234	51.2	3.2	16.1	18.6	13.3	1.0	28.6	2.5	0.9
D9-Sierra Vista	15,485	78.2	15.8	3.5	7.9	9.1	0.2	12.3	1.2	0.4
Commercial Vehicle Bureau	7,067	15.8	3.5	6.9	6.3	13.2	0.8	9.2	0.4	0.4
District 15	2,332	10.2	1.3	5.1	6.7	14.6	1.1	9.1	0.8	1.0
District 16	4,682	18.2	4.5	7.8	6.1	12.6	0.6	9.2	0.1	0.0
Metro East Bureau	37,596	35.3	5.1	19.1	22.7	7.1	2.1	33.5	3.2	0.1
Shift #1	6,570	36.1	2.4	22.4	23.9	4.9	1.2	38.6	1.3	0.0
Shift #2	13,586	29.4	3.4	22.5	24.5	10.0	2.3	34.7	2.3	0.0
Shift #3	6,266	40.1	5.3	15.9	26.0	4.1	2.3	33.5	11.0	0.0
Metro Motors	10,898	39.1	7.9	15.3	18.0	6.6	2.4	29.5	0.9	0.0
Canine	276	55.8	35.5	2.5	17.8	9.4	0.4	8.0	1.1	7.6
Canine North	82	26.8	18.3	0.0	30.5	2.4	0.0	7.3	0.0	22.0
Canine Central & South	194	68.0	42.8	3.6	12.4	12.4	0.5	8.2	1.5	1.5

Table 5.4: 2006 Violations for Citations Issued – Statewide, Division, Bureaus, & Districts/Shifts

	Total # of Warning Violations	% Speeding	% Registration / License Plate	% Drivers License	% Seat belt / Child restraint	% Required Equipment	% Insurance
DPS Statewide	180,411	60.2	17.7	3.1	0.2	1.8	3.0
Criminal Investigations Division	427	51.1	11.7	5.4	1.4	3.7	4.7
Highway Patrol Division	179,465	60.2	17.7	3.1	0.2	1.8	3.0
Northern Bureau	74,892	76.2	10.3	2.9	0.2	1.4	2.1
D1-Kingman	11,855	62.6	12.5	3.7	0.2	2.1	3.1
D2-Flagstaff	12,591	76.5	10.1	1.9	0.1	1.0	1.7
D3-Holbrook	25,389	84.6	9.0	3.3	0.1	0.5	1.1
D11-Globe	11,522	78.2	10.3	2.5	0.3	2.7	4.1
D12-Prescott	13,344	70.3	10.8	2.4	0.2	1.8	1.5
Metro West Bureau	22,658	41.4	30.2	3.9	0.3	2.1	3.6
Shift #1	7,970	44.8	27.9	3.7	0.4	1.2	4.4
Shift #2	8,344	36.9	33.4	3.1	0.4	1.9	3.7
Shift #3	6,178	42.6	29.0	5.5	0.1	3.4	2.4
Southern Bureau	55,733	56.9	20.2	3.1	0.3	1.8	3.9
D4-Yuma	15,476	61.8	18.8	3.1	0.1	2.4	3.8
D6-Casa Grande	15,281	55.2	22.0	3.7	0.2	1.4	3.8
D8-Tucson	14,680	43.8	25.6	2.4	0.5	1.2	4.3
D9-Sierra Vista	10,104	70.7	11.7	3.3	0.3	2.3	3.5
Commercial Vehicle Bureau	1,260	63.8	11.7	3.9	1.1	1.2	4.1
District 15	680	71.9	8.2	2.6	1.0	0.9	3.5
District 16	537	53.8	16.4	5.6	1.3	1.5	5.0
Metro East Bureau	24,689	36.1	23.7	2.8	0.3	3.2	3.0
Shift #1	4,208	41.6	25.6	2.8	0.2	0.9	3.4
Shift #2	7,173	28.4	31.4	2.4	0.5	3.9	4.3
Shift #3	5,056	40.1	21.7	3.5	0.0	6.3	1.2
Metro Motors	2,715	29.6	26.9	3.1	0.6	1.7	1.7
Canine	5,537	41.4	12.4	2.5	0.4	1.8	3.3
Canine North	1,786	72.4	6.2	0.6	0.0	0.1	0.2
Canine Central & South	3.738	26.6	15.4	3.5	0.6	2.5	4.7

Table 5.5: 2006 Violations for Warnings Issued – Statewide, Division, Bureaus, & Districts/Shifts

Differences in Stop Outcomes across Types of Drivers

Analysis of racial/ethnic differences in post-stop outcomes is an important component of any traffic stop data analysis study because the potential for racial bias in police decision-making is not limited to the initial stopping decision. Indeed, differential treatment based on the drivers' race/ethnicity *after* the initial stop has the potential to be more harmful. Fridell (2004, 2005) notes, that there is some disagreement about what outcomes are more likely to indicate bias; that is, is racial bias more likely at work for more severe outcomes because of their punitiveness, or less severe outcomes because they may not have been based on a legitimate reason for the stop? Researchers disagree; therefore, it is prudent to consider all post-stop outcomes in traffic stop analyses.

The remainder of this subsection examines racial/ethnic differences in the severity of outcomes (Figure 5.2), warnings, repair orders, citations, arrests, and searches (Tables 5.6 - 5.7). For these racial/ethnic comparisons across organizational units, drivers' race is collapsed into four categories – Caucasian, Hispanic, Native American, and Black. Traffic stops where the driver's race was Asian, Middle Eastern, other or unknown, or where the race/ethnicity of the driver was not included on the data collection form (3.4% of the cases) are excluded from these analyses because their total numbers were too small to make racial/gender comparisons across organizational units.

Racial/Ethnic Differences in Most Severe Outcome Received

As noted previously, a single traffic stop often results in multiple outcomes. In terms of official sanctions by DPS, it is important to consider traffic stop outcomes as rank ordered by severity. For the analysis reported in Figure 5.2, the categories of outcomes described are rank ordered and mutually exclusive. The rank ordering is as follows (from least severe to most severe):

- Level 1: Warning
- Level 2: Repair Order or DVER
- Level 3: Citation or Tribal Citation
- Level 4: Arrest

Figure 5.2 below displays the total number of traffic stops for each racial/ethnic group and each group's percentages of each of the most severe consequences for motorists. As shown, statistically significant racial/ethnic differences are evident for the most severe outcome received. Specifically, Hispanics were significantly less likely than other racial/ethnic groups to have a warning be the most severe outcome received. Hispanics and Native Americans were significantly more likely than Caucasians and Blacks to have repair orders or DVERs as the most severe outcome received. Hispanics were significantly more likely than other racial/ethnic groups to have a citation as the most severe outcome received, while Native Americans were significantly less likely to have citations as the most severe outcome received. Finally, for the most severe outcome—arrest—Hispanics, Native Americans, and Blacks were all significantly more likely than Caucasians to have arrest as the most serious outcome received.





Racial/Ethnic Differences in Warnings, Repair Orders, Citations, Arrests & Searches

In addition, it is important to consider racial/ethnic differences in *any* outcomes received. For the comparisons reported below, the outcomes are not mutually exclusive – that is, information regarding the outcomes for traffic stops that result in multiple outcomes is retained. Tables 5.6 - 5.7 report the following information by organizational unit: the total number of stops, the percentage of drivers warned, cited, and arrested, and searched by race/ethnicity and gender categories.²¹

Table 5.6 illustrates the variation in post-stop outcomes (i.e., warnings, repair orders, citations, arrests, and searches) by drivers' race and gender for the department, division, and bureau levels in 2006. At the department level, Hispanic drivers were the least likely to be

²¹ In Tables 5.6 - 5.7, the asterisks indicate statistically significant differences in the outcomes received by racial and gender groups based on bivariate chi-square associations. Chi-square statistics are based on the differences between groups and the sample size. Because this statistical technique is sensitive to sample size, smaller differences between groups can result in statistically significant differences when the sample size is large. Therefore, depending on the sample size used in the chi-square test, statistical significance is reported at the 0.05, 0.01, or 0.001 level. For example, if the 0.05 level is used, a finding is statistically significant if we are 95% confident that the difference between groups is not due to chance; in contrast, a 0.001 level is interpreted as 99.9% confident that the result is not due to chance. Also note that these analyses are based on only the relationship between two variables (e.g., drivers' race and citations). That is, for each chi-square test, the comparison is between one outcome (e.g., citation) and one explanatory variable (e.g., drivers' gender). These findings do not take into account any other factors that might influence the outcome of the stop. In addition, multivariate analyses are reported and statistical significance in these analyses is also signified by an asterisk (see Tables 5.8 - 5.11). These asterisks, however, represent statistical significance when other factors believed to influence the outcome of stops are taken into account.

issued warnings (32.0% of stops) compared to Caucasian (44.4%), Native American (46.2%), and Black (40.6%) drivers. Native Americans were the most likely to be issued repair orders (21.5% of stops) compared to Caucasian (12.8%), Hispanic (16.0%), and Black (10.5%) drivers. Hispanics received the highest percentage of citations, while Native Americans (42.1%) were significantly less likely than Caucasians (45.1%), Blacks (49.7%), and Hispanics (52.8%) to be cited. Hispanic, Native American and Black drivers were all significantly more likely than Caucasian drivers to be arrested and searched. Specifically, Native Americans were the most likely to be arrested (4.9%), followed by Blacks (4.3%), Hispanics (4.2%), and Caucasians (2.4%). Hispanics were the most likely to be searched (7.7% of stops) compared to Blacks (7.1%), Native Americans (6.2%), and Caucasians (3.2%). These racial/ethnic differences in stop outcomes are statistically significant based on a 0.001 level chi-square analysis. That is, the differences noted are likely due to chance no more than 0.1% of the time. Based solely on the statistical significance, these results suggest that a difference exists in the likelihood of receiving various stop outcomes depending on the race of the driver. It is important to recognize, however, that chi-square analyses do not consider other variables when determining statistical significance. That is, the chi-square test does not measure other factors potentially associated with the likelihood of receiving particular stop outcomes; rather, it only considers the race/ethnicity of the driver. Consequently, the results of these analyses should be interpreted with some caution and the multivariate models (reported later in this section) should be examined prior to reaching conclusions regarding the relationship between race of the driver and post-stop outcomes. This caution also applies to the additional findings reviewed below.

Division and bureau level differences in stop outcomes by racial/ethnic characteristics are also displayed in Table 5.6. At the division level, differences are evident between the Criminal Investigation Division and the Highway Patrol Division. Specifically, of stops conducted by CID officers, Caucasians, not Native Americans, are the most likely to be issued warnings. Hispanic drivers, however, were still the least likely to be warned by CID officers. No significant racial/ethnic differences exist for repair orders issued by CID officers. Citations by Highway Patrol Division officers exhibit the same racial/ethnic differences as at the department level. For CID officers, however, Native Americans were the most likely to be issued citations, while Caucasians were the least likely. Finally, Hispanics and Blacks were searched at significantly higher rates by CID officers compared to Caucasians. Native Americans, however, were the least likely racial group to be arrested and searched by CID officers.

At the bureau level, Hispanics were the least likely to be warned and the most likely to be issued citations across all bureaus, except the Commercial Vehicle Bureau. Other racial/ethnic variation in warnings, repair orders, and citations at the bureau level is shown in Table 5.6. In all bureaus – except the Commercial Vehicle Bureau – the trends in racial/ethnic disparities for arrests and searches are similar to the department-wide pattern. Hispanic, Native American and Black drivers were significantly more likely than Caucasian drivers to be arrested and searched. For the Commercial Vehicle Bureau, Hispanics were the least likely to be arrested and searched compared to the other racial/ethnic categories. Native Americans and Blacks, however, still had higher arrest and search rates than Caucasians.

Gender differences for 2006 stop outcomes are also displayed in Table 5.6. At the department level, male drivers were more likely to be issued repair orders (14.1% of stops), cited (47.4% of stops), arrested (3.4%), and searched (5.4%) compared to female drivers (12.9% repair orders, 46.8% cited, 2.0% arrested, and 2.6% searched). In contrast, female drivers were significantly more likely to be issued warnings (45.5%) compared to male drivers (39.1%). At the division level, males stopped by officers from the Criminal Investigation Division were significantly more likely than females to be searched. The Highway Patrol Division patterns in gender differences were the same as the overall department.

At the bureau level, the patterns in gender differences are similar to the overall department trend in 4 of the 5 bureaus (Northern, Metro West, Southern, and Metro East). That is, in each of the bureaus other than the Commercial Vehicle Bureau, male drivers were more likely to be issued repair orders, cited, arrested, and searched compared to female drivers; female drivers were more likely than males to be issued warnings. Of the stops conducted by the Commercial Vehicle Enforcement Bureau, the major difference was that females (40.6%) were significantly more likely than males to be issued citations (27.3%).

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
	Caucasian	287,346	44.4***	12.8***	45.1***	2.4***	3.2***
	Hispanic	113,064	32.0	16.0	52.8	4.2	7.7
	Native American	23,928	46.2	21.5	42.1	4.9	6.2
DPS Dept	Black	20,445	40.6	10.5	49.7	4.3	7.1
	Male	330,916	39.1***	14.1***	47.4***	3.4***	5.4***
	Female	129,589	45.5	12.9	46.8	2.0	2.6
	Caucasian	482	55.4***	13.9	38.4**	5.4*	11.6***
	Hispanic	330	40.9	17.0	50.3	10.9	23.9
Criminal	Native American	41	43.9	7.3	53.7	2.4	9.8
Investigation Division	Black	56	46.4	12.5	50.0	8.9	25.0
	Male	710	48.6	15.2	43.8	8.0	19.2***
	Female	225	49.3	11.6	46.7	4.9	8.0
	Caucasian	285,862	44.4***	12.8***	45.1***	2.4***	3.2***
	Hispanic	112,387	32.0	16.0	52.8	4.2	7.7
Highway	Native American	23,831	46.2	21.6	42.0	4.9	6.2
Patrol Division	Black	20,303	40.6	10.5	49.6	4.3	7.0
	Male	329,104	39.1***	14.1***	47.3***	3.4***	5.3***
	Female	128,924	45.5	12.9	46.7	2.0	2.6
	Caucasian	112,803	50.5***	11.9***	43.0***	1.8***	2.3***
	Hispanic	19,267	38.2	14.1	55.0	3.5	7.2
	Native American	20,163	47.8	22.3	40.5	4.3	5.2
Northern Bureau	Black	4,166	47.8	9.6	46.5	3.7	6.5
	Male	114,219	47.1***	13.6***	45.5***	2.7***	4.0***
	Female	48,019	50.9	12.2	42.9	1.5	1.8

Table 5.6: 2006 Stop Outcomes by Race and Gender for Department, Division, and Bureaus (p.1 of 2)

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
	Caucasian	37,234	43.4***	14.6***	47.4***	2.9***	3.7***
	Hispanic	17,330	27.4	14.0	64.5	5.4	8.6
	Native American	482	34.2	12.0	57.9	8.9	10.6
Bureau	Black	4,211	40.1	11.4	52.9	4.8	6.8
	Male	43,956	36.8***	14.7***	54.1***	4.3***	6.2***
	Female	17,210	43.1	12.3	49.6	2.3	3.0
	Caucasian	79,316	44.5***	17.4***	44.4***	2.3***	3.2***
	Hispanic	49,958	37.1	22.6	49.8	3.8	7.0
C d	Native American	2,034	39.1	23.8	48.4	6.0	9.0
Bureau	Black	5,637	43.8	15.2	47.4	3.6	6.0
	Male	97,445	40.8***	20.2***	46.6	3.4***	5.6***
	Female	42,587	43.5	16.7	46.6	1.9	2.7
	Caucasian	12,753	8.0***	2.0***	28.4***	0.8**	3.1***
	Hispanic	9,429	2.4	0.9	24.0	0.6	2.1
Commercial Vehicle	Native American	127	14.2	3.9	35.4	3.1	7.1
Enforcement	Black	1,351	5.6	1.6	39.9	1.0	6.2
Bureau							
	Male	24,733	4.6***	1.6	27.3***	0.7	3.0*
	Female	1,354	21.6	2.2	40.6	0.5	1.8
	Caucasian	43,400	39.7***	8.3**	54.5***	3.9***	4.8***
	Hispanic	16,286	30.6	8.9	63.3	6.9	12.7
Metro East	Native American	1,006	38.7	10.0	53.7	13.0	17.3
Bureau	Black	4,905	41.1	7.6	54.6	6.2	9.0
	Male	48,321	36.6***	8.8***	57.4***	5.6***	8.4***
	Female	19,631	40.5	7.6	54.4	3.1	4.1

 Table 5.6: 2006 Stop Outcomes by Race and Gender for Department, Division, and Bureaus (p.2 of 2)

Table 5.7 displays the differences in stop outcomes by driver race and gender at the district/shift level for 2006. Statistically significant differences in warnings between racial/ethnic groups were evident for all 19 districts/shifts. For 13 of the 19 districts/shifts, Hispanics were the least likely racial/ethnic group to be issued warnings, while in the other six, Native American drivers received the lowest percentage of warnings.

Fifteen of the 19 districts/shifts exhibited statistically significant differences in repair orders between racial/ethnic groups. Specifically, Black drivers were the least likely to be issued repair orders in 10 of those 15 districts/shifts, Native Americans in 3 of the 15 districts/shifts, and Caucasians in the remaining 2 of the 15 districts/shifts. Native Americans were the most likely to be issued repair orders in 8 of those 15 districts/shifts, Hispanics in 4 of those 15 districts/shifts, and Caucasians in the remaining 3 of those 15 district/shifts.

For citations, all 19 districts/shifts reported statistically significant differences between racial/ethnic groups. In 10 of these districts/shifts, Hispanic drivers had the highest percentage of citations, while Native Americans and Blacks had the highest percentages of citations in 4 districts/shifts each.

With the exceptions of Districts 15 and 16, all districts/shifts had statistically significant differences between racial/ethnic groups for drivers arrested; in all 17 of those districts, Hispanics, Native Americans, and Blacks were significantly more likely to be arrested than Caucasians. Similarly, across all districts/shifts, Hispanics, Native Americans, and Blacks were significantly more likely to be searched than Caucasians.

Table 5.7 also reports differences in stop outcomes by gender at the district/shift level. Of the 19 districts/shifts, 18 reported statistically significant differences in the likelihood of male and female motorists receiving warnings. Specifically, female drivers were significantly more likely to receive warnings across 18 of the 19 districts/shifts. In 14 of the 19 districts/shifts, statistically significant differences in the likelihood of male and female drivers receiving repair orders were evident. In all but 2 of these districts, male drivers were significantly more likely than female drivers to be issued repair orders. For citations, 13 of the 19 districts/shifts reported statistically significant gender differences in the likelihood of receiving a citation. In all but 2 of these districts, male drivers were significantly more likely than female drivers. For arrests, 16 of the 19 districts/shifts had statistically significant gender differences, and male drivers were more likely than female drivers to be arrested in all 16 districts/shifts. Additionally, in 18 of the 19 districts/shifts, it was also significantly more likely for a search to be conducted in stops of male drivers when compared to stops of female drivers.

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
	Caucasian	20,970	48.6***	15.5***	44.5***	3.0***	3.2***
	Hispanic	4,093	38.4	19.7	52.0	4.8	7.3
District 1	Native American	464	44.8	17.5	49.1	5.6	6.7
Kingman	Black	875	49.3	12.6	44.1	4.3	5.5
-	Male	20,374	45.3***	16.5***	46.8***	3.7***	4.5***
	Female	7,219	50.5	13.5	44.2	2.5	2.1
	Caucasian	16,046	54.1***	11.4***	37.5***	1.6***	2.2***
	Hispanic	2,832	43.3	11.7	49.8	3.7	7.0
District 2	Native American	4,736	40.2	30.3	36.5	5.8	6.5
Flagstaff	Black	828	54.5	6.4	42.5	5.4	8.9
	Male	18,640	49.1	13.6***	41.1***	3.1***	4.4***
	Female	7,623	50.0	15.4	38.3	1.4	1.8
	Caucasian	32,181	52.6***	9.4***	42.7***	1.2***	1.7***
	Hispanic	5,520	39.6	12.3	55.6	2.3	6.1
District 3	Native American	12,215	51.5	20.7	40.0	3.7	4.7
Holbrook	Black	1,334	46.8	9.3	48.7	2.5	6.4
	Male	35,698	49.4***	12.5*	44.8***	2.3***	3.6***
	Female	16,705	52.9	11.8	42.0	1.2	1.7
	Caucasian	19,128	51.5***	12.8***	41.6***	1.2***	1.6***
	Hispanic	2,567	40.1	15.8	51.9	2.9	3.9
District 11	Native American	1,723	48.8	16.9	43.8	3.2	3.9
Globe	Black	298	41.3	10.7	47.0	3.4	3.4
	Male	17,206	48.1***	13.9***	44.2***	1.8***	2.4***
	Female	6,872	54.1	11.7	40.5	1.1	1.2

Table 5.7: 2006 Stop Outcomes by Race and Gender for Districts/Shifts (p.1 of 5)

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
	Caucasian	24,258	46.0***	11.8***	47.1***	2.2***	3.1***
	Hispanic	4,213	31.4	11.6	62.7	4.2	10.7
District 12	Native American	985	38.3	15.5	55.0	5.9	7.4
Prescott	Black	824	43.6	9.8	49.3	3.3	6.4
	Male	22,071	42.7***	12.6***	50.0	3.0***	5.2***
	Female	9,509	45.7	9.5	49.0	1.6	2.1
	Caucasian	14,312	41.5***	12.2***	52.8***	1.5***	2.1***
	Hispanic	5,575	29.1	12.9	66.3	3.6	6.9
Metro West	Native American	165	40.0	12.1	52.7	2.4	3.0
Shift #1	Black	1,315	39.0	6.5	58.6	2.7	4.2
	Male	15,610	37.1***	13.4***	57.0	2.5***	4.0***
	Female	6,335	40.9	8.2	56.0	1.3	2.1
	Caucasian	14,928	41.0***	16.2**	47.3***	2.7***	3.4***
	Hispanic	7,099	22.5	15.0	67.0	4.5	8.0
Metro West	Native American	191	29.8	11.5	60.7	8.9	11.0
Shift #2	Black	1,650	36.8	13.5	54.0	4.7	6.7
	Male	17,723	33.1***	15.7	55.3***	3.9***	5.9***
	Female	6,935	40.3	14.9	49.9	2.0	2.6
	Caucasian	7,674	51.9***	15.9*	37.2***	5.6***	7.1***
	Hispanic	4,484	33.4	13.9	58.1	9.1	11.8
Metro West	Native American	118	33.1	12.7	60.2	17.8	20.3
Shift #3	Black	1,216	45.5	13.9	45.4	7.3	10.1
	Male	10,231	43.0***	15.2	47.1***	7.8***	10.1***
	Female	3,783	52.1	14.2	38.0	4.7	5.5

 Table 5.7: 2006 Stop Outcomes by Race and Gender for Districts/Shifts (p.2 of 5)

`	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
	Caucasian	19,509	47.6***	18.9***	41.9***	1.6***	2.6***
	Hispanic	14,698	38.8	26.5	46.8	2.4	5.3
District A	Native American	305	36.1	31.8	48.9	2.6	5.9
Yuma	Black	1,513	46.8	15.2	47.4	2.9	5.6
	Male	26,316	43.3**	23.1***	44.2	2.3***	4.6***
	Female	10,756	45.0	18.1	45.0	1.2	2.0
	Caucasian	21,155	46.6***	19.2***	40.2***	1.9***	2.6***
	Hispanic	10,364	42.8	28.3	38.6	3.3	6.4
District 6	Native American	989	46.0	24.6	39.4	4.8	7.1
Casa Grande	Black	1,490	51.2	20.1	35.6	2.8	5.6
	Male	24,131	44.5***	23.4***	39.8	2.8***	4.7***
	Female	10,572	48.4	19.1	38.9	1.6	2.3
	Caucasian	19,903	44.9***	14.4***	45.8***	3.6***	5.0***
	Hispanic	15,151	35.1	16.7	56.0	5.8	10.4
District 8	Native American	446	33.4	19.7	59.4	11.7	16.6
Tucson	Black	1,463	45.9	12.7	46.5	5.8	8.9
	Male	26,066	39.6***	15.9***	50.8***	5.3***	8.7***
	Female	11,717	43.6	13.8	48.6	3.0	4.4
	Caucasian	18,476	38.2***	17.1***	50.1***	2.3***	2.7***
	Hispanic	9,590	31.6	19.9	46.9	2.9	4.6
District 9	Native American	290	27.6	19.0	61.7	5.2	7.2
Sierra Vista	Black	1,148	27.8	12.1	63.7	2.7	3.5
	Male	20,601	35.0*	18.5***	52.5***	3.0***	4.1***
	Female	9,409	36.2	15.9	54.7	1.4	1.9

 Table 5.7: 2006 Stop Outcomes by Race and Gender for Districts/Shifts (p.3 of 5)

	Drivers	Total # of stops	% drivers warned	% drivers issued repair order	% drivers cited	% drivers arrested	% drivers searched
	Caucasian	4,333	13.8***	3.2	34.2***	1.3	7.2***
	Hispanic	1,222	7.4	3.0	42.5	2.3	8.9
	Native American	75	13.3	1.3	34.7	2.7	9.3
District 15	Black	402	12.2	4.2	44.3	2.0	13.4
	Male	6,070	11.1***	3.1	37.2	1.6	8.8***
	Female	439	28.9	4.1	35.3	0.7	4.3
	Caucasian	8,316	4.6***	1.3***	25.4***	0.5	0.9***
	Hispanic	8,178	1.6	0.6	21.1	0.4	1.1
	Native American	44	11.4	9.1	31.8	2.3	2.3
District 16	Black	946	2.5	0.5	38.1	0.5	3.1
	Male	18,541	2.4***	1.0	24.0***	0.4	1.1
	Female	891	17.1	1.3	43.3	0.4	0.7
	Caucasian	7,896	41.9***	4.9	55.1***	2.4***	3.0***
	Hispanic	2,277	24.8	5.2	71.6	6.3	9.6
Metro Fast	Native American	116	27.6	7.8	65.5	16.4	18.1
Shift #1	Black	739	39.1	3.7	59.1	5.1	6.6
	Male	7,851	35.2***	5.7***	61.0***	4.2***	5.7***
	Female	3,491	44.5	3.0	54.0	1.8	2.4
	Caucasian	14,733	37.8***	6.5	58.0***	3.8***	4.2***
	Hispanic	4,802	20.3	5.5	76.1	6.6	10.0
Metro East	Native American	278	25.5	5.8	70.1	10.8	13.7
Shift #2	Black	1,543	35.2	6.1	61.2	6.1	7.6
	Male	15,274	31.7***	6.4	64.1***	5.4***	6.9***
	Female	6,850	38.5	5.9	57.8	2.9	3.3

 Table 5.7: 2006 Stop Outcomes by Race and Gender for Districts/Shifts (p.4 of 5)

	Drivers	Total #	% drivers	% drivers issued	% drivers	% drivers	% drivers
	0	of stops	warned	repair order	cited	arrested	searched
	Caucasian	8,637	42./***	17.5***	43.6***	/.0***	/./***
	Hispanic	2,989	27.7	13.6	61.8	11.2	14.4
Metro East	Native American	227	28.2	11.5	61.7	28.2	30.4
Shift #3	Black	1,000	41.3	13.1	48.7	8.7	9.9
	Male	9,556	37.9***	15.6***	49.9***	9.2***	10.8***
	Female	3,826	41.9	17.4	44.1	6.1	6.8
	Caucasian	9,038	22.3***	4.9	75.3***	2.8***	2.8***
	Hispanic	3,562	12.0	5.7	85.2	6.0	7.6
	Native American	136	12.5	2.2	86.8	6.6	5.9
Metro Motors	Black	1,003	23.3	5.3	75.3	4.9	5.9
	Male	10,148	18.3***	5.4**	79.1***	4.4***	5.1***
	Female	4,070	22.9	4.1	75.2	2.1	2.1
	Caucasian	3,096	86.1***	10.2***	6.4**	2.6***	9.9***
	Hispanic	2,656	82.4	17.4	5.5	4.3	25.3
All	Native American	249	82.3	18.9	4.4	3.6	15.3
Canine	Black	620	86.5	11.1	9.2	6.0	18.7
	Male	5,492	84.0**	14.0**	6.2	3.8	18.2***
	Female	1,394	86.9	11.1	6.4	2.7	11.0
	Caucasian	1,156	93.1***	4.4***	5.1***	2.8***	9.0***
	Hispanic	507	87.2	10.8	5.5	3.9	21.1
Canine	Native American	26	76.9	7.7	15.4	3.8	11.5
North	Black	236	84.3	11.4	11.0	8.5	19.1
	Male	1,634	89.2***	8.0**	6.3	3.5	14.0*
	Female	407	94.6	3.9	5.2	4.7	10.1
	Caucasian	1,936	81.9*	13.6***	7.2*	2.6*	10.4***
	Hispanic	2,135	81.3	18.9	5.5	4.3	26.3
Canine Central &	Native American	223	83.0	20.2	3.1	3.6	15.7
South	Black	384	87.8	10.9	8.1	4.4	18.5
	Male	3,841	81.7	16.6	6.2	3.9**	19.9***
	Female	986	83.8	14.1	6.9	1.8	11.5

 Table 5.7: 2006 Stop Outcomes by Race and Gender for Districts/Shifts (p.5 of 5)

Tables 5.6 - 5.7 illustrate the wide variation in outcomes across racial/ethnic and gender groups at the department, division, bureau, and district/shift levels for 2006. It is important to reiterate, however, that the relationships reported in the previous tables are bivariate in nature and thus do not statistically control for other relevant legal and extralegal factors that might influence officer decision-making. Therefore, the information provided in these tables cannot determine whether or not differences in outcomes across racial/ethnic and gender groups are due to officer bias.

It is plausible that racial/ethnic and gender differences in post-stop outcomes exist due to legal and extralegal reasons other than race, ethnicity, and gender. To explore these possibilities, more advanced statistical analyses that control for other legally relevant variables are presented below. The information reported in Tables 5.1 - 5.7 is included in this report solely to provide details to DPS administrators regarding differences in post-stop outcomes at the department, division, bureau, and district/shift levels. Although this information will allow DPS administrators to identify potential problems and target specific districts/shifts for policy interventions, it should not be the sole information used to examine whether or not discriminatory practices exist.

MULTIVARIATE ANALYSES

A multivariate statistical model is one that takes many different factors into account when attempting to explain a particular behavior. Unlike a bivariate model, which simply assesses the relationship between two variables, a multivariate model examines many variables simultaneously, and therefore provides a more thorough and accurate interpretation of the data. In other words, the individual impact of one variable on the outcome can be measured while considering all of the other variables simultaneously.

When a multivariate analysis includes other likely factors that influence stop outcomes and disparity remains, then we can have more confidence in the possibility that racial bias is at work (Fridell, 2004, 2005). Importantly, however, it still cannot be said with certainty that racial disparity in stop outcomes reflects officer bias. That is, although multivariate analysis is a stronger analytical strategy than traffic stop comparisons to benchmark data or bivariate analysis, it is not without its limitations. The key weakness of multivariate statistical analysis is that it can only statistically control for those variables that are measured. This is called "specification error" or the error in a statistical model due to the inability to specify all of the factors that might have an influence over the outcome (in this case, officers' behavior). Due to issues associated with specification error, the results from the multivariate models must be interpreted with caution. Researchers generally note the explanatory factors that are not or could not be measured, and speculate about their possible impact on the results. Despite these limitations, researchers can generally be more confident in the findings of multivariate models that examine traffic stop dispositions because at least some legal and extralegal factors that contribute to officer decision-making are statistically controlled.

In Tables 5.8 - 5.11, the results of seven multivariate models are presented. These multivariate analyses examine the associations between drivers' characteristics and seven post-stop outcomes (i.e., warnings, repair orders, citations, arrests, searches, seizures, and

multiple citations) when other characteristics likely associated with these outcomes are statistically controlled.

Many factors other than drivers' race/ethnicity are likely to influence officers' decision making once a traffic stop has been made. For example, other driver characteristics (e.g., drivers' gender, age, residency), vehicle characteristics (e.g., registration, type of vehicle), stop characteristics (e.g., time of day, day of the week, season), reasons for the stop (moving violations, non-moving violations, equipment violations, etc.), and other legal variables (e.g., evidence found during a search) have all been hypothesized to influence post-stop outcomes. Multivariate analyses allow the examination of the effects of each of these predictor variables, while controlling for the influence of the remaining variables.

For example, the influence of drivers' race can be examined while holding constant the predictive power of drivers' age, reason for the stop, time of day, etc.²² The multivariate analyses below examine the following specific variables for their influence over post-stop outcomes:

- <u>Driver characteristics</u>: race/ethnicity (dichotomous variables Caucasian, Hispanic, Native American, Black, Other; Caucasian is the excluded comparison category), gender (1=male), age (in years), county residency where stop occurred (1=yes), Arizona residency (1=yes).
- <u>Vehicle characteristics</u>: registration (1= Arizona registration), type of vehicle (dichotomous variables cars, truck/tractor trailer, van/station wagon, and other; car is the excluded comparison category)²³
- <u>Stop characteristics</u>: time of day (1=night), day of the week (1=weekend), season (dichotomous variables spring, summer, fall, winter; winter is excluded comparison category)
- <u>Legal variables</u>: reason for the stop (dichotomous variables moving violations, non-moving violations, equipment violations, investigatory stop, externally generated information stop, and criminal offense; moving violations is the excluded comparison category), evidence found during a search (evidence=1)

²² Other characteristics are also believed to potentially influence officer decision making, including officer characteristics (e.g., sex, race, experience, education, assignment), organizational characteristics (e.g., number of officers assigned to district, % canine handlers assigned to area, % minority officers assigned to district, etc.), and community characteristics where the stop occurred (e.g., residential population, poverty, factors related to traffic patterns, etc.). The inclusion of community characteristics, organizational characteristics, and individual officer characteristics in the analyses introduces additional statistical complexity with the use of data at two levels of aggregation. Therefore, the application of a specialized statistical program called hierarchical linear and nonlinear modeling (HLM) would be required. Unfortunately, due to data limitations, the UC research team is currently unable to examine these possibilities. Specifically, the UC research team does not have access to employee demographic information and organizational demographic information. Analyses using DPS data from 2003 demonstrate that these variables do lend to an explanation of racial/ethnic disparities in post-stop outcomes (Engel, 2004, 2005). The community characteristics can only currently be assessed at the county level – with only 15 counties in the state of Arizona, there are too few areas to examine statistically in a hierarchical linear model.

²³ Additional vehicle characteristics (e.g., age and color) are collected on the data collection form but not currently scanned into the electronic dataset. It would be worthwhile to explore the addition of these variables to the electronic data, particularly age of vehicle as it can serve as a proxy for socioeconomic status.

Understanding and Interpreting Multivariate Analyses

Table 5.8 presents the results of two logistic regression models predicting <u>warnings</u> and <u>repair orders</u> issued to drivers during officer-initiated traffic stops in 2006. Table 5.9 presents results for similar logistic regression analyses predicting <u>citations</u> and <u>arrests</u>, while Table 5.10 presents the analyses predicting <u>searches</u> and <u>seizures</u>, and Table 5.11 reports the analyses predicting <u>multiple citations</u>. These models demonstrate what factors likely influence officer decision making when other factors are equal. That is, the effects of drivers' race/ethnicity on the likelihood of being issued warnings, repair orders, citations, arrests or searches are isolated. A statistically significant finding on race/ethnicity would indicate that Hispanic, Native American, and/or Black motorists are significantly more or less likely to be given warnings, repair orders, citations, arrested, or searched compared to Caucasians in similar situations (e.g., traveling during the same times, stopped for the same initial reasons, etc.). In addition, the Exp(b) is calculated and reported as a measure of the log odds – this is loosely translated into the number of times more likely drivers with the given characteristic are to receive the particular outcome compared to others.

For each of the models reported in Tables 5.8 - 5.11, several independent variables were included that could potentially influence officer actions. As shown in the left hand column, the predictor variables include: 1) driver characteristics, 2) vehicle characteristics, 3) stop characteristics, and 4) legal variables. It is believed that each of these variables has the potential to influence officer behavior, and therefore must be statistically controlled to examine our variables of interest (i.e., drivers' race/ethnicity).

Each of the independent variables is assessed relative to their effect upon the post-stop outcome being examined. It is important to note, though, that some variables are excluded from the model for comparison purposes. For example, the drivers' race is captured in the model as Hispanic, Native American, Black, and Other. The "other" category includes Asian/Pacific Islander, Middle Eastern, Other, and Undetermined. Caucasian is excluded from the model for comparison purposes. That is, the influence of the other race/ethnic variables that are reported in the models is in comparison to Caucasians. Thus, the coefficients reported in the models should be interpreted as compared to Caucasians – that is, the likelihood of Black drivers being issued a citation compared to Caucasian drivers. The other dichotomous variables in the models are simply compared against their opposite (e.g., male drivers are compared to female drivers).

The first column in each model reported in Tables 5.8 - 5.11 displays the variable coefficient, or predicted log-odds, for each independent variable. The coefficient represents an additive expression of a particular variable. In the "coefficient" column, there are two things to examine: 1) the presence of an asterisk following the coefficient indicating a statistically significant relationship, and 2) the presence of a negative sign preceding the number. The asterisk reveals whether or not a significant relationship exists between the independent variable (e.g., male drivers) and the dependent variable (e.g., issuing a warning). If an asterisk is not present, the relationship is not considered statistically significant. Due to

the extremely large sample size, the statistical significance of the relationships is assessed at the 0.001 level. The asterisks indicate that the relationships between variables are due to chance less than 0.1% of the time. The sign of the coefficient (i.e., positive or negative) indicates the direction of the relationship. For example, a positive sign on the "driver male" variable would indicate that male drivers are *more* likely than female drivers to receive a particular outcome, while a negative sign would indicate that males are *less* likely than females to receive a particular outcome.

Because the interpretation of log-odds is not intuitively straightforward, this type of coefficient is usually exponentiated to allow for interpretation in terms of odds (Liao, 1994). The second column—the odds ratio—represents this antilog transformation of the coefficient into the multiplicative odds of the outcome variable based on the predictor variable, all being equal. The odds ratio indicates the <u>strength</u> of the relationship. For example, an odds ratio of 3.0 indicates that the presence of the variable (e.g., being a male driver) leads to three times the likelihood of receiving the outcome (e.g., receiving a citation). The strength of the relationship is one of the most important considerations. Even if the relationship between variables is statistically significant, it may not be substantively important. This is due to the large sample size – that is, there is such a large number of traffic stops, even the slightest differences might be considered statistically significant, but not substantively important. That is, the strength of the relationship may not be very large, and therefore, the odds ratio is important to consider when determining the amount of influence particular factors have over the post-stop outcomes.

In summary:

- Check the sign in the coefficient column if positive then the variable contributes positively to the outcome, if negative, the variable contributes negatively (e.g., positive sign indicates Hispanics are more likely to receive an outcome, minus sign indicates Hispanics are less likely to receive outcome).
- 2) If there is an asterisk following the coefficient, it is a statistically significant relationship (i.e., due to chance less than 0.1% of the time).
- 3) The odds ratio indicates the strength of the relationship 1.5 indicates Hispanics are 1.5 times more likely to receive the outcome. As a rule of thumb, with a large sample (over 450,000 traffic stops), only odds ratios over 1.5 should be considered substantively important.

Multivariate Findings

Table 5.8 reports results for logistic regression models predicting whether or not drivers received warnings (first two columns) or repair orders (last two columns).

The statistical model predicting warnings explains over 14% of the variance (Nagelkerke R-Square = 0.142). That is, about 14% of the variation in whether or not drivers receive citations can be predicted with this group of factors. Specifically, during officer-initiated traffic stops in 2006, Hispanic, Black, and drivers of other race/ethnicity were significantly *less* likely compared to Caucasians to receive warnings. In contrast, Native American drivers

were significantly *more* likely than Caucasians to receive warnings. The odds ratios of these coefficients indicate that all of these relationships, though statistically significant, are not particularly strong. Likewise, although gender, age, and residency significantly predict warnings, their influence is relatively weak. In contrast, the strongest predictors of whether or not drivers receive warnings were the reasons for the stop.

The statistical model predicting repair orders is much stronger – explaining nearly 60% of the variance (Nagelkerke R-Square = 0.596). The strength of this model is driven almost entirely by the reason for the stop. As expected, drivers stopped for equipment violations were 114 times more likely to receive a repair order compared to those stopped for moving violations. Likewise, drivers of trucks/tractor trailers were 14.7 times more likely to be issued repair orders compared to drivers of cars. In terms of racial/ethnic differences, Hispanic, Black, and drivers of other races were significantly less likely compared to Caucasians to be issued repair orders. In contrast, Native American drivers were significantly more likely to be issued repair orders compared to Caucasians. The strength of these relationships range between 1.3 to 1.5 times more/less likely to result in repair orders.

Variables	WARNINGS (n=449,134)		REPAIR ORDERS (n=449,134)	
	Coefficient	Odds ratio Exp(b) or 1/Exp(b)	Coefficient	Odds Ratio Exp (b) or 1/Exp (b)
Intercept	-0.41*	1.51	-3.99*	55.56
Driver Characteristics				
Hispanic	-0.35*	1.41	-0.30*	1.35
Native American	0.16*	1.17	0.39*	1.48
Black	-0.08*	1.08	-0.32*	1.38
Other Race	-0.31*	1.37	-0.42*	1.52
Male	-0.13*	1.14	0.02	
Age	0.02*	1.02	0.01*	1.01
County resident	-0.13*	1.14	-0.17*	1.19
AZ resident	-0.16		0.19*	1.21
Vehicle Characteristics				
Arizona registration	0.03		-0.09*	1.10
Truck/Tractor Trailer	-1.02*	2.78	-2.69*	14.71
Van/Station Wagon	-0.00		-0.00	
Other Vehicle Type	0.11		-0.70*	2.02
Stop Characteristics				
Night-time	0.22*	1.24	0.35*	1.42
Weekend	-0.01		0.10*	1.11
Spring	-0.02		-0.04	
Summer	-0.02		-0.07*	1.07
Fall	-0.07*	1.07	-0.05	
Legal variables				
Reason for stop: non-moving violation	-0.01		0.92*	2.51
Reason for stop: equipment violation	-1.40*	4.03	4.73*	113.55
Reason for stop: investigation	-1.85*	6.37	1.31*	3.72
Reason for stop: pre-existing information	-1.61*	5.03	1.29*	3.64
Reason for stop: criminal offense	-3.08*	21.74	-2.61*	13.51
Evidence found during search	-0.84*	2.32	-1.22*	3.39
Model Chi-square	50093.05*		179433.68*	
Nagelkerke R Square	0.142		0.597	

 Table 5.8: Multivariate Analyses Predicting WARNINGS and REPAIR ORDERS during officer-initiated traffic stops in 2006

Table 5.9 documents the statistical models predicting citations and arrests. The citation model explains 14.6% of the variance in predicting whether or not citations are issued. As with the model for repair orders, the model for citations is influenced primarily by the reasons for the stop. Drivers stopped for criminal offenses were 17.2 times more likely to receive a citation compared to drivers stopped for moving violations. Likewise, drivers found with contraband were 6.7 times more likely to receive a citation compared to those without discoveries of contraband. All of the driver characteristics were significant predictors of whether or not citations were issued – the strength of some of these relationships is larger than those from previous models. Hispanic, Black, and Other drivers were significantly more likely to receive citations compared to Caucasian drivers, while Native Americans were significantly less likely, all else equal. Specifically, Hispanic motorists were 1.5 times more likely to receive citations compared to Caucasian motorists, even after taking into consideration the reason for the stop, along with vehicle and stop characteristics. Likewise, Black and Other drivers were 1.2 and 1.3 times more likely to be issued citations, compared to Caucasian drivers. Likewise, drivers who reside in the county where stopped and Arizona residents were significantly more likely than non-county and non-Arizona residents, respectively, to receive citations.

The arrest model displayed in Table 5.9 demonstrates that 20.2% of the variance in arrest can be explained by these factors. As expected, the strongest factor associated with arrest is the discovery of contraband – drivers with contraband were over 63 times more likely to be arrested compared to drivers without contraband. More important, however, is the strength of the race coefficients even after legal variables such as reason for the stop and evidence seized are taking into consideration. Hispanic, Native American, and Black drivers were all significantly more likely to be arrested compared to Caucasian drivers given the same reasons for the stop, vehicle characteristics, and stop characteristics. Specifically, Hispanic, Native American, and Black drivers were 1.7, 2.2, and 1.6 times more likely to be arrested, respectively, compared to Caucasians.

· · · · · · · · · · · · · · · · · · ·	CITATIONS (n=449,134)		ARRESTS (n=449,134)	
Variables	Coefficient	Odds Ratio Exp (b) or 1/Exp (b)	Coefficient	Odds Ratio Exp (b) or 1/Exp (b)
Intercept	0.54*	1.72	-4.78*	125.00
Driver Characteristics				
Hispanic	0.41*	1.51	0.50*	1.65
Native American	-0.13*	1.13	0.77*	2.16
Black	0.17*	1.19	0.47*	1.60
Other Race	0.29*	1.34	-0.22	
Male	0.17*	1.18	0.58*	1.79
Age	-0.02*	1.02	-0.01*	1.01
County resident	0.15*	1.16	0.20*	1.22
AZ resident	0.30*	1.35	0.30*	1.35
Vehicle Characteristics				
Arizona registration	-0.13*	1.14	0.28*	1.33
Truck/Tractor Trailer	-0.42*	1.52	-1.26*	3.53
Van/Station Wagon	-0.01		-0.16*	1.17
Other Vehicle Type	-0.38*	1.47	-0.30	
Stop Characteristics				
Night-time	-0.28*	1.32	0.59*	1.81
Weekend	0.02		0.23*	1.26
Spring	0.03*	1.03	-0.10*	1.10
Summer	0.03		-0.11*	1.11
Fall	0.06*	1.07	-0.05	
Legal variables				
Reason for stop: non-moving violation	-0.11*	1.12	0.31*	1.35
Reason for stop: equipment violation	-1.39*	4.03	-0.20*	1.22
Reason for stop: investigation	-1.05*	2.85	1.12*	3.06
Reason for stop: pre-existing information	-0.52*	1.68	2.07*	7.89
Reason for stop: criminal offense	2.84*	17.18	1.59*	4.92
Evidence found during search	1.93*	6.89	4.15*	63.17
Model Chi-square	52048.69*		23765.34*	
Nagelkerke R Square	0.146		0.202	

Table 5.9: Multivariate Analyses Predicting CITATIONS and ARRESTS during officer-initiated traffic stops in 2006.

Table 5.10 documents the models predicting searches and seizures. Both of these models are relatively weak and explain little overall variation in the outcomes. The search model explains only 8.1% of the variation in whether or not searches are conducted, and the seizure model (based on only traffic stops involving a search) explains only 4.2% of the variance. The weak overall ability of these models to predict outcomes indicates that other factors more central to explaining whether or not drivers are searched and contraband is found have not been included in the data collection. Nevertheless, the search model – though weak – does suggest that important racial/ethnic disparities exist in whether or not searches are conducted. These racial/ethnic disparities may (or may not) be explained by other factors not included in this model. Hispanic, Native American, and Black drivers were all significantly more likely to be searched during officer-initiated traffic stops compared to Caucasians. Specifically, Hispanic, Native American, and Black drivers were 2.2, 2.1, and 2.1 times more likely to be searched compared to Caucasians given the same vehicle characteristics, stop characteristics, and reasons for the stop.

Finally, the seizure model reported in Table 5.10 is simply too weak to provide any substantive interpretation. That is, none of the variables considered in the statistical model – including drivers' race/ethnicity – are strong predictors of whether or not contraband is discovered during searches. Hispanic and Native American drivers are less likely to be discovered with contraband when compared to Caucasian drivers, but the strength of these relationships is substantively small. Given the inability of the multivariate statistical models to provide a clear understanding of DPS search and seizure patterns, additional analyses examining searches and seizures are conducted and reported in Section 7. The remaining portions of this section examine possible explanations for the racial/ethnic disparities reported in citations.

Variables	SEARCHES (n=449,134)		SEIZURES (n=20,347)	
	Coefficient	Odds Ratio Exp (b) or 1/Exp (b)	Coefficient	Odds Ratio Exp (b) or 1/Exp (b)
Intercept	-3.46*	31.25	-0.42*	1.52
Driver Characteristics				
Hispanic	0.80*	2.22	-0.53*	1.69
Native American	0.76*	2.14	-0.25*	1.28
Black	0.75*	2.12	0.02	
Other Race	-0.20*	1.22	-0.19	
Male	0.76*	2.14	0.09	
Age	-0.03*	1.03	-0.01*	1.01
County resident	0.04		-0.28*	1.32
AZ resident	0.07		-0.07	
Vehicle Characteristics				
Arizona registration	0.03		-0.26*	1.30
Truck/Tractor Trailer	-0.47*	1.60	0.41*	1.50
Van/Station Wagon	-0.16*	1.17	-0.00	
Other Vehicle Type	-0.07		-0.52	
Stop Characteristics				
Night-time	0.36*	1.43	0.07	
Weekend	0.13*	1.14	0.10	
Spring	0.00		-0.04	
Summer	-0.04		-0.12	
Fall	-0.06		-0.11	
Legal variables				
Reason for stop: non-moving violation	0.47*	1.61	-0.02	
Reason for stop: equipment violation	0.14*	1.16	0.10	
Reason for stop: investigation	1.32*	3.75	0.23	
Reason for stop: pre-existing information	2.53*	12.53	0.60*	1.83
Reason for stop: criminal offense	1.63*	5.09	0.19	
Model Chi-square	11359.71*		575.63*	
Nagelkerke R Square	0.081		0.042	

Table 5.10: Multivariate Analyses Predicting SEARCHES and SEIZURES during officer-initiated traffic stops in 2006
Understanding Racial/Ethnic Disparities in Citations

As noted previously, there are a number of legitimate factors that may explain the racial/ethnic disparities reported in the findings from the multivariate analyses. Unfortunately, the DPS data collection design does not allow for examination of some of the most intuitive explanations. For example, the differences in citation rates may be due to socio-economic status rather than race/ethnicity per se. Drivers' socio-economic status, however, is not captured on the traffic stop forms. The closest proxy indicator of wealth routinely collected – age of vehicle – was not included in the data set for analyses. In addition, the behavior of the driver (e.g., demeanor, compliance with officer requests, suspicious indicators, misstatement of facts / lying to officers, etc.) is not systematically captured on the traffic stop form. Therefore, any conclusions regarding racial/ethnic disparities in traffic stop outcomes based on the multivariate analyses must be tempered.

In an effort to better understand factors that influence whether or not drivers receive citations, additional analyses were performed. Some of the possible explanations noted above could be partially examined when citation rates are further examined across racial/ethnic groups. As noted in the third phase of the data audit in Section 2, in addition to data regarding the traffic stop, if a citation was issued, information linking to the original stop regarding the number of citations issued and the specific violations was collected. The following analyses examine the types of citations, along with the number of citations issued to racial /ethnic groups.

Figure 5.3 below examines the *types* of violations for which citations are issued by race/ethnicity. Each of the violation categories shows statistically significant racial/ethnic differences. Specifically, Caucasians were significantly more likely (62.4%) to be issued citations for speeding violations compared to Hispanics (46.0%), Native Americans (39.4%), and Blacks (49.8%). Black drivers were significantly more likely (11.4%) than other racial/ethnic groups to be issued citations for speeding over 85 mph. Black drivers were also significantly more likely to be issued citations for violations related to vehicle registration and/or license plate. Alternatively, Hispanic drivers were significantly more likely than other racial/ethnic groups to be issued citations for violations related to drivers' license, seat belts/child restraints, required equipment, and insurance.



Figure 5.3: Racial/Ethnic Differences in Citation Violations (n=211,712)

<u>NOTE</u>: Violations for drug offenses were excluded from this figure due to their statistical infrequency across all racial/ethnic groups.

These results provide additional support for the proposition that minority drivers are more likely to be issued citations for violations that are indirectly linked to income. Infractions for registrations / license plates, drivers' licenses, required equipment, and insurance all have an economic component. These results also provide support for the proposition that officers make enforcement decisions based on drivers' behaviors. Higher percentages of minority drivers issued citations for seat belt and child restraint violations are consistent with the public health literature that finds minorities are significantly less likely than Caucasians to use such safety devices (Braver, 2003; Everett et al., 2001; Harper et al., 2000; Lerner et al., 2001; Wells et al., 2002). Recognizing these disparities, public health officials have specifically targeted campaigns for child restraint and seatbelt usage toward minority groups (Cruz & Mickalide, 2000). Differences in DUI citation rates are also supported by some literature that suggests racial/ethnic differences in offending rates (Baker et al., 1998; Braver, 2003; Harper et al., 2000; Royal, 2000). Likewise, differences in the percentage of Black motorists receiving citations for the highest speeding infractions are supported by observational studies of speeding that have reported differential speeding offending rates for minority drivers (Engel et al., 2004, 2006; Lange et al., 2005; Smith et al., 2003).

The *number* of citations issued during a single traffic stop was also examined. The number of citations issued during an individual traffic stop ranged from 0 to 6. The majority of citizens stopped did not receive a citation (54%), followed by one citation (32.7%), two citations (8.7%), three (3.2%), four, (1.0%), five (0.4%) and six (0.001%). For the analyses reported below, multiple citations were considered. Multiple citations refer to traffic stops where two or more citations were issued to the driver – 13.2% of drivers stopped by DPS officers were issued multiple citations.

Figure 5.4 displays the racial/ethnic differences in percentages of drivers receiving multiple citations. As shown, Hispanics were significantly more likely than all other racial/ethnic groups to be issued multiple citations. Specifically, 22.3% of Hispanic drivers received multiple citations, compared to 15.7% of Blacks, 11.9% of Native Americans, and 9.8% of Caucasians and Others, respectively.



Figure 5.4: Racial/Ethnic Differences in Multiple Citations (n=460,530)

The reasons for the reported racial/ethnic disparities in multiple citations cannot be determined with these data. It could be argued that Hispanic, Native American, and Black drivers – all members of racial/ethnic groups that have historically been victims of discrimination resulting in social and economic disparities – are more likely to drive vehicles that have equipment violations, have expired licenses, expired registrations, no insurance, etc. If true, it is disparities in wealth (correlated in our society with race/ethnicity) that increase the likelihood of receiving multiple citations during traffic stops with police. Alternatively, it could be argued that minority drivers are significantly more likely to be issued multiple citations because of police bias. The results of these analyses provide support for both hypotheses – it cannot, however, be determined with these analyses which (if either) hypothesis is accurate.

The final analysis examines the multiple factors simultaneously that may influence the likelihood of receiving multiple citations. Table 5.11 reports the results from a logistic regression model examining the influence of drivers' race/ethnicity over the likelihood of receiving multiple citations. In this model, only traffic stops resulting in a citation were examined (n=212,558). Of importance to note: When drivers receive a citation, Hispanic, Native American, and Black drivers were all significantly more likely to receive multiple citations. Specifically, of those receiving citations, Hispanic, Native American, and Black drivers were 2.3, 1.4 and 1.5 times more likely, respectively, to receive multiple citations compared to Caucasians.

	MULTIPLE CI	FATIONS (n=212,558)
Variables	Coefficient	Odds Ratio Exp (b) or 1/Exp (b)
Intercept	-1.47*	4.37
Driver Characteristics		
Hispanic	0.85*	2.33
Native American	0.34*	1.41
Black	0.40*	1.49
Other Race	0.02	
Male	0.28*	1.32
Age	-0.02*	1.02
County resident	0.37*	1.45
AZ resident	0.23*	1.25
Vehicle Characteristics		
Arizona registration	0.15*	1.16
Truck/Tractor Trailer	0.11*	1.11
Van/Station Wagon	-0.10*	1.10
Other Vehicle Type	0.12	
Stop Characteristics		
Night-time	0.18*	1.19
Weekend	-0.09*	1.09
Spring	-0.00	
Summer	-0.06*	1.06
Fall	-0.05	
Legal variables		
Reason for stop: non-moving violation	1.07*	2.91
Reason for stop: equipment violation	0.37*	1.45
Reason for stop: investigation	0.70*	2.02
Reason for stop: pre-existing information	1.00*	2.63
Reason for stop: criminal offense	0.49*	1.64
Evidence found during search	1.37*	3.92
Model Chi-square	24,817.14*	
Nagelkerke R Square	0.159	

 Table 5.11: Multivariate Analyses Predicting MULTIPLE CITATIONS during officer-initiated traffic stops in 2006

These findings provide support for two competing hypotheses. First, it demonstrates support for the proposition noted above that based on wealth and social status disparities in American society, Hispanics, Native Americans, and Blacks are more likely to be of lower socio-economic status compared to Caucasians; based on these wealth disparities, members of these racial/ethnic groups may be more likely to drive motor vehicles with equipment violations, no registration, and no drivers' license. These additional infractions would raise the likelihood of being issued citations for these racial/ethnic groups disproportionately compared to Caucasians. It must also be noted, however, that the alternative hypothesis – racial bias by DPS officers – is also possible based on these findings. In order to disentangle these possibilities, the data collection effort should be altered to capture the primary reasons for the stop, and subsequent violations discovered during the course of the stop, for all traffic stops, regardless of the disposition imposed.

Understanding Racial/Ethnic Disparities in Arrests

Additional analyses were also performed in an effort to better understand factors that influence whether or not drivers were arrested. Some of the possible explanations for the racial/ethnic disparities in arrest noted above could be partially examined when arrest rates are examined across types of violations. As noted above, racial/ethnic differences exist in the types of violations for which drivers are issued citations. Therefore, if particular types of violations are more likely to result in arrests, and these types of violations also differ systematically by race/ethnicity, then racial/ethnic disparities in arrest rates may be partially accounted for by alternative factors. The following analyses examine arrest rates by the types of violations (as indicated on the citation and warring forms).

Figure 5.5 shows the percent of drivers arrested by the types of violations for which they were also cited or warned.²⁴ As shown, significant differences in arrest rates exist across violation types. Specifically, drivers cited or warned for violations related to drivers' license, equipment, and insurance were significantly more likely to be arrested compared to drivers cited or warned for speeding. For example, 10% of traffic stops involving drivers' license violations resulted in arrests, compared to less than 1% of traffic stops involving speeding infractions. As noted above, Hispanics drivers were significantly more likely than Caucasians to have drivers' license, equipment, and insurance violations. These results suggest that racial/ethnic disparities in arrest rates may be partially accounted for by factors related to violation type; which, in turn, are likely related to socioeconomic status.





²⁴ The vast majority (over 90%) of stops that indicated DUI or drug offense violations resulted in arrests. Therefore, these two types of violations were excluded from this analysis.

SECTION SUMMARY

This summary highlights the findings of racial/ethnic disparities in post stop outcomes for drivers stopped in 2006. When reviewing these results, it is important to remember that the bivariate analyses only consider two variables at a time (e.g., the race of the driver and the post-stop outcome). As a result, the interpretation of these findings should be made with caution and cannot determine the existence of racial bias. The multivariate analyses are better suited to make substantive claims about the results of the post-stop outcomes due to their consideration of more than one factor simultaneously. Nevertheless, the multivariate analyses are limited by the type and amount of data collected. Thus, multivariate analyses can demonstrate racial/ethnic disparities that exist after statistically controlling for other factors measured with these data that might influence officer decision making.

Bivariate Analyses – Differences in Outcomes across Types of Drivers

- At the department level, statistically significant racial/ethnic differences are evident for the most severe outcome received.
 - Specifically, Hispanics were significantly less likely than other racial/ethnic groups to have a warning be the most severe outcome received.
 - Hispanics and Native Americans were significantly more likely than Caucasians and Blacks to have repair orders or DVERs as the most severe outcome received.
 - Hispanics were significantly more likely than other racial/ethnic groups to have a citation as the most severe outcome received, while Native Americans were significantly less likely to have citations as the most severe outcome received.
 - For the most severe outcome—arrest—Hispanics, Native Americans, and Blacks were all significantly more likely than Caucasians to have arrest as the most serious outcome received.
- At the department level, Hispanic drivers were the least likely to be given a warning (32.0%) when compared to Caucasian (44.4%), Native American (46.2%), and Black (40.6%) drivers.
- Native Americans were the most likely to be issued a repair order (21.5%) when compared to Caucasian (12.8%), Hispanic (16.0%), and Black (10.5%) drivers.
- Hispanics received the highest percentage of citations, while Native Americans (42.1%) were significantly less likely than Caucasians (45.1%), Blacks (49.7%), and Hispanics (52.8%) to be cited.
- Hispanic, Native American and Black drivers were all significantly more likely than Caucasian drivers to be arrested and searched.
 - Specifically, Native Americans were the most likely to be arrested (4.9%), followed by Blacks (4.3%), Hispanics (4.2%), and Caucasians (2.4%).

- Hispanics were the most likely to be searched (7.7% of stops) compared to Blacks (7.1%), Native Americans (6.2%), and Caucasians (3.2%).
- At the department level, male drivers were more likely to be issued repair orders (14.1% of stops), cited (47.4% of stops), arrested (3.4%), and searched (5.4%) when compared to female (12.9% repair orders, 46.8% cited, 2.0% arrested, and 2.6% searched) drivers.
- Female drivers, on the other hand, were significantly more likely to be issued warnings (45.5%) when compared to male (39.1%) drivers.
- These patterns and trends varied somewhat at the bureau level and more so at the district/shift level.
- DPS supervisors should review findings at multiple levels within the organization for the best understanding of trends of racial/ethnic disparities in stop outcomes within their jurisdictions.

Bivariate Analyses – Differences in Types of Violations across Types of Drivers

- Statistically significant differences in the *types* of violations for which citations are issued are evident by race/ethnicity:
 - Specifically, Caucasians were significantly more likely (62.4%) to be issued citations for speeding violations compared to Hispanics (46.0%), Native Americans (39.4%), and Blacks (49.8%).
 - Black drivers were significantly more likely (11.4%) than other racial/ethnic groups to be issued citations for speeding over 85 mph and for violations related to vehicle registration and/or license plate.
 - Alternatively, Hispanic drivers were significantly more likely than other racial/ethnic groups to be issued citations for violations related to drivers' license, seat belts/child restraints, and insurance.
- These results suggest that minority drivers are more likely to be issued citations for violations that are indirectly linked to income. These results also provide support for the proposition that officers make enforcement decisions based on drivers' behaviors.

Multivariate Analyses of Traffic Stop Outcomes

- Multivariate statistical models take many different factors into account simultaneously when attempting to explain a particular behavior, and therefore provide a more thorough and accurate interpretation of the data.
- Warnings
 - Hispanic, Black, and drivers of other race/ethnicity were significantly *less* likely compared to Caucasians to receive warnings.
 - In contrast Native American drivers were significantly *more* likely than Caucasians to receive warnings.

- The odds ratios of these coefficients indicate that all of these relationships, though statistically significant, are not particularly strong.
- In addition, although gender, age, and residency significantly predict warnings, their influence was relatively weak.
- In contrast, the strongest predictors of whether or not drivers receive warnings were the reasons for the stop.
- Repair Orders
 - Drivers stopped for equipment violations were 113.6 times *more* likely to receive a repair order compared to those stopped for moving violations.
 - Drivers of trucks/tractor trailers were 14.7 times *more* likely to be issued repair orders compared to drivers of cars.
 - In terms of racial/ethnic differences:
 - Hispanic, Black, and drivers of other races were significantly *less* likely compared to Caucasians to be issued repair orders.
 - Native American drivers were significantly *more* likely to be issued repair orders compared to Caucasians.
 - The strength of these relationships range between 1.3 to 1.5 times more/less likely, which indicates that they are not particularly strong explanatory factors.
- Citations
 - Drivers stopped for criminal offenses were 17.2 times *more* likely to receive a citation compared to drivers stopped for moving violations.
 - Drivers found with contraband were 6.7 times *more* likely to receive a citation compared to those without discoveries of contraband.
 - All of the driver characteristics were significant predictors of whether or not citations were issued the strength of some of these relationships is larger than those from previous models.
 - Hispanic, Black, and Other drivers were significantly *more* likely to receive citations compared to Caucasian drivers, while Native Americans were significantly *less* likely, taking into consideration the reason for the stop, along with vehicle and stop characteristics.
 - Specifically, Hispanic motorists were 1.5 times *more* likely to receive citations compared to Caucasian motorists.
 - Drivers who reside in the county where stopped and Arizona residents were significantly *more* likely than non-county and non-Arizona residents, respectively, to receive citations.
- Arrests
 - The strongest factor associated with arrest is the discovery of contraband drivers with contraband were almost 63 times *more* likely to be arrested compared to drivers without contraband.
 - More important, however, is the strength of the race coefficients even after legal variables such as reason for the stop and evidence seized are taken into consideration.

- Hispanic, Native American, and Black drivers are all significantly *more* likely to be arrested compared to Caucasian drivers given the same reasons for the stop, vehicle characteristics, and stop characteristics.
- Specifically, Hispanic, Native American, and Black drivers are 1.7, 2.2, and 1.6 times *more* likely to be arrested, respectively, compared to Caucasians.
- Searches
 - The search model though weak in predictive power– suggests that important racial/ethnic disparities exist in whether or not searches are conducted. These racial/ethnic disparities may (or may not) be explained by other factors not included in this model.
 - Compared to Caucasians, Hispanic, Native American, and Black drivers are all significantly *more* likely to be searched during officer-initiated traffic stops.
 - Specifically, Hispanic, Native American, and Black drivers are 2.2, 2.1, and 2.1 times *more* likely to be searched compared to Caucasians given the same vehicle characteristics, stop characteristics, and reasons for the stop.
- Seizures
 - The multivariate model predicting seizure is too weak to provide any substantive interpretation.
 - Whether racial/ethnic disparities exist for seizure rates will be explored using the outcome test in Section 7.
- Multiple Citations
 - The model for citations is driven by a variety of significant factors.
 - Reason for the Stop: Non-moving violations, investigative reasons, or stops based on pre-existing information were all *more* likely to result in multiple citations when compared to stops conducted due to a moving violation.
 - Stop and vehicle characteristics were also significant, and all driver characteristics, except for Other drivers were significant. Specifically, Hispanic, Native American, and Black drivers were all *more* likely to receive multiple citations when compared to Caucasian drivers at the rate of 2.3, 1.4, and 1.5 times more likely, respectively.
 - Drivers who reside in the county where stopped and Arizona residents were significantly *more* likely than non-county and non-Arizona residents, respectively, to receive multiple citations.
 - Bivariate analyses of race and multiple citations also indicated that Hispanics were significantly more likely than all other racial/ethnic groups to be issued multiple citations.
 - The reasons for the reported racial/ethnic disparities in multiple citations, however, cannot be determined with these data.
 - It could be argued that Hispanic, Native American, and Black drivers are more likely to drive vehicles that have equipment violations, have expired licenses, expired registrations, no insurance, etc. If true, it is disparities in

wealth (correlated in our society with race/ethnicity) that increase the likelihood of receiving multiple citations during traffic stops with police.

- Alternatively, it could be argued that minority drivers are significantly more likely to be issued multiple citations because of police bias.
- Racial / ethnic differences in stop outcomes may be explained by legitimate factors unmeasured by these data (e.g., the severity of the traffic offense, drivers' compliance with officers' requests, drivers' socioeconomic status, etc.) or officer bias toward specific minority groups. The reasons for the racial/ethnic disparities in stop outcomes reported cannot be determined with these data. Therefore, any conclusions regarding racial/ethnic disparities in traffic stop outcomes based on the multivariate analyses must be tempered.

6. TREND ANALYSES 2003-2006: TRAFFIC STOP OUTCOMES

OVERVIEW

This section describes the outcomes that drivers received during officer-initiated traffic stops between 2003 and 2006. These analyses document the long term trends in traffic stop outcomes across DPS. As described in Section 4, trend analyses may be considered a form of benchmarking, as previous years' rates of traffic stop outcomes are used as a baseline to measure more current stopping rates. The limitation of using trend analyses is that racial/ethnic discrimination cannot be determined. Rather, the information simply provides a description of whether or not traffic stop outcomes within organizational units are consistent across time. If inconsistencies are found, the cause of the inconsistencies cannot be determined with these data. Rather, these areas are flagged for further consideration by DPS officials. The trends reported here are based on traffic stop outcomes resulting from only officer-initiated traffic stops and are primarily focused on the actions of the Highway Patrol Division.

In addition to benchmarking, trend analysis offers several advantages for analyzing post-stop outcomes for traffic stops. First, it allows for an assessment of the long term trends in traffic stop outcomes by racial/ethnic group. By comparing current data to previous data, important patterns and trends emerge. Second, these analyses can be used at multiple organizational units, allowing the agency to assess potential problems and the location of those problems. In this section, trends at the department, division, bureau, and district/shift levels are reported. Finally, the analyses are not complex and provide for a relatively easy interpretation of the results (i.e., changes in the pattern of post-stop outcomes over time). The limitations of this technique have been documented in Section 4. It is important to reiterate that some inconsistencies in the rates of post-stop outcomes across racial groups do not necessarily indicate racial/ethnic bias by officers. Multiple explanations exist that may explain why patterns of racial/ethnic disparities are discovered, and trend analysis cannot distinguish among these alternative explanations. Notwithstanding these limitations, trend analysis offers a simple, yet important description of traffic stop outcomes over time. This technique is most effective when used in combination with other analytical tools, and should not be used as a definitive indicator of racial bias. Please refer to Sections 4 for a more thorough discussion of benchmarking and its strengths and limitations.

COMPARISON OF TRAFFIC STOP OUTCOMES: 2003 – 2006

This section reports the rate of stop outcomes (e.g., warnings, citations, arrests, and searches) at the department, division, bureau, and district/shift levels between 2003 and 2006, as displayed in Tables 6.1 & 6.2. A further examination of post-stop outcomes focusing on warnings, repair orders, citations, arrests, and searches for Caucasian, Hispanic, Native American, and Black drivers is reported in Tables 6.3 - 6.7 for activity occurring between 2003 and 2006. The departmental trends for these outcomes are visually displayed in Figures 6.1 - 6.6.

The tables in this section report activity by the Criminal Investigations Bureau and the Highway Patrol Bureau; however, the accompanying text for each of these tables will focus

exclusively on the Highway Patrol Bureau, as the vast majority of all traffic stops are conducted by the Highway Patrol Division. In cases where the percent of activity is noticeably different for the Criminal Investigations Division, further discussion will be provided regarding those differences. In the tables throughout this section, percentages that are based on less than 50 traffic stops are identified because rates calculated from small numbers of traffic stops may be unstable.

Traffic Stop Outcomes across Organizational Levels: 2003 – 2006

Figure 6.1 below visually displays the percentage of officer-initiated traffic stops conducted from 2003 – 2006 that resulted in warnings, repair orders, citations, arrests, and/or searches. As this figure demonstrates, there is great variation in the frequency of different post-stop outcomes. Traffic stops are most likely to result in citations or warnings, and least likely to result in arrests and searches. Figure 6.1 also demonstrates variation in the percentage of traffic stops that result in particular outcomes across years. These trends are further documented in Tables 6.1 and 6.2, and discussed below.





Tables 6.1 - 6.2 report the traffic stop outcomes received by drivers over time, across the department, division, bureau, and district levels. Specifically, Table 6.1 summarizes the percentages of traffic stops that resulted in warnings, repair orders, and citations, while Table 6.2 reports the percentage of traffic stops that resulted in arrests and searches of the driver,

vehicle and/or occupants. Importantly, more than one outcome can result from a traffic stop; thus, totaling the percentages for each outcome will likely exceed 100%.

<u>Warnings</u>

Throughout the state between 2003 and 2006, the rate of traffic stops resulting in a warning fluctuated from a low in 2003 of 38.9 % to a high in 2004 of 44.6%. Across the four years, the trend fluctuated upward in 2004, with a sharp decline in 2005, and leveling in 2006. This trend is primarily driven by the Highway Patrol Division, which contributes the vast majority of traffic stops. This pattern is relatively consistent across the bureaus, with only minor deviations. For example, the Northern Bureau's 2006 rate of warnings (47.5%) is lower than that recorded in 2003 (50.2%). Metro West, Southern, and Metro East Bureaus reported increases in warnings until 2006. Across the nineteen districts/shifts that reported stable rates in both 2003 and 2006, nine reported elevated rates of warnings, three were relatively unchanged (i.e., less than 1% change), and seven had lower rates of warnings in 2006 when compared to 2003. See Table 6.1 for specific rates of warnings by year and organizational unit.

Repair Orders

In regard to repair orders, the statewide trend demonstrates an increase in 2005 and 2006 when compared to the previous two years, with a low of 11.1% in 2004 and a high of 13.9% in 2005. At the bureau level, this pattern is consistent, except for the Commercial Vehicle bureau, which had lower rates of repair orders in 2005 and 2006 when compared to the previous two years. Moreover, the Metro West, Southern, and Metro East Bureaus had higher rates of repair orders in 2005 and 2006 when compared to the nineteen units reported higher rates in 2005 and 2006 when compared to 2003 and 2004. Two of the units had lower rates in 2005 and 2006, while the remaining four units fluctuated across the four years. See Table 6.1 for specific rates by year and organizational unit.

Citations

Table 6.1 also reports the rate of citations issued across the four years by organizational unit. Across the state, the trend demonstrates a noticeable drop in 2004 to 42.6% from a peak of 48.4% in 2003. The rate of citations issued to drivers increased in 2005 and 2006 to 46.0% and 46.5%, respectively. All bureaus experienced a decrease in citations in 2004; however a different trend emerged for the bureaus in 2005 and 2006. The Northern Bureau reported its highest rate of citations issued in 2006 (44.0%); conversely, the Metro West Bureau reported its lowest rate of citations issued in 2006 (53.1%). The Southern and Metro East Bureaus reported increases in 2005, but lower rates of citations issued in 2006. Finally, after its decline in 2004 (27.7%), the Commercial Vehicle Bureau's rate of citations decreased further in 2005 (26.6%) with a slight increase in 2006 (27.5%). As expected at the district/shift level, there is further variation with eleven of the nineteen units reporting lower rates in 2006 compared to 2003, four of the remaining units had unchanged rates of citations issued (i.e., less than 1% change), and the final four units reporting an increase in their citation rate in

2006 compared to 2003. Please refer to Table 6.1 for specific rates of citations by year and organizational unit.

	` O	rnings	,		% Repai	ir Order		% Citations				
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006
DPS Statewide	38.9	44.6	40.7	40.1	11.8	11.1	13.9	13.8	48.4	42.6	46.0	46.5
Criminal Investigations Division	44.7	48.7	46.3	47.0	9.4	12.5	19.3	14.3	40.3	32.9	35.1	44.1
Highway Patrol Division	38.9	44.6	40.7	40.1	11.8	11.1	13.9	13.8	48.4	42.6	46.0	44.1
Northern Bureau	50.2	57.4	51.4	47.5	12.6	11.7	14.4	13.2	40.6	33.6	38.7	43.2
D1-Kingman	43.9	44.6	46.7	45.8	11.1	9.9	16.5	15.7	48.1	47.3	44.5	46.0
D2-Flagstaff	52.7	61.7	51.5	48.6	12.3	10.4	13.4	14.1	36.3	27.9	37.3	38.8
D3-Holbrook	49.1	65.9	57.3	49.9	16.0	16.1	15.6	12.3	41.0	24.3	31.4	40.2
D11-Globe	54.3	51.8	50.8	49.2	10.1	10.0	15.5	13.3	37.2	39.4	39.4	42.9
D12-Prescott	52.9	58.0	46.8	42.6	12.0	9.9	10.7	11.7	39.1	34.5	46.3	49.5
Metro West	28.9	33.8	32.4	37.8	10.0	9.5	13.4	14.1	61.1	56.0	57.0	52.7
Shift #1	24.3	31.3	31.7	37.3	7.9	8.9	11.0	11.9	66.8	58.2	60.0	56.6
Shift #2	28.7	29.6	31.8	34.4	13.8	11.7	15.0	15.5	58.8	58.9	55.9	53.7
Shift #3	34.2	42.2	35.1	44.8	6.8	7.0	14.9	14.9	58.2	49.9	52.8	44.6
Southern Bureau	39.2	41.4	39.3	40.7	15.4	14.0	18.4	19.2	49.2	46.5	47.9	46.5
D4-Yuma	39.8	44.9	43.6	42.7	11.1	11.3	19.7	21.6	49.8	44.0	43.3	44.3
D6-Casa Grande	47.9	50.8	41.0	44.7	20.1	15.4	19.6	22.1	37.1	37.4	45.5	39.4
D8-Tucson	34.1	34.5	36.8	39.9	14.3	13.9	17.4	15.2	56.4	54.0	51.1	49.9
D9-Sierra Vista	33.9	35.0	36.6	34.6	14.6	15.0	17.3	17.7	55.5	50.5	50.5	53.1
Commercial Vehicle	4.7	8.3	8.2	5.3	2.2	3.1	1.9	1.6	33.1	27.5	26.6	27.5
District 15	3.9	9.5	16.5	12.0	1.4	3.9	3.4	3.2	40.0	41.5	38.7	36.4
District 16	5.0	7.6	4.4	2.9	2.7	2.7	1.2	1.0	29.7	21.4	21.5	24.4
Metro East	31.1	44.1	35.2	36.8	3.4	4.8	7.2	8.4	64.1	50.1	58.2	56.4
Shift #1	100.0*	36.3	35.0	37.4	0.0*	3.7	4.2	4.8	0.0*	60.0	61.1	58.7
Shift #2	24.2	35.2	33.2	33.2	1.5	5.9	6.6	6.3	74.2	59.2	61.3	62.0
Shift #3		40.4	38.3	38.3		8.7	13.7	16.1		49.5	48.6	48.1
Metro Motors	12.4	26.8	16.9	18.7	2.0	3.8	3.3	5.0	84.4	68.5	80.4	77.9
Canine	84.5	87.6	83.0	81.6	7.4	5.4	12.5	13.4	6.2	4.9	4.6	6.2
Canine North	88.2	87.6	89.0	88.2	3.8	5.2	9.1	7.2	5.6	4.9	3.5	5.9
Canine South/Central	82.6	87.6	79.5	78.8	9.2	5.6	14.6	16.1	6.4	5.0	5.2	6.3

 Table 6.1: Traffic Stop OUTCOMES (Warnings, Repair Orders & Citations) - Statewide, Division, Bureau, & District – 2003-2006

Arrests

Table 6.2 reports the rate of arrests and searches across the department, division, bureaus, and districts/shifts between 2003 and 2006. Between 2003 and 2006 throughout the state, the rate of traffic stops that resulted in an arrest varied between a low of 2.8% in 2004 to a high of 3.1% in 2005. Overall, this trend represents a 0.3% change across the four years, with the 2006 rate of arrest at the mid-point of these rates. At the bureau level, there was a slight increase in the variation across all four years, with the Metro West and Southern Bureaus reporting a 0.4% change and the Metro East Bureau's rate of arrest changing by 1.0%. In the Commercial Vehicle and Metro East Bureaus, their 2006 arrest rate was the lowest for any of the four years. At the district/shift level, the rate of change in more pronounced. For example, in the Metro West Bureau, Shift #1 demonstrated a decrease in their rate of arrest across the four years, while Shift #3 reported an increase their arrest rate between 2003 and 2006. See Table 6.2 for specific rates of arrests by year and organizational unit.

Searches

The most notable change in the rate of searches across the department is the low rate of searches conducted in 2004. In the other three years, there is a relatively stable rate of searches, with a slight increase in 2005 (4.7%) and 2006 (4.6%) compared to 2003 (4.4%). The 2004 rate of searches (3.3%) is at least 1.0% lower than any other year. A clear reason for such a decline in 2004 did not occur during the data analysis – it is likely an artifact of the data collection effort. This pattern is consistent at all bureau levels except for the Commercial Vehicle and Metro East Bureaus. The Commercial Vehicle Bureau reported increases in their search rate in 2004, and the lowest rates of searches occurred in 2006. Similarly, the Metro East Bureau had its lowest search rate in 2006 (7.1%), which followed the steady decline in its search rate since its high in 2003 (8.4%). At the district/shift level, fourteen of the nineteen units reported their lowest rate of searches in 2004. See Table 6.2 for specific rates of searches by year and organizational unit.

2000 2000		%Ar	rested		% Searched					
	2003	2004	2005	2006	2003	2004	2005	2006		
DPS Statewide	3.0	2.8	3.1	3.0	4.4	3.3	4.7	4.6		
Criminal Investigations Division	15.2	13.5	9.7	7.3	20.1	20.9	20.9	16.5		
Highway Patrol Division	3.0	2.8	3.1	3.0	4.3	3.3	4.7	4.6		
Northern Bureau	2.5	2.2	2.4	2.4	3.4	2.5	3.4	3.4		
D1-Kingman	2.9	2.3	2.7	3.4	3.7	2.8	4.3	3.9		
D2-Flagstaff	2.6	2.3	2.6	2.6	4.3	2.9	3.7	3.6		
D3-Holbrook	2.9	2.3	2.2	1.9	3.8	2.6	3.1	3.0		
D11-Globe	2.2	1.9	2.0	1.6	2.3	2.1	2.3	2.0		
D12-Prescott	2.0	2.0	2.7	2.6	2.8	2.1	3.8	4.3		
Metro West	3.7	3.3	3.6	3.7	4.2	3.0	4.4	5.3		
Shift #1	4.7	3.2	2.2	2.1	3.9	2.2	2.5	3.4		
Shift #2	2.4	2.5	2.9	3.4	4.7	2.5	4.1	5.0		
Shift #3	4.5	4.7	7.7	6.9	3.9	4.3	9.1	8.9		
Southern Bureau	3.0	2.7	3.1	2.9	4.7	3.3	5.2	4.8		
D4-Yuma	2.7	2.4	2.4	2.0	5.6	3.5	4.3	3.8		
D6-Casa Grande	2.5	2.6	2.7	2.4	4.1	3.2	4.4	4.0		
D8-Tucson	3.9	3.2	4.1	4.6	5.7	3.7	7.1	7.4		
D9-Sierra Vista	2.8	2.5	2.8	2.5	3.8	2.6	4.2	3.4		
Commercial Vehicle	0.9	1.0	1.0	0.7	3.3	3.8	4.0	3.0		
District 15	1.6	2.4	2.0	1.6	7.2	11.1	11.3	8.5		
District 16	0.6	0.4	0.5	0.4	1.3	0.6	0.8	1.1		
Metro East	5.5	5.9	5.5	4.9	8.4	7.9	7.3	7.1		
Shift #1	50.0*	2.8	3.1	3.4	0.0*	2.8	3.9	4.7		
Shift #2	0.0	4.3	4.1	4.6	0.0	4.5	5.2	5.8		
Shift #3		17.8	13.1	8.3		18.3	14.3	9.6		
Metro Motors	6.3	5.7	3.9	3.8	6.2	5.6	4.1	4.2		
Canine	3.3	3.6	3.2	3.5	14.8	12.4	14.6	16.7		
Canine North	3.5	3.9	3.9	3.7	16.1	15.6	14.8	13.2		
Canine South/Central	3.1	3.4	2.7	3.4	14.2	10.1	14.4	18.2		

Table 6.2: Traffic Stop OUTCOMES (Arrests & Searches) - Statewide, Division, Bureau, & District – 2003-2006

Traffic Stop Outcomes by Racial/Ethnic Groups across Organizational Units: 2003 – 2006

While the general trends in traffic stop outcomes are important to examine across organizational units, one of the key areas of interest for this research is the pattern of stop outcomes that occur for different racial/ethnic groups. Tables 6.3 - 6.7 report the percentage of traffic stops from 2003 to 2006 that resulted in warnings, repair orders, citations, arrests, and searches respectively, for different minority groups across the department, division, bureau, and district/shift levels. For each of the traffic stop outcomes, Figures 6.2 - 6.6 display the rates for each racial/ethnic group. Due to the small number of traffic stops that occurred for some racial/ethnic groups, the descriptive statistics reported below are limited to comparisons for Caucasian, Hispanic, Native American, and Black drivers. Due to the volume of information provided in these tables, discussion of the bureaus and district/shift levels will be restricted to only trends that are noticeably different from the trends discussed at the higher organizational levels.

<u>Warnings</u>

Table 6.3 & Figure 6.2 report the rate of warnings issued to Caucasian, Hispanic, Native American, and Black drivers between 2003 and 2006. Across the department, the rate of warnings for each group was at its lowest rate in 2003, prior to an increase in 2004. In 2005 and 2006, the rate of warnings issued declined in each year for all race groups, except for Hispanic drivers who were warned at equivalent rates in 2005 and 2006, and Black drivers who had an increase in warnings issued in 2006. See Table 6.3 for the warning trends at the bureau and district/shift levels.



Figure 6.2: Warnings Issued during Officer-Initiated Traffic Stops by Racial/Ethnic Group: 2003-2006

r	<u>% Caucasian</u>					<u>% Hi</u>	spanic		% Native American				<u>% Black</u>			
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006
DPS Statewide	41.9	47.9	44.3	43.6	29.6	33.4	31.1	31.1	43.7	52.7	48.2	45.3	37.8	43.7	38.5	39.6
Investigations Division	41.8	54.8	53.1	52.7	52.6	35.0	31.5	39.7	36.4*	77.8*	45.5*	43.9*	31.3	45.5*	41.7*	46.4
Highway Patrol Division	41.9	47.9	44.2	43.6	29.6	33.4	31.1	31.1	43.7	52.7	48.2	45.3	37.8	43.7	38.5	39.6
Northern Bureau	52.5	59.5	53.7	49.8	42.1	48.2	42.2	37.5	46.0	55.3	50.5	47.0	51.8	59.4	51.7	47.0
D1-Kingman	45.7	46.3	48.5	47.7	37.5	39.0	40.8	37.6	38.4	42.0	40.2	44.0	41.8	41.6	43.0	48.6
D2-Flagstaff	55.3	65.6	55.5	53.4	47.4	54.7	45.7	42.5	50.1	51.7	46.2	39.1	58.7	66.2	52.9	53.5
D3-Holbrook	52.7	70.6	61.0	52.1	42.7	57.1	46.3	39.1	43.7	58.9	54.2	50.7	47.3	67.8	54.8	45.9
D11-Globe	56.5	53.8	53.1	50.9	41.7	41.3	40.3	39.5	50.9	46.3	43.8	48.0	52.6	49.1	48.4	40.6
D12-Prescott	54.1	59.4	48.2	45.0	42.8	47.9	36.5	30.5	47.4	49.1	42.2	37.1	62.3	64.8	57.3	43.0
Metro West	32.1	37.1	36.2	42.6	19.5	23.2	23.6	26.7	20.6	29.9	27.6	33.6	29.4	35.2	34.1	39.2
Shift #1	27.8	34.7	35.0	40.7	15.2	21.4	22.9	28.2	18.0	26.1	32.8	40.0	26.8	32.6	34.0	38.4
Shift #2	31.0	32.2	36.3	40.1	22.3	21.6	22.6	22.0	19.9	29.0	23.0	28.8	26.8	30.8	33.4	35.9
Shift #3	37.8	46.3	39.0	51.2	21.2	27.8	26.7	32.7	23.6	33.9	25.0	32.2	36.2	43.3	35.5	44.3
Southern Bureau	42.4	45.0	42.5	43.6	33.9	34.8	34.7	36.1	35.2	40.2	36.4	37.8	39.7	42.4	37.7	42.7
D4-Yuma	42.2	49.3	48.3	46.6	36.1	38.0	37.9	37.6	30.0	38.4	43.0	34.8	39.0	47.3	39.5	45.4
D6-Casa Grande	50.0	52.8	42.1	45.8	43.1	44.9	38.3	41.7	39.9	48.3	38.1	44.7	50.1	53.7	46.3	50.3
D8-Tucson	36.5	37.3	41.0	44.0	30.6	30.6	31.7	34.2	31.9	34.2	33.6	32.1	40.4	35.2	37.9	44.4
D9-Sierra Vista	37.9	38.6	39.8	37.5	27.7	29.0	32.8	30.7	31.4	30.8	30.4	26.2	28.9	32.6	25.6	27.3
Commercial Vehicle	5.6	9.7	11.1	7.7	3.2	4.6	4.1	2.3	7.5	22.6	19.3	14.2	4.0	6.9	6.7	5.0
District 15	4.3	10.3	17.9	13.5	2.8	7.2	13.1	7.3	7.1	23.8	18.5	13.3	3.0	10.0	12.7	10.9
District 16	6.6	9.3	6.2	4.4	3.2	4.1	2.4	1.5	7.9	20.6	22.0	11.4*	4.7	4.9	2.5	2.2
Metro East	31.5	45.6	37.6	38.9	25.2	37.7	27.6	29.5	41.1	45.7	33.6	37.3	42.3	49.3	37.4	39.7
Shift #1	100.0*	39.8	39.0	41.2	100.0*	23.9	22.9	24.2		24.6	22.8	27.6		38.2	35.4	38.3
Shift #2	22.8	38.4	37.0	37.2	14.3*	19.8	20.2	19.8		17.9*	25.7	25.5	100.0*	39.6	33.5	34.5
Shift #3		43.8	41.7	41.9		30.8	28.0	26.8		23.2	25.6	26.4		44.4	42.2	40.7
Metro Motors	13.7	30.1	19.6	21.3	8.2	15.9	10.1	11.3	5.5	23.3	7.5	11.8	13.0	27.3	15.3	22.0
Canine	85.8	89.3	84.7	84.1	79.4	84.9	80.0	78.7	77.7	83.8	78.0	78.7	88.7	87.6	86.9	81.5
Canine North	89.7	90.3	92.4	91.6	85.5	82.3	81.7	85.0	76.5	88.1*	94.1*	76.9	88.3	83.9	85.5	79.7
Canine South/Central	83.6	88.5	78.6	79.7	77.6	85.9	79.4	77.2	77.9	82.9	76.5	78.9	88.9	91.8	88.4	82.6

Table 6.3: Traffic Stop WARNINGS - Statewide, Division, Bureau, & District - 2003-2006

Repair Orders

Table 6.4 and Figure 6.3 report the rate of repair orders between 2003 and 2006 for Caucasian, Hispanic, Native American, and Black drivers. For Caucasian and Hispanic drivers, their rate of repair orders decreased in 2004 prior to a noticeable increase in 2005 and 2006. Native American drivers also experienced a decline in 2004 and an increase in 2005; however, the rate of repair order issued to Native American drivers in 2006 was noticeably lower. Black drivers had a consistent increase in their rate of repair orders issued across the four years, except for an increase in 2005. While the overall trends are similar for all groups, Native American drivers have considerably higher rates of receiving a repair order when compared to the other racial/ethnic groups. Hispanic drivers also have slightly increased rates of receiving a repair order when compared with Caucasian and Black drivers. See Table 6.4 for the repair order trends at the bureau and district/shift levels.



Figure 6.3: Repair Orders Issued during Officer-Initiated Traffic Stops by Racial/Ethnic Group: 2003-2006

*	<u>% Caucasian</u>					<u>% Hi</u>	<u>spanic</u>			% Native	America	<u>n</u>	<u>% Black</u>				
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	
DPS Statewide	10.8	10.1	12.9	12.8	13.6	12.6	15.9	16.0	22.7	21.7	24.8	21.6	8.1	8.2	10.4	10.5	
Investigations Division	11.1	9.2	16.8	13.9	7.4	18.3	22.2	17.0	0.0	22.2*	36.4*	7.3*	6.3	18.2*	25.0*	12.5	
Highway Patrol Division	10.8	10.1	12.9	12.8	13.6	12.6	15.9	16.0	22.7	21.7	24.8	21.6	8.1	8.1	10.4	10.5	
Northern Bureau	11.2	10.0	12.6	11.9	12.5	12.8	15.3	14.1	24.1	23.4	25.9	22.3	9.3	9.2	11.5	9.6	
D1-Kingman	11.4	10.1	16.7	15.5	11.9	11.3	18.2	19.7	18.5	12.2	19.6	17.5	7.2	6.0	12.9	12.6	
D2-Flagstaff	10.0	8.3	10.7	11.4	10.6	10.6	12.1	11.7	25.4	23.1	28.3	30.3	6.5	6.8	9.1	6.4	
D3-Holbrook	12.2	12.0	10.9	9.4	14.5	17.6	16.9	12.3	25.7	25.7	26.4	20.7	10.7	13.6	13.6	9.3	
D11-Globe	9.6	9.4	15.1	12.8	12.9	13.2	17.2	15.8	12.5	13.0	21.2	16.9	10.9	10.3	9.4	10.7	
D12-Prescott	12.0	9.7	10.6	11.8	12.5	10.8	12.2	11.6	17.5	18.1	15.7	15.5	13.4	8.8	10.3	9.8	
Metro West	9.9	9.6	13.6	14.6	10.9	9.6	14.0	14.0	8.8	8.2	13.1	12.0	8.3	8.7	9.9	11.4	
Shift #1	8.6	9.3	10.9	12.2	6.2	8.1	12.5	12.9	8.0	6.1	10.4	12.1	7.5	8.9	6.7	6.5	
Shift #2	13.0	11.6	15.2	16.2	17.7	12.7	16.3	15.0	11.6	9.9	16.2	11.5	10.2	9.8	10.4	13.5	
Shift #3	6.8	7.2	16.8	15.9	6.7	6.5	11.6	13.9	7.0	8.4	13.4	12.7	7.2	7.3	13.6	13.9	
Southern Bureau	14.1	12.9	17.2	17.4	18.6	16.7	21.2	22.6	20.3	17.2	22.1	23.8	10.9	9.4	13.7	15.2	
D4-Yuma	9.5	9.7	18.6	18.9	15.3	15.0	22.4	26.5	18.5	16.8	25.2	31.8	6.9	5.6	16.2	15.2	
D6-Casa Grande	18.3	14.3	17.7	19.2	25.0	19.1	24.2	28.3	24.3	17.6	23.2	24.6	18.2	11.5	19.3	20.1	
D8-Tucson	12.2	11.8	16.1	14.4	17.3	16.9	19.7	16.7	17.7	16.2	19.6	19.7	9.1	10.8	10.9	12.7	
D9-Sierra Vista	14.1	15.0	16.8	17.1	16.8	16.1	19.8	19.9	13.2	18.5	20.8	19.0	8.1	8.3	8.7	12.1	
Commercial Vehicle	2.7	3.7	2.2	2.0	1.5	2.1	1.1	0.9	4.8	8.4	6.7	3.9	1.8	3.0	1.6	1.6	
District 15	1.5	4.0	3.2	3.2	1.1	3.2	3.9	3.0	1.2	9.5	7.6	1.3	1.7	4.7	3.1	4.2	
District 16	3.7	3.6	1.6	1.3	1.6	1.9	0.7	0.6	9.5	5.9	4.0	9.1*	1.9	1.6	0.6	0.5	
Metro East	3.2	4.9	7.0	8.3	4.0	4.8	7.7	8.9	8.7	5.3	11.6	10.0	2.4	4.5	7.2	7.6	
Shift #1	0.0*	4.0	4.1	4.9	0.0*	3.2	4.2	5.2		1.5	6.8	7.8		2.6	4.5	3.7	
Shift #2	1.8	6.3	6.6	6.5	0.0*	5.0	6.6	5.5		7.7*	7.7	5.8	0.0*	5.4	7.0	6.1	
Shift #3		9.6	14.6	17.5		7.0	11.3	13.6		5.8	11.8	11.5		8.7	13.6	13.1	
Metro Motors	2.0	4.2	3.2	4.9	2.0	3.1	4.0	5.7	1.1	1.7	3.0	2.2	1.5	3.0	3.2	5.3	
Canine	6.7	4.1	10.0	10.2	10.3	7.1	16.4	17.4	16.6	9.1	25.3	18.9	3.9	5.7	9.1	11.1	
Canine North	3.4	3.3	5.3	4.4	4.7	8.3	16.2	10.8	7.8	4.8*	11.8*	7.7	4.0	8.2	14.0	11.4	
Canine South/Central	8.5	4.9	13.7	13.6	12.0	6.6	16.5	18.9	18.8	10.1	26.5	20.2	3.8	2.8	4.5	10.9	

 Table 6.4: Traffic Stop REPAIR ORDERS - Statewide, Division, Bureau, & District – 2003-2006

Citations

Table 6.5 and Figure 6.4 report the trends of citations for Caucasian, Hispanic, Native American, and Black drivers form 2003-2006. The pattern for Caucasian, Hispanic, and Black drivers is consistent across the four years. In 2004, there was a decrease in the rate of citations issued to these racial/ethnic groups, followed by an increase in 2005 and a leveling in 2006. Native American drivers also experienced a decline in their rate of citations in 2004; however, they experienced a further reduction in 2005, prior to an increase in 2006. Importantly, their citation rate was highest in 2003 (43.4%), and noticeably lower in 2006 (32.6%). This pattern is not consistent with the other race/ethnic groups, whose 2006 citation rate is more closely aligned with the 2003 rate. When assessing the rates relative to one another, Hispanic and Black drivers have higher rates of citations, followed by Caucasian drivers, and Native American drivers who have noticeably lower rates of citations. See Table 6.5 for the citation trends at the bureau and district/shift levels.



Figure 6.4: Citations Issued during Officer-Initiated Traffic Stops by Racial/Ethnic Group: 2003-2006

-	<u>% Caucasian</u>				<u>% Hispanic</u>				<u>% Native American</u>				<u>% Black</u>				
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	
DPS Statewide	46.3	40.4	44.2	44.9	54.9	50.3	52.3	52.6	43.4	33.8	30.5	32.6	50.6	44.5	50.5	49.4	
Investigations Division	42.1	29.8	30.5	37.8	34.1	42.5	45.4	50.0	36.4*	22.2*	27.3*	53.7*	56.3*	18.2*	41.7*	50.0	
Highway Patrol Division	46.3	40.4	44.2	44.9	54.9	50.4	52.3	52.6	43.4	33.8	30.5	32.5	50.6	44.5	50.5	49.4	
Northern Bureau	38.7	32.1	38.3	42.9	49.3	42.6	49.0	54.9	41.4	30.9	26.9	29.3	39.7	32.7	40.7	46.5	
D1-Kingman	46.2	45.4	42.5	44.3	54.3	52.1	50.1	52.0	53.9	47.4	49.8	47.6	50.5	52.4	49.6	44.1	
D2-Flagstaff	35.1	25.9	36.0	37.4	43.6	34.9	45.4	49.7	29.8	26.4	27.9	28.9	34.0	26.4	39.4	42.4	
D3-Holbrook	37.1	20.0	32.3	42.5	48.4	34.2	45.0	55.4	46.6	29.9	22.4	24.9	44.2	22.9	36.9	48.7	
D11-Globe	35.6	38.1	37.4	41.5	47.4	46.7	49.1	51.7	38.1	41.7	41.2	42.3	36.4	39.8	41.9	47.0	
D12-Prescott	37.6	32.9	44.9	46.9	50.2	44.8	55.6	62.5	45.2	40.0	48.9	54.7	27.4	27.6	37.3	49.2	
Metro West	58.3	52.9	53.0	47.3	69.6	66.0	65.6	64.3	66.6	60.1	60.4	57.7	60.7	53.9	57.4	52.7	
Shift #1	63.4	55.0	56.9	52.7	76.1	67.6	67.9	66.1	68.2	63.3	60.1	52.7	64.2	55.6	61.2	58.4	
Shift #2	56.9	56.2	51.2	47.2	63.3	66.7	64.6	66.9	67.1	62.5	62.3	60.7	61.6	57.0	57.3	53.8	
Shift #3	55.1	46.3	47.5	37.2	70.0	63.1	63.6	57.9	65.1	54.9	58.0	59.3	55.1	48.2	52.4	45.4	
Southern Bureau	46.4	43.7	45.2	44.2	53.6	51.2	51.1	49.7	49.6	46.5	50.5	48.0	51.6	48.6	52.3	47.2	
D4-Yuma	48.8	41.3	40.0	41.8	50.5	47.5	46.1	46.7	49.3	46.6	45.7	48.5	53.0	46.1	51.8	47.3	
D6-Casa Grande	35.8	36.3	45.4	40.1	39.7	40.3	46.0	38.4	43.8	40.7	48.3	39.2	34.8	37.0	40.0	35.5	
D8-Tucson	54.2	52.3	47.3	45.6	59.5	56.1	55.2	55.7	53.5	51.3	52.6	58.7	53.5	55.1	52.9	46.2	
D9-Sierra Vista	51.1	46.4	47.1	50.1	61.4	56.9	53.9	56.8	62.0	52.3	57.3	61.4	65.9	57.3	66.4	63.6	
Commercial Vehicle	33.8	28.0	27.7	27.8	28.2	22.2	20.3	23.7	58.5	45.8	36.7	33.1	41.8	36.8	38.7	39.3	
District 15	37.7	39.1	37.0	33.4	46.0	46.1	40.1	42.3	54.8	50.0	40.2	34.7	44.2	45.1	46.4	43.3	
District 16	30.8	21.2	21.6	24.9	25.0	17.9	16.9	20.8	63.5	39.7	28.0	31.8*	40.3	31.4	33.2	37.6	
Metro East	64.3	48.9	56.2	54.4	68.5	55.5	64.8	63.2	49.6	47.1	54.8	53.6	52.9	44.0	55.9	54.4	
Shift #1	0.0*	56.9	57.6	54.9	0.0*	71.6	72.5	71.3		70.8	66.2	65.5		55.4	61.1	58.6	
Shift #2	75.4	55.7	57.8	57.9	85.7*	74.9	73.3	75.9		69.2*	65.6	70.1	0.0*	55.0	60.7	60.9	
Shift #3		45.2	44.5	43.4		60.6	60.4	61.7		68.1	61.1	61.7		45.6	44.3	48.6	
Metro Motors	83.4	65.0	77.8	75.1	87.5	79.3	86.8	85.1	91.9	74.1	90.3	86.0	83.5	68.6	81.5	75.2	
Canine	5.9	5.3	5.3	6.4	7.9	4.7	3.4	5.5	6.0	5.0	2.7	4.4	4.4	3.0	4.5	9.0	
Canine North	5.0	5.1	3.2	5.0	6.7	5.4	3.7	5.3	15.7	4.8*	5.9*	15.4	5.7	3.0	5.0	10.6	
Canine South/Central	6.5	5.5	6.9	7.2	8.1	4.4	3.4	5.5	3.8	5.0	2.4	3.1	3.7	3.1	3.7	8.1	

Table 6.5: Traffic Stop CITATIONS - Statewide, Division, Bureau, & District – 2003-2006

Arrests

Table 6.6 and Figure 6.5 report the rate of arrests between 2003 and 2006 for Caucasian, Hispanic, Native American, and Black drivers. For Caucasian and Hispanic drivers, there is a noticeable amount of consistency in their individual rates of arrest. For example, the rate of arrest for Caucasian and Hispanic drivers only varied by 0.4% across the four years. For Native American drivers, there is more variation punctuated by a decrease in the arrest rate in 2004. In 2003 and 2005, the rate of arrest for Native American drivers was 5.7%, whereas in 2004 and 2006 the rate was 4.9%. For Black drivers, their rate of arrest was fairly consistent except for 2005 when it increased to 4.6%. This followed the lowest arrest rate of 3.9% in 2004. Comparing each group to one another, Native American drivers have the highest rate, followed by Black and Hispanic drivers with similar rates. Caucasian drivers have noticeably lower rates of arrest across all four years. See Table 6.6 for the arrest trends at the bureau and district/shift levels.



Figure 6.5: Arrests Conducted during Officer-Initiated Traffic Stops by Racial/Ethnic Group: 2003-2006

•	<u>% Caucasian</u>				<u>% Hispanic</u>				<u>% Native American</u>				<u>% Black</u>				
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	
DPS Statewide	2.3	2.1	2.4	2.4	4.7	4.3	4.5	4.2	5.7	4.9	5.5	4.9	4.2	3.9	4.6	4.3	
Investigations Division	11.1	10.1	7.0	5.4	21.5	16.7	15.7	10.9	18.2*	22.2*	9.1*	2.4*	25.0*	27.3*	16.7*	8.9	
Highway Patrol Division	2.3	2.1	2.4	2.4	4.7	4.3	4.5	4.2	5.7	4.9	5.5	4.9	4.2	3.8	4.6	4.3	
Northern Bureau	2.0	1.7	1.8	1.8	3.4	3.0	3.3	3.5	5.3	4.4	4.8	4.3	3.3	2.9	3.1	3.7	
D1-Kingman	2.7	2.1	2.5	3.0	3.8	3.1	3.4	4.8	8.6	4.8	9.1	5.6	3.2	3.0	2.9	4.3	
D2-Flagstaff	1.8	1.6	1.6	1.6	2.7	3.2	2.9	3.7	5.7	5.3	6.3	5.8	2.7	3.2	4.1	5.4	
D3-Holbrook	1.8	1.4	1.3	1.2	3.3	2.9	2.6	2.3	5.1	4.1	4.1	3.7	4.1	3.0	2.4	2.5	
D11-Globe	1.7	1.5	1.6	1.2	4.0	3.2	3.6	2.9	5.0	4.8	3.9	3.2	2.6	4.0	2.8	3.4	
D12-Prescott	1.7	1.9	2.4	2.2	3.4	2.9	4.4	4.2	4.4	3.8	5.6	5.9	3.2	1.7	3.6	3.3	
Metro West	2.7	2.5	2.6	2.9	6.3	5.8	5.4	5.4	10.7	8.2	9.6	8.9	4.6	4.1	4.6	4.8	
Shift #1	3.3	2.3	1.6	1.5	7.9	5.3	3.8	3.6	12.3	10.6	4.9	2.4	4.9	4.0	2.5	2.7	
Shift #2	1.9	1.9	2.3	2.7	4.0	4.1	3.9	4.5	6.5	6.8	9.3	8.9	2.6	2.6	4.1	4.7	
Shift #3	3.3	3.3	5.9	5.6	7.9	8.9	11.1	9.1	13.0	7.7	17.9	17.8	6.4	5.8	8.0	7.3	
Southern Bureau	2.4	2.0	2.5	2.3	3.9	3.7	4.0	3.8	7.2	7.0	7.8	6.0	4.2	3.5	4.0	3.6	
D4-Yuma	2.3	2.1	2.0	1.6	3.3	2.7	2.7	2.4	11.2	7.1	4.7	2.6	3.7	3.5	3.5	2.9	
D6-Casa Grande	1.9	1.8	2.2	1.9	3.5	4.1	3.7	3.3	5.7	7.7	6.3	4.8	4.9	3.4	3.0	2.8	
D8-Tucson	3.1	2.2	3.1	3.6	4.7	4.2	5.1	5.8	7.9	6.9	12.3	11.7	4.0	3.9	5.7	5.8	
D9-Sierra Vista	2.3	2.0	2.3	2.3	3.7	3.4	3.6	2.9	7.0	4.6	7.3	5.2	4.2	2.9	3.4	2.7	
Commercial Vehicle	1.0	1.0	1.0	0.8	0.5	0.6	0.7	0.6	4.1	3.2	5.3	3.1	1.5	2.0	2.1	1.0	
District 15	1.6	2.0	1.8	1.3	1.2	2.4	1.6	2.3	3.6	6.0	7.6	2.7	2.4	3.8	4.4	2.0	
District 16	0.6	0.3	0.4	0.5	0.4	0.2	0.6	0.4	4.8	0.0	0.0	2.3	0.9	0.9	0.5	0.5	
Metro East	3.1	3.8	4.1	3.9	13.2	11.6	8.9	6.9	6.3	8.4	12.6	13.0	6.7	7.0	7.6	6.2	
Shift #1	0.0*	2.0	2.3	2.4	100.0*	5.2	5.4	6.3		6.2	6.2	16.4		5.6	4.3	5.1	
Shift #2	0.0	3.1	2.9	3.8	0.0*	8.8	6.7	6.6		12.8*	12.6	10.8	0.0*	4.5	7.6	6.1	
Shift #3		13.0	10.7	7.0		29.9	20.4	11.2		33.3	28.0	28.2		15.8	11.1	8.7	
Metro Motors	3.4	3.2	2.5	2.8	15.7	13.7	7.2	6.0	9.5	5.6	11.2	6.6	7.4	5.7	7.3	4.9	
Canine	2.3	2.6	2.4	2.6	5.0	4.6	3.6	4.3	3.0	3.7	1.1	3.6	5.7	7.1	7.5	6.0	
Canine North	2.7	3.0	2.7	2.8	6.1	4.2	3.4	3.9	0.0	2.4*	0.0*	3.8	5.7	9.4	10.9	8.5	
Canine South/Central	2.0	2.3	2.1	2.6	4.6	4.8	3.5	4.3	3.8	4.0	1.2	3.6	5.7	4.5	4.5	4.4	

Table 6.6: Traffic Stop ARRESTS - Statewide, Division, Bureau, & District - 2003-2006

Searches

Table 6.7 and Figure 6.6 provide a review of search trends between 2003 and 2006 for Caucasian, Hispanic, Native American, and Black drivers. Across the department, the rate of searches for all race/ethnic groups was noticeably lower in 2004 compared to all other years. Caucasian drivers were searched most frequently in 2005 (3.3%), after a low rate of searches in 2004 (2.4%). The search rate decreased in 2006 to 3.2%, which is identical to the 2003 rate of 3.2%. Hispanic drivers experienced the highest rate of searches in 2006 (7.7%), which was an increase from 2005 (7.6%) and 2003 (7.1%). This is the same pattern as experienced by Native American drivers, who had their highest rate of searches in 2006 (6.2%), exceeding the 2005 (6.1%) and 2003 rates (5.5%). Black drivers actually had a lower rate of searches in 2006 (7.1%) compared to 2005 (7.6%) and 2003 (7.4%). Similar to arrests, Caucasian drivers have the lowest rate of search in contrast to Hispanic, Native American, and Black drivers who demonstrate noticeably higher rates. See Table 6.7 for further description of the search rates of Caucasian, Hispanic, Native American, and Black drivers who demonstrate noticeably higher rates.

Figure 6.6: Searches Conducted during Officer-Initiated Traffic Stops by Racial/Ethnic Group: 2003-2006



		% Cat	icasian		<u>% Hispanic</u>					% Native	America	<u>n</u>	<u>% Black</u>				
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	
DPS Statewide	3.2	2.4	3.3	3.2	7.1	5.6	7.6	7.7	5.5	4.4	6.1	6.2	7.4	5.6	7.6	7.1	
Investigations Division	18.0	18.0	14.1	11.6	23.5	25.8	35.2	23.9	18.2*	22.2*	18.2*	9.8*	25.0*	27.3*	50.0*	25.0	
Highway Patrol Division	3.2	2.4	3.3	3.2	7.1	5.5	7.8	7.7	5.5	4.4	6.1	6.2	7.4	5.6	7.5	7.0	
Northern Bureau	2.6	1.9	2.5	2.3	6.5	4.9	6.7	7.2	4.7	3.8	5.2	5.2	8.4	5.6	7.3	6.5	
D1-Kingman	3.0	2.2	3.4	3.2	6.6	5.5	7.9	7.3	7.9	4.3	9.6	6.7	7.6	5.5	7.2	5.5	
D2-Flagstaff	3.3	2.0	2.3	2.2	8.5	6.1	6.7	7.0	5.1	4.5	7.3	6.5	8.9	6.6	7.7	8.9	
D3-Holbrook	2.7	1.7	1.9	1.7	7.2	5.5	6.0	6.1	4.4	3.5	4.1	4.7	11.4	6.6	7.8	6.4	
D11-Globe	1.9	1.6	1.8	1.6	4.3	3.7	5.0	3.9	4.2	4.5	4.3	3.9	3.3	4.5	4.8	3.4	
D12-Prescott	2.3	1.9	3.1	3.1	5.7	3.5	7.6	10.7	5.1	2.7	6.6	7.4	7.2	3.6	6.7	6.4	
Metro West	3.4	2.1	3.1	3.7	6.5	5.3	7.1	8.6	9.9	7.0	10.4	10.6	5.4	3.8	5.8	6.8	
Shift #1	2.5	1.5	1.7	2.1	6.9	3.4	4.8	6.9	8.8	8.7	4.9	3.0	5.2	3.2	3.0	4.2	
Shift #2	4.4	1.9	3.1	3.4	5.6	4.5	5.9	8.0	9.4	6.8	10.8	11.0	5.7	2.9	5.4	6.7	
Shift #3	2.8	3.0	6.7	7.1	7.3	8.8	13.6	11.8	10.9	5.9	18.8	20.3	5.3	5.6	10.3	10.1	
Southern Bureau	3.4	2.3	3.6	3.2	6.9	4.6	7.2	7.0	9.7	7.4	10.5	9.0	6.2	4.6	6.5	6.0	
D4-Yuma	4.3	2.8	3.3	2.6	7.9	4.4	5.5	5.3	13.8	7.5	5.5	5.9	7.1	5.0	5.9	5.6	
D6-Casa Grande	2.9	2.2	3.0	2.6	6.4	5.4	6.8	6.4	7.0	7.9	7.6	7.1	7.5	4.6	6.6	5.6	
D8-Tucson	3.9	2.5	5.0	5.0	7.5	4.9	9.1	10.4	12.4	8.0	17.9	16.6	6.0	5.3	8.2	8.9	
D9-Sierra Vista	2.8	2.0	3.0	2.7	5.6	3.7	6.1	4.6	8.9	4.3	10.8	7.2	4.3	3.0	4.6	3.5	
Commercial Vehicle	3.3	3.9	4.0	3.1	2.8	2.6	3.0	2.1	1.4	2.6	7.3	7.1	5.2	5.7	8.8	6.2	
District 15	6.4	9.5	9.0	7.2	8.5	13.3	14.4	8.9	1.2	4.8	10.9	9.3	10.1	12.9	19.9	13.4	
District 16	0.9	0.5	0.7	0.9	1.8	0.7	1.0	1.1	1.6	0.0	0.0	2.3	1.7	1.2	0.9	3.1	
Metro East	5.2	5.0	5.1	4.8	17.4	15.4	12.9	12.7	10.2	10.1	14.8	17.3	13.8	11.3	10.5	9.0	
Shift #1	0.0*	2.0	2.9	3.0	0.0*	4.9	7.0	9.6		6.2	7.6	18.1		5.2	6.2	6.6	
Shift #2	0.0	3.3	3.7	4.2	0.0*	8.8	9.4	10.0		12.8*	15.3	13.7	0.0*	5.9	8.8	7.6	
Shift #3		13.3	11.5	7.7		31.6	22.7	14.4		33.3	29.4	30.4		15.4	12.9	9.9	
Metro Motors	3.2	3.0	2.5	2.8	15.9	13.9	8.0	7.6	9.9	5.6	11.2	5.9	6.7	5.4	7.5	5.9	
Canine	11.4	8.8	9.3	9.9	22.2	17.3	22.0	25.3	10.5	8.3	5.9	15.3	25.2	21.5	23.5	18.7	
Canine North	12.7	12.5	11.4	9.0	31.8	23.7	21.7	21.1	3.9	4.8*	0.0*	11.5	22.7	22.3	23.1	19.1	
Canine South/Central	10.7	5.6	7.7	10.4	19.4	14.7	22.0	26.3	12.1	9.0	6.0	15.7	26.8	20.6	23.6	18.5	

Table 6.7: Traffic Stop SEARCHES - Statewide, Division, Bureau, & District - 2003-2006

The previously reported analyses (Tables 6.3 - 6.7) and graphical displays (Figures 6.2 - 6.6) document the trends in traffic stop outcomes by racial/ethnic group. These figures provide a comparison across years within racial/ethnic groups, and across racial/ethnic groups. Caution must be exercised when interpreting these comparisons, as each group may be engaging in different types of behavior that warrant differences in outcomes (i.e., driving behavior, involvement in criminal activity, etc.). With these limitations understood, it is instructive to assess if minority groups are experiencing different patterns of traffic stops outcomes, regardless of the reasons for those trends. These trend analyses are descriptive in nature and do not provide evidence of discrimination or racial bias toward any racial/ethnic group. The information, however, does provide a picture of the general trends in traffic stop outcomes for Caucasian, Hispanic, Native American, and Black drivers between 2003 and 2006 throughout the state.

SECTION SUMMARY

Section 6 reported on the four years of data collection by focusing on trends in traffic stop outcomes between 2003 and 2006 at all organizational units. Moreover, the racial/ethnic composition of those outcomes is of particular interest and represents a significant component of the analyses. It is important to note that the analyses reported in this section are descriptive; therefore, these findings should be interpreted with caution, as not all possible factors that might explain the results are included (please see Sections 6 & 8 for a more detailed analyses). Irrespective of the nature of the analyses, several findings are important to highlight:

Traffic Stop Outcomes: 2003-2006

- Five traffic stop outcomes were analyzed: warnings, repair orders, citations, arrests, and searches:
 - Warnings: approximately 40% of all traffic stops resulted in warnings across the four years, with the 2006 rate (40.1%) similar to the 2003 rate (38.9%).
 - Repair Orders: this outcome occurs in slightly more than 10% of all traffic stops, but this trend is increasing in the last three years.
 - Citations: slightly less than 50% of all traffic stops resulted in the issuance of a citation in 2006, and the rate of citations issued has been increasing since 2004.
 - Arrests: the rate of arrest has consistently hovered around three and a half percent and is not demonstrating any significant pattern of change across the four years.
 - Searches: 4.6% of all traffic stops outcomes resulted in a search in 2006, which is an increase from 2003 (4.4%), and noticeably higher that the low in 2003 (3.3%).
- Traffic stop outcomes were also assessed for Caucasian, Hispanic, Native American, and Black drivers throughout the four years of data collection

- Generally, the pattern within racial/ethnic groups matched the overall pattern throughout the state with minor exceptions; however, there are differences in the rate of traffic stop outcomes for specific groups.
 - Warnings: Caucasian and Native American drivers have higher rates of warnings, while Hispanic drivers have noticeably lower rates of warnings.
 - Repair Orders: Hispanic and Native American drivers have considerably higher rates of receiving a repair order when compared to Caucasian and Black drivers across all four years.
 - Citations: Hispanic and Black drivers have the highest rates of citations, followed by Caucasian drivers, and Native American drivers who have noticeably lower rates of citations, and experienced a significant decline from 2003 to 2004.
 - Arrests: Native American drivers have the highest rate of arrest, followed by Hispanic and Black drivers. Caucasian drivers have noticeably lower rates of arrest.
 - Searches: similar to arrests, Hispanic, Native American, and Black drivers all have rates that exceed Caucasian drivers across all four years.

7. SEARCH & SEIZURE ANALYSES

OVERVIEW

The material presented in this section is focused specifically on searches conducted during officer-initiated traffic stops. As reported in Section 5, 4.6% of all member-initiated traffic stops during 2006 resulted in a search of the driver, vehicle or passenger.²⁵ Additionally, the results of the multivariate analysis in Section 5 indicate that after controlling for other relevant legal and extralegal factors captured on the data collection form, Hispanic, Black and Native American drivers are at least two times more likely than Caucasians to be searched. The purpose of the analyses presented in this section is to further examine searches and seizures conducted by DPS officers. Given that searching motorists is a statistically infrequent event, it may seem unusual that an entire section of this report is dedicated to exploring searches and seizures. Searches, however, despite their infrequency, involve a physical and psychological intrusion upon those subjected to searches. Therefore, these police actions merit further exploration.

Section 7 begins with a description of searches and seizures at the department, division, bureau, and district/shift levels. This information is documented in Tables 7.1 - 7.2, as well as Figures 7.1 - 7.3. Table 7.1 reports, at the department, division, bureau, and district/shift level: 1) the total number of traffic stops, 2) the percentage of stops that result in a search, 3) the total number of searches, and 4) the percentage of searches for each reason indicated on the data collection form. Figure 7.1 graphically displays the percentages of searches for each reason for search (e.g., consent, incident to arrest, probable cause, Terry, vehicle inventory, plain view, warrant, and canine alert) at the department level. Figure 7.2 describes the search targets, displaying the percentages of drivers, vehicles, and passengers searched at the department, division, and bureau level. Table 7.2 and Figure 7.3 report the different types of contraband seized by department, division, bureau, and district/shift.

The next subsection describes search rates for three types of searches: Type I—searches required by DPS policy, Type II—searches allowed by case law or policy and, guided by legal statutes, and Type III—searches based solely on drivers' consent to an officer's request to search. Figure 7.4 reports the search rates for each of the three types of searches at the department and bureau level. Figure 7.5 and Table 7.3 document at the department and bureau level the racial/ethnic and gender differences in search rates by these three types of searches.

Finally, search success rates are explored in detail. Specifically, Table 7.4 and Figure 7.6 report the search success rates by the reason for search at the department, division and bureau level. Search success rates for Type II searches are examined in Figures 7.7 – 7.8 and Table 7.5. Figure 7.7 provides the overall Type II search success rates at the department and bureau level, while Figure 7.8 reports the racial/ethnic differences in Type II searches at the department level. Table 7.5 displays the Type II search success rates by driver characteristics

²⁵ Only searches captured on the contact forms with drivers were included for analyses. It is assumed that passengers searched would be captured on these forms. If forms for passengers were included, there would be multiple searches included in the data base for a single traffic stop. The research team assumed that if a passenger is searched and contraband is found on that passenger, this information is captured on the drivers' contact data form.

at the department and bureau level. Thereafter, an examination of consent searches (Type III) is provided. Racial and ethnic differences in request for consent to search and refusal to consent are examined in Figures 7.9 and 7.10. Search success rates for Type III searches are examined in Figures 7.11 - 7.12 and Table 7.6. Figure 7.11 provides the overall Type III search success rates at the department and bureau level, while Figure 7.12 reports the racial/ethnic differences in Type III searches at the department level. Table 7.6 displays the Type III search success rates by driver characteristics at the department and bureau level. Finally, an overview of search rates and search success rates for undocumented aliens is provided. Section 7 concludes with a summary of the main findings.

DESCRIPTION OF SEARCHES AND SEIZURES

Searches

This section provides a descriptive overview of the searches conducted by DPS officers during traffic stops in 2006. Table 7.1 and Figure 7.1 describe the frequency of each reason for a search at the department, division, bureau, and district/shift level. Thereafter, Figure 7.2 displays the search targets involved in DPS searches during traffic stops.

Reasons for the Search

Table 7.1 below reports the total number of traffic stops, the percentage of stops that result in a search, and the total number of searches at the department, division, bureau, and district/shift levels. This table also documents the percentage of searches for each reason indicated on the data collection forms (e.g., consent, incident to arrest, probable cause, Terry, vehicle inventory, plain view, warrant, and canine alert) by each organizational unit.²⁶

As shown in Table 7.1, DPS officers conducted a total of 21,218 searches of drivers, vehicles, and/or passengers during officer-initiated traffic stops in 2006 (4.6% of the 460,545 traffic stops). Variation in these percentages is evident at the different organizational levels. Motorists stopped by the Criminal Investigations Division (16.5%) were over 3 times as likely to be searched compared to those stopped by the Highway Patrol Division (4.6%). It is important to note, however, that the overwhelming majority of searches were conducted by officers assigned to the Highway Patrol Division. At the bureau level, the Commercial Vehicle Bureau and the Metro East Bureau conducted the smallest and largest percentages of searches (3.0% and 7.1%, respectively). At the district/shift level, the percent of traffic stops resulting in searches range from a low of 1.1% in District 16 to a high of 16.7% in the Canine District.

²⁶ Officers may have indicated that a search was conducted for multiple reasons. As a result, the sum of percentages across search categories reported in Table 7.1 may exceed 100%. The last column in Table 7.1 indicates the percentage of searches that were conducted based solely on drivers' consent. That is, this column partially duplicates information provided in the "consent" column, but excludes searches that were conducted based on consent and any other (i.e., non-consent) reason.

	Total # of Stops	% Stops resulting in Searches	Total # of Searches	% Consent	% Incident to Arrest	% Probable Cause	% Terry	% Vehicle Inventory	% Plain View	% Warrant	% Canine Alert	% Consent Only
DPS Statewide	460,545	4.6	21,218	16.5	54.7	14.5	10.7	30.0	2.8	0.5	2.9	13.4
Crim. Invest. Division	935	16.5	154	38.3	34.4	15.6	15.6	7.8	1.9	0.0	0.6	33.1
Highway Patrol Division	458,068	4.6	20,985	16.3	54.9	14.5	10.6	30.2	2.8	0.5	2.9	13.2
Northern Bureau	162,250	3.4	5,437	15.9	51.5	17.6	11.8	27.4	3.7	0.4	2.6	12.2
D1-Kingman	27,596	3.9	1,077	18.3	51.5	16.5	16.2	17.6	5.6	0.1	1.3	14.9
D2-Flagstaff	26,264	3.6	951	18.5	55.1	21.1	13.7	20.9	1.2	0.2	2.3	13.7
D3-Holbrook	52,405	3.0	1,557	14.6	49.6	18.6	10.9	34.4	2.4	0.4	3.7	12.1
D11-Globe	24,081	2.0	489	18.8	60.1	16.0	6.3	18.6	7.4	0.4	1.6	12.7
D12-Prescott	31,583	4.3	1,353	12.6	48.1	15.3	10.1	34.7	4.1	0.9	3.2	9.2
Metro West Bureau	61,175	5.3	3,246	7.2	66.3	8.4	13.0	36.7	1.2	0.5	0.6	5.8
Shift #1	21,951	3.4	750	10.0	53.1	11.6	9.9	41.9	0.9	0.7	0.8	8.8
Shift #2	24,661	5.0	1,228	8.7	65.4	7.6	11.9	32.2	1.5	0.4	0.6	6.8
Shift #3	14,014	8.9	1,245	4.0	75.1	7.1	16.1	38.2	1.1	0.4	0.6	3.1
Southern Bureau	140,045	4.8	6,657	18.2	54.3	13.9	8.6	29.4	2.7	0.6	2.3	15.1
D4-Yuma	37,080	3.8	1,416	27.7	42.9	16.9	17.7	29.6	3.2	0.4	4.7	19.4
D6-Casa Grande	34,805	4.0	1,390	21.8	47.0	13.3	5.5	24.1	3.2	1.7	3.5	19.6
D8-Tucson	37,784	7.4	2,797	13.0	60.8	12.6	6.0	33.5	2.4	0.4	0.7	12.4
D9-Sierra Vista	30,011	3.4	1,027	14.3	62.1	14.1	7.0	25.1	2.5	0.2	1.9	10.4
Comm. Vehicle Bureau	26,088	3.0	773	28.5	16.2	51.2	17.3	11.8	8.7	1.0	2.7	21.9
District 15	6,510	8.5	551	28.9	14.0	53.5	21.8	13.8	10.9	0.9	2.4	21.4
District 16	19,432	1.1	214	27.6	22.0	45.3	6.5	7.0	3.3	1.4	3.3	22.9
Metro East Bureau	67,957	7.1	4,855	18.4	58.0	10.1	9.5	33.0	1.9	0.4	5.7	15.3
Shift #1	11,344	4.7	533	3.2	59.5	14.4	15.9	36.4	6.6	0.6	1.7	2.4
Shift #2	22,127	5.8	1,280	4.1	72.4	6.3	12.3	54.4	1.7	0.2	0.4	3.1
Shift #3	13,382	9.6	1,290	2.7	81.9	7.4	8.1	34.8	1.2	0.3	1.2	1.8
Metro Motors	14,218	4.2	599	2.8	76.6	9.3	6.3	40.7	1.8	1.2	0.8	1.7
Canine	6,886	16.7	1,153	66.8	5.1	15.9	6.7	1.7	0.7	0.3	20.9	57.0
Canine North	2,041	13.2	270	70.0	7.4	22.6	24.4	0.7	0.0	0.0	21.5	45.6
Canine Central & South	4,827	18.2	879	65.6	4.4	13.9	1.3	2.0	0.9	0.5	20.8	60.3

Table 7.1: Reasons for 2006 Traffic Stop Searches – Statewide, Division, Bureaus, & Districts/Shifts

As shown in Table 7.1 and graphically displayed in Figure 7.1, the most frequent reason for searches across the department was incident to arrest (54.7%), distantly followed by vehicle inventory (30.0%), consent (16.5%) probable cause (14.5%), consent *only* (13.4%), and Terry (10.7%). The least common reasons for searches included: canine alert (2.9%), plain view (2.8%), and search warrant (0.5%).





Table 7.1 above also illustrates the variation in the different reasons for searches across divisions, bureaus and district/shifts. For example, at the division level, consent was a more common reason for the Criminal Investigations Division (38.3%) compared to Highway Patrol (16.3%). At the bureau level, incident to arrest is the most common reason for searches for all bureaus except the Commercial Vehicle Bureau, where the most common reason is probable cause (51.2%). Table 7.1 provides a description of further variation at these lower organizational units.

Canine officers are examined separately in Table 7.1 due to the unique nature of their assignment. The differences between these and other officers are readily apparent. Consent is the most frequent reason for search by Canine officers; overall 66.8% of searches are conducted for this reason, and over half (57.0%) are conducted solely for this reason. The next most common reasons for searches by Canine officers were Canine alerts (20.9%) and probable cause (15.9%). There were also some differences between canine handlers assigned to the North compared to those assigned in Central/South regions. Northern canine handlers were more likely to indicate probable cause and Terry as reasons for searches compared to the North constant, Central/South handlers were more likely to indicate inventory and only consent as reasons for searches compared to handlers assigned to the North.

Search Target

Figure 7.2 below documents the percentages of drivers, vehicles, and passengers searched at the department, division, and bureau level. Searches frequently involve multiple targets; therefore, the cumulative percentages exceed 100%. At the department level, 70.6% of searches were conducted of drivers, 82.1% involved vehicles, and 12.2% were performed on passengers. These percentages are consistent across divisions and bureaus, with the exception of the Commercial Vehicle Enforcement Bureau, where 90.9% of searches involved vehicles, but only 40.8% of searches were conducted of drivers.



Figure 7.2: Traffic Stops Resulting in Searches by Search Target

Seizures

Table 7.2 below reports the total number of seizures at the department, division, bureau, and district/shift levels, and further documents the types of evidence and/or contraband confiscated during searches conducted by DPS officers. In 2006, there were 5,014 seizures of contraband resulting from the 21,218 conducted searches during 460,545 officer-initiated traffic stops.
Tuble Har 2000 Truine Stop Scient	Total # of	<u>%</u>	<u>%</u>	%	%	%	% Other	% Other
	Seizures	Alcohol	Drugs	Vehicle	Weapon	Currency	Contraband	Property
DPS Statewide	5,014	22.2	48.3	10.1	5.6	3.6	33.2	13.4
Criminal Investigations Division	49	28.6	57.1	6.1	4.1	4.1	24.5	10.2
Highway Patrol Division	4,950	22.1	48.3	10.2	5.7	3.7	33.3	13.5
Northern Bureau	1,603	28.9	50.4	7.5	4.6	3.2	36.8	8.6
D1-Kingman	331	29.6	45.6	2.1	4.2	1.2	29.0	16.6
D2-Flagstaff	297	24.9	52.9	14.8	4.7	5.7	36.7	8.1
D3-Holbrook	467	30.4	53.3	8.8	3.2	3.9	40.7	6.4
D11-Globe	128	25.8	55.5	4.7	10.2	2.3	36.7	2.3
D12-Prescott	377	30.5	47.5	6.1	4.5	2.7	39.3	6.9
Metro West	520	16.2	50.0	12.1	10.2	2.7	32.3	6.7
Shift #1	104	10.6	55.8	20.2	7.7	5.8	33.7	4.8
Shift #2	243	17.3	45.3	14.0	9.5	2.9	30.0	8.2
Shift #3	168	17.3	53.6	4.2	13.1	0.6	34.5	6.0
Southern Bureau	1,583	25.3	48.9	12.2	4.5	2.4	34.4	10.5
D4-Yuma	392	20.9	57.7	6.9	2.3	3.6	45.7	8.2
D6-Casa Grande	292	24.3	53.1	12.7	4.1	2.4	33.9	5.5
D8-Tucson	603	22.4	42.6	19.6	6.3	2.2	31.7	18.6
D9-Sierra Vista	290	38.3	46.2	3.8	3.8	1.4	25.2	2.4
Commercial Vehicle	385	12.5	13.8	1.6	5.5	0.5	21.6	66.2
District 15	307	12.7	12.4	0.7	6.5	0.7	23.5	67.4
District 16	73	11.0	17.8	5.5	1.4	0.0	13.7	63.0
Metro East	853	11.5	57.7	14.2	7.2	8.8	30.5	8.2
Shift #1	94	10.6	54.3	6.4	5.3	2.1	36.2	18.1
Shift #2	169	19.5	49.7	5.3	10.7	4.1	27.8	8.9
Shift #3	187	15.5	47.6	17.6	5.9	1.6	26.7	9.1
Metro Motors	118	11.9	64.4	5.9	9.3	0.0	33.9	3.4
Canine	285	4.2	67.4	23.2	5.6	22.1	31.2	6.0
Canine North	110	0.0	78.2	22.7	4.5	23.6	37.3	5.5
Canine Central & South	174	6.9	60.9	23.6	6.3	20.7	27.6	6.3

Table 7.2: 2006 Traffic Stop Seizures – Statewide, Division, Bureaus, & Districts/Shifts

Note: Searches may produce seizures of multiple types of contraband; therefore the percentages across the categories may exceed 100%.

As reported in Table 7.2 and graphically displayed in Figure 7.3, across the department, the most frequent type of contraband seized was drugs (48.3%). Approximately 33.2% of searches resulted in seizures categorized as "other contraband." Other common types of contraband seized were alcohol (22.2%), other property (13.4%), and vehicle (10.1%). Table 7.2 also documents the differences in the types of evidence seized across bureaus and district/shifts. The trends displayed at the department level are fairly consistent across the bureau and district/shift levels, with the exception of the Commercial Vehicle Bureau, where the most common type of contraband seized was "other property" (66.2%).



Figure 7.3. Seizures in 2006: Types of Evidence Seized (n=5,014)

TYPES OF SEARCHES

While examining the specific reasons for a search is instructive, this information is more easily understood when collapsed into discrete categories, or types of searches. These types of searches, although based on different reasons, have similar characteristics that warrant them being considered collectively. For the analyses reported in Figures 7.4 – 7.5 and Table 7.3 below, searches were divided into three categories based on the presumed level of officer discretion. The first search category—Type I—includes searches that are required by DPS policy and therefore, mandatory for officers to perform. Type I searches include searches incident to arrest, those based on a pre-existing warrant, and vehicle inventories. The second search category—Type II— includes searches that are allowed by case law or policy and, guided by legal statutes. Specifically, Type II searches include those based on probable cause, Terry, plain view, or canine alert. The third search category—Type III—includes search was based on multiple reasons, it was assigned to the search category with the least officer discretion (e.g., if a search is based on a canine alert [Type II] and consent [Type III], it was

defined as a Type II search). Therefore, the analyses below examining the search rates for Type I, II, and III searches are mutually exclusive.

Figure 7.4 below displays the number of total searches and the search rates for each of the three types of searches at the department and bureau level. At the department level, the majority of searches conducted were Type I (mandatory) searches (67.8%), while 18.8% and 13.4% were Type II (guided by legal statute) and Type III (solely consent) searches, respectively. Similar percentages of the three types of searches were reported for most of the bureaus as well. The Commercial Vehicle Enforcement Bureau, however, conducted a considerably larger percentage of Type II searches compared to the department average and other bureaus. The Canine District conducted over half of its searches based solely on consent, and also conducted a larger percentage of Type II searches compared to the department average and other bureaus.

Figure 7.4: Traffic Stops Resulting in Searches by Type of Search: Type I = mandatory, Type II = guided by case law, policy and legal statute, Type III = solely consent



While examining search rates across the types of searches is important, it is also instructive to consider differences in the types of search rates based on drivers' characteristics. Figure 7.5 and Table 7.3 below report the percentage of stops that resulted in each type of search across different types of drivers. Figure 7.5 graphically displays the racial/ethnic differences in the three types of search rates at the department level, while Table 7.3 reports the racial/ethnic and gender differences in the three types of search rates for drivers at the department and bureau level.

Both Table 7.3 and Figure 7.5 indicate that Blacks were least likely to be searched for mandatory reasons (Type I), while Native Americans were most likely to be searched for mandatory reasons. For Type II searches, the opposite is true: Blacks were significantly more likely, and Native Americans significantly less likely, to be subject to Type II searches. For both Type I and Type II searches, Caucasians and Hispanics had relatively similar

percentages in the middle of the two extremes. In the case of consent searches (Type III searches), Black and Hispanic motorists were significantly more likely to be searched based on consent compared to Caucasians and Native Americans. As shown in Table 7.3, these patterns of racial/ethnic differences were fairly consistent for each of the bureaus and Canine District.

Figure 7.5: Racial/Ethnic Differences in Types of Searches: Type I = mandatory, Type II = guided by case law, policy and legal statute, Type III = solely consent



<u>NOTE</u>: Differences across the four racial/ethnic groups presented in this figure are statistically significant at $p \le .001$

As shown in Table 7.3, gender differences in reasons for searches were also evident at the department level. Specifically, female drivers were significantly more likely to be searched for mandatory reasons (Type I) compared to male drivers, whereas male drivers were more often subjected to Type II and Type III searches. This pattern of gender differences is also evident for each of the bureaus as well as the Canine District, although the gender differences are not statistically significant for the Commercial Vehicle Enforcement Bureau or the Canine District. As noted in Section 5, caution must be used when interpreting these findings. The findings presented are bivariate (i.e., they do not take into account other extralegal and legal factors that might have a significant influence over search decisions).

manuatory, Type	n – gulucu by case	iaw, policy and		<u>%</u>	%
	Drivers	Total # of Searches	Type I Searches	Type II Searches	Type III Searches
	Caucasian	9,138	68.2***	20.4***	11.4***
	Hispanic	8,728	67.4	16.3	16.3
	Native American	1,483	84.6	10.7	4.7
DPS	Black	1,444	57.3	27.2	15.5
	Male	17,797	66.5***	19.8***	13.7***
	Female	3,409	74.4	14.1	11.5
	Caucasian	2,632	63.3***	24.9***	11.8***
	Hispanic	1,380	62.0	20.1	17.9
	Native American	1,055	88.9	9.5	1.6
Northern Bureau	Black	270	35.2	38.9	25.9
	Male	4,573	64.9***	22.4***	12.7*
	Female	859	72.6	17.5	9.9
	Caucasian	1,366	78.0***	16.3***	5.8
	Hispanic	1,486	81.8	12.4	5.8
	Native American	51	88.2	7.8	3.9
Metro West Bureau	Black	288	72.9	20.8	6.3
	Male	2,720	78.2***	15.7***	6.1
	Female	524	85.5	9.9	4.6
	Caucasian	2,566	69.0	17.5**	13.6**
	Hispanic	3,477	70.2	14.0	15.8
G 4	Native American	183	74.3	14.8	10.9
Southern Bureau	Black	340	66.2	15.3	18.5
	Male	5,489	68.5***	16.1**	15.4
	Female	1,164	73.5	13.0	13.6
	Caucasian	391	26.3	50.9	22.8
~	Hispanic	197	30.5	45.2	24.4
Commercial	Native American	9	44.4	55.6	0.0
Enforcement	Black	84	17.9	63.1	19.0
Bureau	Male	748	25.3	52.7	22.1
	Female	25	28.0	56.0	16.0

Table 7.3: Reasons for Search by Driver Characteristics for Department and Bureaus: Type I = mandatory, Type II = guided by case law, policy and legal statute, Type III = solely consent (p.1 of 2)

NOTE: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \le .01$ * $p \le .01$ * $p \le .05$.

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	Drivers	Total # of Searches	% Type I Searches	% Type II Searches	% Type III Searches
	Caucasian	2,088	75.9***	15.0***	9.1***
	Hispanic	2,068	60.2	17.8	22.0
	Native American	174	72.4	10.9	16.7
Bureau	Black	441	61.7	26.3	12.0
	Male	4,050	66.4***	18.0**	15.6
	Female	804	72.4	13.9	13.7
	Caucasian	307	9.1	40.1***	50.8***
	Hispanic	671	6.1	31.9	62.0
	Native American	38	7.9	21.1	71.1
Canine	Black	116	5.2	54.3	40.5
	Male	999	6.4	36.9	56.7
	Female	154	9.1	31.8	59.1
	Caucasian	104	10.6	47.1	42.3
	Hispanic	107	3.7	42.1	54.2
~ .	Native American	3	33.3	33.3	33.3
Canine North	Black	45	8.9	51.1	40.0
	Male	229	6.6	47.6	45.9
	Female	41	12.2	43.9	43.9
	Caucasian	202	8.4	36.6***	55.0***
	Hispanic	561	6.6	30.1	63.3
Canine	Native American	35	5.7	20.0	74.3
Central & South	Black	71	2.8	56.3	40.8
	Male	766	6.4	33.9	59.7
	Female	113	8.0	27.4	64.6

Table 7.3. Reasons for Search by Driver Characteristics for Department and Bureaus: Type I = mandatory, Type II = guided by case law, policy and legal statute, Type III = solely consent (p.2 of 2)

SEARCH SUCCESS RATES

Although multivariate analyses (like those performed in Section 5) are the most common form of testing for disparities in stop outcomes, more recently, the discussion regarding biasbased policing has also focused on examining outcomes in the form of search "hit" rates. If drivers were searched strictly based on legal factors and suspicions unrelated to race, one would expect similar percentages of searches resulting in seizures across racial groups. This has been described as the "outcome test" (Knowles, Persico & Todd, 2001; Ayres, 2001). Originally applied by Becker (1957) to examine economic disparate treatment of minorities, the basic notion of the outcome test is to analyze whether outcomes are systematically different across groups. Ayres (2001) has argued that the "outcome test" can be used to successfully examine racial disparities in police practices, including searches. When applied to police searches, the outcome test is essentially a comparison of the successfulness of those searches - or a statistical comparison of the percentage of searches that result in seizures across racial/ethnic groups. This is also referred to as a statistical comparison of "search success rates" or "hit rates." Racial/ethnic comparisons of hit rates are calculated by dividing the percent of searches in which officers seize some type of contraband (e.g. drugs, illegal weapons, etc.) by the number of total searches (Fridell, 2004, 2005; Ramirez et al., 2000).

Some scholars and police officials have argued that searches of minorities are more likely to produce contraband compared to searches of Caucasians (Knowles, et al., 2001). Others have argued that minority citizens are not more likely to be carrying contraband, and that a comparison of search success rates shows that racial profiling policies are ineffective (Cole, 1999; Harris, 2002). The application of the outcome test to police searches is based on the notion that if officers are profiling minority motorists based on racial prejudice, they will continue to search minorities even when the returns (i.e., the discovery of contraband) are smaller for minorities than the returns for searching Caucasians (Anwar & Fang, 2006). Conversely, if no bias exists, over a period of time a state of equilibrium will be achieved in which the police will search racial groups proportionate to their actual possession of contraband. The need to include multiple variables (i.e., multivariate model) is removed by reliance on the principle of equilibrium.

As with other analytical techniques, limitations exist which limit the conclusions that can be drawn from the outcome test (Engel, 2007; Engel & Tillyer, 2007). The outcome test is only appropriate for an analysis of traffic stops that result in a discretionary search; therefore, mandatory and consent searches should not be considered. In addition, any racial/ethnic disparities in hit rates discovered using this method do not necessarily imply officer bias. Notwithstanding the limitations of the outcome test, it does provide an alternative method to assess post-stop outcomes. Nevertheless, it is recommended that no definitive conclusions about racial bias be drawn from these comparisons based on the limitations of this technique (for details, see Engel, 2007; Engel & Tillyer, 2007).

Search Success Rates by Reasons for Search

As noted above, based on DPS policies, officers have little discretion over some types of searches (e.g., vehicle inventories, searches incident to arrest, searches based on a preexisting warrant). Furthermore, it is likely that different reasons for searches might lead to varying rates of contraband seizures. Figure 7.6 and Table 7.4 explore this possibility. Specifically, Figure 7.6 illustrates the overall search success rate and the success rates for each specific type of search at the department level, while Table 7.4 reports the same information at the department, division, and bureau levels.

As shown in Figure 7.6 and Table 7.4, department-wide, the overall search success rate is 23.6% -- that is, 23.6% of all searches conducted during officer-initiated traffic stops involving drivers resulted in the seizure of contraband. This rate, however, varies dramatically across search types. Figure 7.6 documents the following range: 65.9% of probable cause searches result in seizures compared to only 12.7% of searches based solely on consent. Across the department, searches based partially or solely on consent were least likely to be successful in terms of discovering contraband. Searches that were the most likely to produce seizures of contraband included those based on: probable cause (65.9%), plain view (56.7%), and canine alerts (42.8%).



Figure 7.6: Search Success Rates by Reason for Search (n=22,169 searches)

As documented in Table 7.4 below, these patterns remain relatively consistent across the divisions and bureaus within the department. The Canine District is a notable exception – canine handlers working in different areas varied dramatically in their search success rates. Across all types of searches, canine handlers assigned to the North squad were significantly

more likely to report contraband seizures (40.7% of all searches) compared to handlers assigned to Central/South squads (19.8% of contraband seizures). At first blush it would seem that these differences were directly related to the different patterns across handlers for initially conducting searches. However, when the search success rates are examined within search reason categories, it becomes clear that handlers assigned to the North squad report more success in terms of contraband seizures during officer-initiated traffic stops across almost all search reasons, compared to handlers assigned to Central/South squads.²⁷ It is also noteworthy that 77.6% of the searches based on canine alerts resulted in seizures for North canine handlers.

²⁷ The exceptions are Terry and inventory searches. Central/South canine handlers were more likely to report contraband seizures during these two types of searches compared to Northern canine handlers; however, because there were so few searches reported for these reasons, these percentages are likely unstable.

	# of Searches	# of Seizures	Overall Search Success Rate	Consent Success Rate	Incident to Arrest Success Rate	Probable Cause Success Rate	Terry Success Rate	Inventory Success Rate	Plain View Success Rate	Warrant Success Rate	Canine Alert Success Rate	Consent Only Success Rate
DPS Statewide	21,218	5,014	23.6	17.8	21.7	65.9	23.7	19.5	56.7	21.8	42.8	12.7
Crim. Invest. Division	154	49	31.8	18.6	39.6	70.8	20.8	50.0*	100.0*		100.0*	13.7
Highway Patrol Division	21,933	5,274	23.6	17.8	21.6	65.9	23.8	19.5	56.7	22.0	42.7	12.7
Northern Bureau	5,437	1,603	29.5	21.3	29.0	70.3	26.3	22.8	58.5	26.1	48.6	14.4
Metro West Bureau	3,246	520	16.0	17.2	15.1	48.5	14.3	17.1	42.5	13.3*	19.0	13.2
Southern Bureau	6,657	1,583	23.8	15.1	24.3	67.2	22.8	21.8	54.6	26.2	46.5	10.9
Comm. Veh. Enf. Bureau	773	385	49.8	34.1	41.6	71.7	73.9	33.0	70.1	25.0*	38.1	26.0
Metro East Bureau	4,855	853	17.6	14.4	14.7	59.9	15.8	14.6	53.3	14.3	39.6	10.2
Canine	1,153	285	24.7	13.6	47.5	64.5	36.4	25.0*	75.0*	25.0*	42.7	9.7
Canine North Canine Central & South	270 879	110 174	40.7 19.8	25.9 9.5	60.0* 41.0	80.3 56.6	36.4 36.4*	0.0* 27.8*	 75.0*	 25.0*	77.6 31.7	20.3 7.2

Table 7.4: Search Success Rates by Reasons for Search for Department, Division, and Bureau

Note: Search success rates are measured as the percent of searches that resulted in a seizure of contraband; thus all search success rate entries in the table are percentages. * Twenty or fewer searches conducted for this reason; interpret percentage with caution.

Type II Search Success Rates by Race/Ethnicity & Gender

As noted previously, utilizing the outcome test to examine racial/ethnic disparities in search success rates requires that the analyses be limited to only non-consent discretionary searches. Therefore, information regarding the Type II search success rates only are further summarized below. Figure 7.7 displays the overall Type II search success rates across the department, bureaus, and canine squads. Department-wide, 44.8% of Type II searches are successful in recovering contraband. The search success rate across the bureau level is similar to or higher than the departmental average, with the exception of lower success rates in Metro West and Metro East Bureaus (22.7% and 38.7%, respectively). The Type II search success rate is higher for the Canine North squad (57.5%) compared to Central and South (39.9%).



Figure 7.7: Type II Search Success Rates

Figure 7.8 and Table 7.5 display the total number of Type II searches and the Type II search success rates based on drivers' characteristics. As shown, there were significant racial/ethnic differences in the Type II search success rates at the department and bureau level. Specifically, Type II searches of Hispanic drivers were the least likely to be successful in the discovery of contraband, compared to all other racial/ethnic groups. Blacks and Caucasians had higher and fairly similar search success rates, when compared to Hispanics and Native Americans. That is, only 36.0% of Type II searches of Hispanics resulted in discoveries of contraband, compared to 45.9% for Native Americans, 49.6% for Caucasians, 51.4% of Blacks, and 49.3% of other racial/ethnic drivers.



Figure 7.8: Racial/Ethnic Differences in Type II Search Success Rates



In comparison, fewer differences are found when examining Type II search success rates for male and female drivers, shown in Table 7.5. At the department level, discretionary searches of females (49.3%) were significantly more likely to produce seizures of contraband than searches of males (44.2%). At the bureau level, similar trends in gender differences are evident, although they only reach statistical significance for the Northern Bureau.

Based on the results in Figure 7.8 and Table 7.5, it appears that when drivers were subjected to Type II searches, Caucasian and Black motorists were significantly more likely to be found in possession of contraband compared to Hispanics and Native Americans. Hispanic motorists, in particular, were significantly less likely to be found in possession of contraband compared to other racial groups. In summary, Hispanic motorists were significantly more likely to be searched during officer-initiated traffic stops, but less likely to be found in possession of contraband during Type II searches.

	Drivers	Total # of Searches	Total # of Type II Searches	Type II Search Success Rate
	Caucasian	9,138	1,868	49.6***
	Hispanic	8,728	1,426	36.0
	Native American	1,483	159	45.9
DPS	Black	1,444	393	51.4
	Male	17,797	3,515	44.2*
	Female	3,409	481	49.3
	Caucasian	2,632	656	54.0***
	Hispanic	1,380	278	37.4
Northern	Native American	1,055	100	46.0
Bureau	Black	270	105	59.0
	Male	4,573	1,025	47.9**
	Female	859	90	60.0
	Caucasian	1,366	222	23.0
	Hispanic	1,486	185	21.6
Metro West	Native American	51	4	0.0
Bureau	Black	288	60	28.3
	Male	2,720	428	21.7
	Female	524	52	30.8
	Caucasian	2,566	448	54.5***
	Hispanic	3,477	487	38.4
Southern	Native American	183	27	59.3
Bureau	Black	340	52	40.4
	Male	5,489	884	45.4
	Female	1,164	151	50.3
	Caucasian	391	199	67.3
Commonoicl	Hispanic	197	89	64.0
Vehicle	Nat. Amer.	9	5	60.0
Enforcement	Black	84	53	71.7
Bureau	Male	748	394	66.8
	Female	25	14	64.3

Table 7.5: Type II Search Success Rates by Driver Characteristics for Department, Bureaus, & Canines (p.1 of 2)

<u>NOTE</u>: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \le .01$ * $p \le .01$ * $p \le .05$

	Drivers	Total # of Searches	Total # of Type II Searches	Type II Search Success Rate
	Caucasian	2,088	314	42.4***
	Hispanic	2,068	368	31.5
Matrix Fast	Native American	174	19	31.6
Bureau	Black	441	116	52.6
	Male	4,050	727	38.5
	Female	804	112	40.2
	Caucasian	104	49	61.2***
	Hispanic	107	45	37.8
Conina	Native American	3	1	0.0
North	Black	45	23	91.3
	Male	229	109	56.0
	Female	41	18	66.7
	Caucasian	202	74	52.7***
	Hispanic	561	169	30.2
Contro Control	Native American	35	7	71.4
& South	Black	71	40	52.5
	Male	766	260	40.0
	Female	113	31	38.7

Table 7.5. Type II Search Success Rates by Driver Characteristics for Department, Bureaus, & Canines (p.2 of 2)

Examining Consent Searches

As demonstrated earlier, consent search success rates are the least successful type of search in terms of producing seizures of contraband. Examining whether these success rates vary by race/ethnicity, however, is complex. As noted above, it is ill-advised to utilize the outcome test to assess racial/ethnic bias in consent searches, because ultimately it is the citizen, not the officer who has final discretion over whether or not these types of searches are conducted. That is, citizens always have the right to refuse. As such, the underlying assumptions of the outcome test that officers have full discretion over whether or not to conduct searches is violated. Despite these limitations, DPS administrators have requested such comparisons for internal purposes; therefore, following an examination of racial/ethnic differences in requests for consent and refusals to consent, racial/ethnic differences in search success rates for Type III searches are provided with the above noted caveats.

Of the 460,530 officer-initiated traffic stops with valid race information, 4,104 (0.9%) drivers were asked for consent to search.²⁸ As demonstrated in Figure 7.9 below, an examination of the drivers' race/ethnicity indicates that certain ethnic/racial groups were significantly more likely than others to be asked for consent to search. Specifically, 1.6% of Hispanic and Black drivers were asked for consent to search, compared to only 0.6% of Caucasians drivers.





<u>NOTE</u>: Differences across the racial/ethnic groups presented in this figure are statistically significant at $p \le .001$

Of the 4,104 drivers with valid race information who were asked for consent to search, 545 (13.3%) refused to give consent. Again, as documented in Figure 7.10 below, the percentage of refusals varied significantly across racial/ethnic groups. Hispanic drivers were significantly less likely to refuse consent when asked, compared to all other racial/ethnic groups. That is, Hispanic motorists were significantly more likely to be asked for consent to search and significantly less likely to refuse to give consent when asked, compared to other

²⁸ The number of drivers asked for consent was estimated by summing the number of consent searches conducted and the number of search refusals.

racial/ethnic groups. Specifically, only 8.5% of Hispanic drivers asked for consent to search refused to give consent, compared to 18.6% and 18.7%, respectively, of Caucasian and Native American drivers who were asked for consent and refused.



Figure 7.10: Racial/Ethnic Differences in Refusal to Consent to Search (n=4,104)



As noted above, the inclusion of consent searches in outcome test analyses is especially problematic because, as with mandatory searches, the decision of whether or not to search is not entirely based on the officers' decision (Fridell, 2004; Engel, 2007). Although officers initially decide whom to *request* a consent search from, ultimately it is citizens, not officers, who decide whether or not consent searches are conducted. That is, citizens have the right to refuse search requests, and if the officer has no probable cause to conduct the search, their denial of the police request must be honored. As demonstrated in Figure 7.10, rates of refusal are *not* equivalent across racial/ethnic groups. Hispanic drivers, in particular, are more likely to give consent when requested compared to other racial / ethnic groups. Despite these limitations, DPS administrators requested analyses of consent search success rates by race and gender for purposes of internal comparisons. These rates are provided below. It is important to note, however, because of the limitations described above, *no definitive conclusions about racial bias should be drawn from these comparisons*.

Figure 7.11 below displays the overall Type III (consent only) search success rates across the department, bureaus, and canine squads. Department-wide, 12.7% of consent only searches were successful in recovering contraband. The search success rates across the bureau level were similar to the departmental average, with the exception of a considerably higher success rate in the Commercial Vehicle Bureau (26.0%). The consent only search success rate was significantly higher for the Canine North squad (20.3%) compared to Canine Central/South (7.2%).

Figure 7.11: Type III Search Success Rates



Figure 7.12 display the total number of Type III (consent only) search success rates based on drivers' characteristics. As shown, there were significant racial/ethnic differences in the Type III search success rates at the department and bureau level. Specifically, department-wide, Type III searches of Native American drivers (4.3%) were the least likely to be successful in the discovery of contraband, compared to all other racial/ethnic groups. Blacks and Caucasians have higher and similar search success rates (16.5% and 16.7%, respectively), compared to Hispanics and Native Americans. Consent searches of Hispanics (9.4%) were also significantly less likely to be successful compared to Blacks and Caucasians.



Figure 7.12: Racial/Ethnic Differences in Type III Search Success Rates

Table 7.6 presents the total number of searches based on both consent only and any consent (i.e., consent and some other reason), at the request of the department. The first column notes the total number of all searches for each racial/ethnic group. The second and third columns include the total number of searches based only on consent, and the search success rate for those searches, while the fourth and fifth columns include the total number of searches based on any consent and the search success rates for those searches. The department-level findings for searches based on only consent are the same as what was presented above in Figure 7.12. Due to small numbers of solely consent searches of specific racial/ethnic groups at the bureau level, however, only 3 of the bureaus exhibit statistically significant racial/ethnic differences in search success rates. For searches based on any consent, the overall search success rates are higher across all racial groups, but particularly Native Americans, whose success rate is now 16.0% compared to 4.3% based on solely consent searches. Searches of Hispanics based on any consent are the least likely to produce seizures of contraband at the department level. Again, due to small numbers of any consent searches of specific racial/ethnic groups at the bureau level, only 3 of the bureaus exhibit statistically significant racial/ethnic differences in search success rates.

	Drivers	Total # of Searches	Total # of Consent Only Searches	Consent Only Search Success Rate	Total # of Any Consent Searches	Any Consent Search Success Rate
	Caucasian	9,138	1,038	16.7***	1,313	23.3***
	Hispanic	8,728	1,420	9.4	1,702	12.7
	Native American	1,483	70	4.3	94	16.0
DPS	Black	1,444	224	16.5	283	22.6
	Male	17,797	2,444	12.5	3,014	17.5
	Female	3,409	392	13.8	480	20.2
	Caucasian	2,632	310	18.7*	400	26.3***
	Hispanic	1,380	247	9.3	321	15.0
Northern	Native American	1,055	17	11.8	36	33.3
Bureau	Black	270	70	17.1	84	20.2
	Male	4,573	580	13.8	752	20.2*
	Female	859	85	18.8	112	28.6
	Caucasian	1,366	79	16.5	93	21.5
	Hispanic	1,486	86	10.5	107	12.1
Motro Wost	Native American	51	2	0.0	3	0.0
Bureau	Black	288	18	11.1	24	20.8
	Male	2,720	165	12.7	205	17.1
	Female	524	24	16.7	28	17.9
	Caucasian	2,566	348	14.7*	442	21.7***
	Hispanic	3,477	548	8.6	643	10.9
	Native American	183	20	5.0	21	9.5
Southern Bureau	Black	340	63	11.1	74	13.5
	Male	5,489	847	10.5	1,021	14.5
	Female	1,164	158	13.3	190	18.4
	Caucasian	391	89	31.5	114	37.7
Commercial	Hispanic	197	48	14.6	60	25.0
Vehicle	Native American	9	0		2	0.0
Enforcement	Black	84	16	25.0	23	34.8
Bureau	Male	748	165	26.1	214	34.1
	Female	25	4	25.0	6	33.3

Table 7.6: Type III Search Success Rates by Driver Characteristics for Department, Bureaus, & Canines (p. 1 of 2)

	Drivers	Total # of Searches	Total # of Consent Only Searches	Consent Only Search Success Rate	Total # of Any Consent Searches	Any Consent Search Success Rate
	Caucasian	2,088	190	10.0**	237	15.6***
	Hispanic	2,068	455	9.5	533	12.2
	Native American	174	29	0.0	29	0.0
Metro East Bureau	Black	441	53	22.6	72	31.9
	Male	4,050	633	10.3	758	14.0
	Female	804	110	10.0	133	16.5
	Caucasian	104	44	20.5	64	23.4*
	Hispanic	107	58	15.5	92	21.7
Canine	Native American	3	1	0.0	1	0.0
North	Black	45	18	38.9	26	50.0
	Male	229	105	21.0	165	26.1
	Female	41	18	16.7	24	25.0
	Caucasian	202	111	6.3	115	9.6***
	Hispanic	561	355	7.3	390	8.7
Canine Central	Native American	35	26	0.0	26	0.0
& South	Black	71	29	17.2	37	27.0
	Male	766	457	6.8	493	8.5*
	Female	113	73	9.6	84	15.5

Table 7.6: Type III Search	Success Rates by Drive	r Characteristics for	Department , Bureaus	, & Canines
(p. 2 of 2)				

<u>NOTE</u>: Asterisks indicate statistically significant chi-square associations across 4 racial groups and 2 gender groups. *** $p \le .001$ ** $p \le .01$ * $p \le .05$

Understanding Racial/Ethnic Disparities in Searches and Seizures

As noted previously, there are a number of legitimate factors that may explain the racial/ethnic disparities reported in the findings regarding search and seizure rates. Unfortunately, the DPS data collection design does not allow for examination of some of the most intuitive explanations. For example, the differences in search rates may be due to socio-economic status rather than race/ethnicity per se. Drivers' socio-economic status, however, is not captured on the traffic stop forms. The closest proxy indicator of wealth routinely collected – age of vehicle – was not included in the data set for analyses. In addition, the behavior of the driver (e.g., demeanor, compliance with officer requests, suspicious indicators, misstatement of facts / lying to officers, etc.) is not systematically captured on the traffic stop form. Therefore, any conclusions regarding racial/ethnic disparities in searches and seizures based on the bivariate and outcome test analyses must be tempered.

In an effort to better understand factors that influence whether or not drivers are searched and whether searches are successful in recovering contraband, additional analyses were performed. Some of the possible explanations noted above were partially examined when search and seizure rates were considered across types of violations. As noted in Section 5, racial/ethnic differences existed in the types of violations for which drivers were issued citations. Most notably:

- Caucasians were significantly more likely to be issued citations for speeding violations (62.4%), compared to Hispanics (46.0%), Native Americans (39.4%), and Blacks (49.8%).
- Black drivers were significantly more likely (11.4%) than other racial/ethnic groups to be issued citations for speeding over 85 mph, and for violations related to vehicle registration and/or license plate.
- Alternatively, Hispanic drivers were significantly more likely than other racial/ethnic groups to be issued citations for violations related to drivers' license, seat belts/child restraints, required equipment, and insurance.

Therefore, if particular types of violations are more likely to prompt officers to search vehicles, and these types of violations also differ systematically by race/ethnicity, then racial/ethnic disparities in search and seizure rates may be partially accounted for by alternative factors. The following analyses examine search and seizure rates by the types of violations for which citations and warnings were issued.

Figure 7.13 shows the percent of drivers searched by the types of violations for which they were cited or warned.²⁹ As shown, significant differences in search rates exist. Specifically, drivers with drivers' license, equipment, insurance, and to a lesser degree seatbelt/child restraint violations, were significantly more likely to be searched compared to drivers

²⁹ The overwhelming majority of stops (approximately 90% or higher) based on DUI or drug offense violations resulted in a search. Indeed, a citation for a drug offense violation is presumably contingent upon a search being conducted. Therefore, these two types of violations were excluded from these analyses.

stopped for speeding, and registration violations. For example, 15.9% of stops involving drivers' license violations resulted in searches, compared to only 1% or stops for speeding violations. As noted above, analyses in Section 5 showed that Hispanics were significantly more likely than Caucasians to be cited or warned for drivers' license, equipment, insurance, and seatbelt/child restraint violations. These results suggest that racial/ethnic disparities in search rates may be partially accounted for by factors related to violation type, which may be related to socioeconomic status.



Figure 7.13: Percent Searched by Violation Type

Figure 7.14 shows the search success rates (i.e., the percent of searches resulting in discovery of contraband) by the types of violations. As shown, significant differences in search success rates exist across violation types. Specifically, stops involving violations related to drivers' license, insurance, and speeding over 85 mph were significantly *less* likely to result in contraband seizures (range= 15% to17%) compared to searches during stops involving violations related to speeding, registration, seatbelts, and equipment (range = 22% to 25%). As noted above, analyses in Section 5 showed that Hispanic drivers were significantly more likely to be cited or warned for violations related to drivers' license and insurance, two of the three lowest search success rates. Hispanics, however, are also more likely to be cited or warned for violations related to seatbelts and equipment, which have two of the higher search success rates. Therefore, the evidence is mixed on whether differences in violation types may partially account for racial/ethnic disparities in search success rates.



Figure 7.14: Search Success Rates by Violation Type

Undocumented Aliens

Focus groups with troopers from other state police agencies have suggested that racial/ethnic disparities in search success rates may be partially explained by a number of factors. For example, officers from other jurisdictions have suggested that, in particular, Hispanic hit rates might be lower than Caucasians for the following reasons: 1) the use of incorrect cues of suspicion by officers, 2) a lack of officer training specific to Hispanic citizens, 3) a possible language barrier between officers and Hispanic motorists, 4) possible documentation issues on traffic stop forms that do not account for issues regarding searches and seizures of Hispanics, 5) specific types of vehicle characteristics associated with Hispanic motorists, and 6) the extensive and effective use of hidden compartments by this ethnic group (Engel et al., 2007).

One of these reasons – possible documentation problems associated with traffic stop forms that do not account for issues regarding searches and seizures of Hispanic undocumented aliens – can be partially examined empirically with data collected by DPS. Officers in other jurisdictions have suggested that Hispanic motorists are more likely to display cues of nervousness and deception because they are illegal immigrants. These cues of suspicion are perhaps misinterpreted by officers, resulting in searches of Hispanic motorists that are less productive in terms of contraband seizures. Officers in other jurisdictions have requested that undocumented aliens be captured on the traffic stop forms to account for this possibility.

On the DPS traffic stop form, there is a place to indicate if the person receiving the citation, warning, repair order, etc. is considered by the officer to be an undocumented alien. The analyses in this report are limited to data collected specifically on the driver, and not

passengers; therefore, this information falls short of indicating whether any passengers in the vehicle are considered by officers as being undocumented aliens. That is, situations where a legal-resident driver is transporting illegal aliens would not be captured using this method. Nevertheless, if officers across the country are correct in their assessment that Hispanic hit rates are significantly lower than other racial groups because Hispanic motorists demonstrate cues of suspicion due to nervousness surrounding immigration status rather than other illegal activity (but are subsequently searched by officers with no contraband found, resulting in a lower hit rate), analyses of these data should lend some support to this hypothesis.

Of the 460,545 officer-initiated traffic stops, 3,397 (0.7%) of the drivers were considered by officers to be undocumented aliens. The majority of these individuals (86.0%) were reported as Hispanic. Of these 3,397 undocumented aliens, 847 (24.9%) were searched, compared to only 4.6% of drivers with legal resident status.

Over 15% (130) of the 847 searches of undocumented aliens were Type II searches; the Type II search success rate for undocumented aliens was 36.9%. That is, only 36.9% of Type II searches of undocumented aliens resulted in contraband seizures, compared to 44.8% of discretionary searches of drivers in the country legally. Similar disparities are found when consent searches are examined – 10.3% of consent searches of undocumented aliens result in seizure contrabands, compared to 12.7% of consent searches of those in the country legally.

If undocumented aliens are considered "contraband" – i.e., they are in country illegally, and therefore should be counted as a "hit" for search rates – the search success rates for Hispanic drivers increased from 36.0% to 41.2%. This percentage would likely increase further if information regarding undocumented alien passengers was also collected on the form. It is possible that some officers consider undocumented alien passengers as an "other" form of contraband on the data collection form, but the actual content of the "other" category is not known to the UC research team.

In summary, undocumented aliens (the majority of whom are Hispanic) were significantly more likely to be searched, but less likely to be found in possession of contraband compared to others. When they are included as a "form of contraband," the search success rates for Hispanic motorists increase by more than 5%, but still remains over 8% below the hit rates for Caucasian motorists.

SECTION SUMMARY

- Description of Searches and Seizures
 - Department-wide in 2006, DPS officers conducted 21,218 searches of drivers, vehicles, and/or passengers during traffic stops.
 - Incident to arrest (54.7%) and vehicle inventory (30.0%) were the most common reasons for searches.

- The next most common reasons for searches were: consent (16.5%), probable cause (14.5%), consent only (13.4%), and Terry (10.7%).
- At the department level, 70.6% of searches were conducted of drivers, 82.1% involved vehicles, and 12.2% were performed on passengers.
- Department-wide in 2006, DPS officers successfully seized contraband during 5,014 searches; thus, the overall search success rate is 23.6%.
- The most frequent type of contraband seized was drugs (48.3%).
 - Other common types of contraband seized were: other contraband (33.2%), alcohol (22.2%), other property (13.4%), and vehicle (10.1%).
- Types of Searches
 - At the department level, the majority of searches conducted were Type I searches (67.8%), while 18.8% and 13.4% were Type II and Type III, respectively.
 - Analyses based on the type of search indicate statistically significant racial and ethnic disparities in searches across all three search type categories:
 - Blacks were least likely to be searched for mandatory reasons (Type I), while Native Americans were most likely to be searched for mandatory reasons.
 - For Type II searches, the opposite is true; Blacks were significantly more likely, and Native Americans significantly less likely, to be subject to Type II searches.
 - In the case of consent searches (Type III searches), Black and Hispanic motorists were significantly more likely to be searched based on consent compared to Caucasians and Native Americans.
- Search Success Rates
 - Search success rates across the department vary by the reason for search:
 - Searches based on consent only (12.7%) and consent (17.8%) were the least likely to be successful in terms of discovering contraband.
 - Searches most likely to produce seizures of contraband include those based on canine alerts (42.8%), plain view (56.7%), and probable cause (65.9%).
 - The overall Type II search success rate for DPS was 44.8%, but success rates varied significantly by race/ethnicity:
 - Type II searches of Hispanic drivers were the least likely to be successful in the discovery of contraband, compared to all other racial/ethnic groups.
 - Conversely, contraband was most likely to be discovered in Type II searches of Blacks and Caucasians.
 - Analyses of consent searches revealed racial/ethnic differences in those asked for consent to search as well as refusals to consent:

- Specifically, Hispanics were significantly more likely than other racial/ethnic groups to be asked for consent to search and significantly less likely than members of other racial/ethnic groups to refuse consent to search.
- Because consent searches are not solely dependent on officer's discretion (i.e., a citizen may refuse), analyses of consent search success rates are not recommended. They were, however, conducted, at the request of DPS administrators.
 - Results indicated racial/ethnic differences. Specifically, Type III searches of Native American drivers (4.3%) and Hispanic drivers (9.4%) were less likely to be successful in the discovery of contraband, compared to Blacks and Caucasians (16.5% and 16.7%, respectively), when compared to Hispanics and Native Americans.
- Undocumented aliens (the majority of whom are Hispanic) were significantly more likely to be searched than those with legal residency status.
 - Type II and III searches of undocumented aliens were less likely to result in seizures of contraband than searches of those in the country legally.
- The information presented in this section cannot determine the legality of and/or the presence of discrimination in individual searches conducted by DPS officers.
- As noted above, caution must be used when interpreting the findings in this section for two reasons:
 - Tests of statistical significance are influenced by sample size. For large samples, smaller differences are more likely to be reported as statistically significant. The strength of these relationships, however, may not be substantively meaningful despite their statistical significance.
 - The findings presented above are bivariate in nature. That is, they do not take into account other extralegal and legal factors (e.g., socioeconomic status, drivers' demeanor, compliance with officer requests, suspicious indicators, misstatement of facts / lying to officers, etc.) that might have a significant influence over search decisions.

8. CONCLUSIONS AND POLICY RECOMMENDATIONS

OVERVIEW

This report documents the findings from statistical analyses of data collected during all officer-initiated traffic stops conducted by the Arizona Department of Public Safety from January 1, 2006 through December 31, 2006, which represent the first year of data analysis for the *Traffic Stop Data Analysis Study*. As noted throughout this report, it is impossible with these data to determine the motivating factors behind traffic stops conducted by individual DPS officers. Rather, this data collection effort and subsequent data analyses can only examine patterns and trends in traffic stops and post-stop outcomes to determine if racial disparities exist after considering a host of additional legal and extralegal factors that might influence officer decision making. While it cannot be determined if DPS officers are engaging in the behavior commonly referred to as "racial profiling," analyses can demonstrate if patterns of racial disparities exist in stop and post-stop outcomes that warrant further scrutiny.

This conclusion section first provides a review of the major findings in this report. The findings from this report can be generally examined as three separate, but related issues: 1) the initial stopping decision, 2) post-stop outcomes received by motorists (e.g., warnings, repair orders, citations, arrests, and searches), and 3) specific examinations of searches and seizures. Regarding the initial stopping decision, no department-wide conclusions can be drawn regarding whether racial/ethnic disparities in stopping behavior exist. A form of internal benchmarking, trend analyses, was used to analyze four years of traffic stops, but these analyses are descriptive in nature and are not conclusive in determining disparity. Regarding post-stop outcomes, it is the conclusion of this report that, even after controlling for other explanatory factors, racial/ethnic disparities exist for warnings, repair orders, citations, arrests, and searches. The levels of unexplained racial/ethnic disparities are greatest for the most intrusive outcomes – arrests and searches. Further analyses of searches and seizures illustrate that although Hispanic, Black, and Native American drivers are significantly more likely to be searched compared to Caucasians, Hispanics (and to a lesser degree Native Americans) are significantly less likely than Caucasians to be found in possession of contraband. Following the review of findings, several recommendations related to data collection, policy and training are provided to DPS administrators based on these analyses.

THE INITIAL STOP

During 2006, 460,545 member-initiated traffic stops were recorded by DPS officers. Department-wide, approximately 62.4% of the drivers stopped were Caucasian, while 24.6% were Hispanic, 5.2% Native American, 4.4% Black and 3.4% Other (Asian, Middle Eastern, other or unknown). The rate of stops for particular racial and ethnic groups varied dramatically across divisions, bureaus, districts/shifts, and counties. Some variation is to be expected given residential patterns related to race and travel patterns along interstates, highways, and major thoroughfares.

As described in Section 4, the crux of interpreting data regarding initial traffic stop behavior is dependent upon comparison data. That is, a group's representation in traffic stops is only

meaningful when compared to the same group's "expected" representation in traffic stops, based on alternative data. Unfortunately, all available external benchmarks have limitations that restrict the level of confidence in the results. These limitations coupled with the availability of four years worth of data led to a decision to not utilize specific benchmarks for comparisons to traffic stop data. Rather, comparisons through trend analysis of the percentages of racial/ethnic groups stopped, warned, issued repair orders, cited, arrested, and searched by DPS officers over the course of four years of data collection are utilized.³⁰

Traffic Stop Trends

The trend analysis revealed some fluctuation in stopping patterns over time. Specifically, statistical analyses identify some districts/shifts with an increase in their rate of stopping Hispanic, Native American, and Black drivers. It is possible that these changes over time are the result of a multitude of factors including: changes in the residential or driving population in those jurisdictions, changes in DPS manpower allocation and deployment, adjustments in the data collection procedures, and/or changes in officer behavior toward minority drivers. The organizational units identified with the highest amounts of fluctuation warrant increased monitoring and possible investigation by DPS to reduce potential on-going racial/ethnic disparities in traffic stops.

POST-STOP OUTCOMES

In addition to comparisons of traffic stop data, analyses of post-stop outcomes are an important consideration of any data collection effort because the potential exists for differential treatment based on the drivers' characteristics *after* the initial stop has been made. Bivariate and multivariate analyses of post-stop outcomes examined racial/ethnic differences in warnings, repair orders, citations, arrests, searches and, seizures of contraband. Initially, bivariate chi-square analyses were computed for post-stop outcomes for various types of drivers. The main findings indicated:

- At the department level, statistically significant racial/ethnic differences are evident for the most severe outcome received.
 - Specifically, Hispanics were significantly less likely than other racial/ethnic groups to have a warning be the most severe outcome received.
 - Hispanics and Native Americans were significantly more likely than Caucasians and Blacks to have repair orders or DVERs as the most severe outcome received.
 - Hispanics were significantly more likely than other racial/ethnic groups to have a citation as the most severe outcome received, while Native Americans were significantly less likely to have citations as the most severe outcome received.

³⁰ As explained in Section 4, due to the limitations associated with small numbers of comparison officers, internal benchmarking was not possible across the department.

- For the most severe outcome—arrest—Hispanics, Native Americans, and Blacks were all significantly more likely than Caucasians to have arrest as the most serious outcome received.
- At the department level, Hispanic drivers were the least likely to be given a warning (32.0%) when compared to Caucasian (44.4%), Native American (46.2%), and Black (40.6%) drivers.
- Native Americans were the most likely to be issued a repair order (21.5%) when compared to Caucasian (12.8%), Hispanic (16.0%), and Black (10.5%) drivers.
- Hispanics received the highest percentage of citations, while Native Americans (42.1%) were significantly less likely than Caucasians (45.1%), Blacks (49.7%), and Hispanics (52.8%) to be cited.
- Hispanic, Native American and Black drivers were all significantly more likely than Caucasian drivers to be arrested and searched.
 - Specifically, Native Americans were the most likely to be arrested (4.9%), followed by Blacks (4.3%), Hispanics (4.2%), and Caucasians (2.4%).
 - Hispanics were the most likely to be searched (7.7% of stops) compared to Blacks (7.1%), Native Americans (6.2%), and Caucasians (3.2%).
- Statistically significant differences in the *types* of violations for which citations are issued are evident by race/ethnicity:
 - Specifically, Caucasians were significantly more likely (62.4%) to be issued citations for speeding violations compared to Hispanics (46.0%), Native Americans (39.4%), and Blacks (49.8%).
 - Black drivers were significantly more likely (11.4%) than other racial/ethnic groups to be issued citations for speeding over 85 mph and for violations related to vehicle registration and/or license plate.
 - Alternatively, Hispanic drivers were significantly more likely than other racial/ethnic groups to be issued citations for violations related to drivers' license, seat belts/child restraints, and insurance.
 - These results provide suggest that minority drivers are more likely to be issued citations for violations that are indirectly linked to income. These results also provide support for the proposition that officers make enforcement decisions based on drivers' behaviors, not their demographic characteristics.

Multivariate analyses were modeled to understand the independent effect of each of the variables in relation to the post-stop outcomes. As a result, multivariate analyses provide a more thorough understanding and interpretation of the data. Results from the multivariate analyses demonstrated that, even after controlling for other explanatory factors (e.g., other driver characteristics, vehicle characteristics, stop characteristics, and legal variables), racial/ethnic disparities exist for warnings, repair orders, citations, arrests, searches, and multiple citations. Specifically, the results of these analyses showed that:

- Warnings
 - Hispanic, Black, and drivers of other race/ethnicity were significantly *less* likely compared to Caucasians to receive warnings.
 - In contrast, Native American drivers were significantly *more* likely than Caucasians to receive warnings.
 - The odds ratios of these coefficients indicate that all of these relationships, though statistically significant, were not particularly strong.
- Repair Orders
 - Hispanic, Black, and drivers of other races were significantly *less* likely compared to Caucasians to be issued repair orders.
 - Native American drivers were significantly *more* likely to be issued repair orders compared to Caucasians.
 - The odds ratios of these coefficients indicate that these relationships were not particularly strong.
- Citations
 - All of the driver characteristics were significant predictors of whether or not citations were issued the strength of some of these relationships was larger than those for warnings and repair orders.
 - Hispanic, Black, and Other drivers were significantly *more* likely to receive citations compared to Caucasian drivers, while Native Americans were significantly *less* likely, taking into consideration the reason for the stop, along with vehicle and stop characteristics.
 - Specifically, Hispanic, Black, and Other drivers were 1.5, 1.2, and 1.3 times more likely to receive citations compared to Caucasian motorists.
- Arrests
 - Race coefficients remain strong even after legal variables such as reason for the stop and evidence seized were taken into consideration.
 - Hispanic, Native American, and Black drivers were all significantly more likely to be arrested compared to Caucasian drivers given the same reasons for the stop, vehicle characteristics, and stop characteristics.
 - Specifically, Hispanic, Native American, and Black drivers were 1.7, 2.2, and 1.6 times more likely to be arrested, respectively, compared to Caucasians.
- Searches
 - The search model though weak in predictive power– suggested that important racial/ethnic disparities exist in whether or not searches are conducted.
 - Specifically, Hispanic, Native American, and Black drivers were 2.2, 2.1, and 2.1 times more likely to be searched compared to Caucasians given the same vehicle characteristics, stop characteristics, and reasons for the stop.
- Multiple Citations

- The model for multiple citations is driven by a variety of significant factors including reason for the stop, as well as other stop, vehicle, and driver characteristics.
 - Specifically, Hispanic, Native American, and Black drivers were all more likely to receive multiple citations when compared to Caucasian drivers at the rate of 2.3, 1.4, and 1.5 times more likely, respectively.
- Bivariate analyses of race and multiple citations also indicated that Hispanics were significantly more likely than all other racial/ethnic groups to be issued multiple citations. The reasons for the reported racial/ethnic disparities in multiple citations, however, cannot be determined with these data.
 - It could be argued that Hispanic, Native American, and Black drivers are more likely to drive vehicles that have equipment violations, have expired licenses, expired registrations, no insurance, etc. If true, it is disparities in wealth (correlated in our society with race/ethnicity) that increase the likelihood of receiving multiple citations during traffic stops with police.
 - Alternatively, it could be argued that minority drivers are significantly more likely to be issued multiple citations because of police bias.

It is important to note, however, that racial/ethnic differences in post-stop outcomes may be explained by other characteristics that are also believed to potentially influence officer decision making, but were not available for analysis at this time and/or are not included in the current data collection system (e.g., the severity of the traffic offense, motorists' compliance with officer requests, drivers' socioeconomic status, officer characteristics, organizational characteristics, community characteristics). Many of these factors *cannot* be reliably collected on traffic stop forms. Because of the potential influence of unmeasured variables, the reasons for the racial/ethnic disparities in post-stop outcomes cannot be determined with these data. Therefore, any conclusions regarding racial/ethnic disparities in traffic stop outcomes based on the multivariate analyses must be tempered.

Post-Stop Trends

Post-stop outcomes were also analyzed for all four years of data. It is important to note that the analyses of all four years are simply descriptive and do not consider the factors included in the multivariate analyses of the 2006 data. The primary trends in post-stop outcomes between 2003 and 2006 are as follows:

- Five traffic stop outcomes were analyzed: warnings, repair orders, citations, arrests, and searches:
 - Warnings: approximately 40% of all traffic stops resulted in warnings across the four years
 - Caucasian and Native American drivers have higher rates of warnings, while Hispanic drivers have noticeably lower rates of warnings.
 - Repair Orders: this outcome occurs in slightly more than 10% of all traffic stops, but this trend is increasing in the last three years.
 - Hispanic and Native American drivers have considerably higher rates of receiving a repair order when compared to Caucasian and Black drivers.

- Citations: slightly less than 50% of all traffic stops resulted in the issuance of a citation in 2006, and the rate of citations issued has been increasing since 2004.
 - Hispanic and Black drivers have the highest rates of citations, followed by Caucasian drivers and Native American drivers.
- Arrests: the rate of arrest has consistently hovered around three and a half percent and is not demonstrating any significant pattern of change across the four years.
 - Native American drivers have the highest rate of arrest, followed by Hispanic and Black drivers, while Caucasian drivers have noticeably lower rates of arrest.
- Searches: 4.6% of all traffic stops outcomes resulted in a search in 2006, which is an increase from 2003 (4.4%), and noticeably higher that the low in 2003 (3.3%).
 - Similar to arrests, Hispanic, Native American, and Black drivers all have rates that exceed Caucasian drivers across all four years.

SEARCHES & SEIZURES

As noted above, although the reasons for the stop are the strongest predictors of decisions to search, some differences in the likelihood of conducting searches are still attributable to drivers' characteristics (most notably, drivers' race and ethnicity). These findings merited further consideration; therefore, Section 7 of this report was dedicated to examining issues surrounding searches and seizures during member-initiated traffic stops.

Department-wide in 2006, DPS officers conducted 21,218 searches of drivers, vehicles, and/or passengers during traffic stops. Of these, DPS officers successfully seized contraband during 5,014 searches; thus, the overall search success rate is 23.6%. Analyses of searches were divided into three categories: Type I—searches required by DPS policy, Type II—searches allowed by case law or policy and, guided by legal statutes, and Type III—searches based solely on drivers' consent to an officer's request to search. The first search category—Type I—included searches that are required by DPS policy and therefore, mandatory for officers to perform (e.g., incident to arrest, pre-existing warrants, and vehicle inventories). The second search category—Type II— included searches that were allowed by case law or policy and, guided by legal statutes (e.g., searches based on probable cause, Terry, plain view, or canine alert). The third search category—Type III—includes searched based solely on drivers' consent to an officer's request to search. The majority of searches based solely on drivers' consent to search category—Type III—includes searched based solely on drivers' consent to an officer's request to search. The majority of searches conducted department-wide were Type I searches (67.8%), while 18.8% and 13.4% were Type II and Type III, respectively.

- Analyses based on the type of search indicated statistically significant racial and ethnic disparities in searches across all three search type categories:
 - Black drivers were least likely to be searched for mandatory reasons (Type I), while Native Americans were most likely to be searched for mandatory reasons.
 - For Type II searches, the opposite is true; Blacks were significantly more likely, and Native Americans significantly less likely, to be subject to Type II searches.

- In the case of consent searches (Type III searches), Black and Hispanic motorists were significantly more likely to be searched based on consent compared to Caucasians and Native Americans.
- Search success rates across the department also varied considerably by the reason for the search.
 - Specifically, searches based on consent only (12.7%) and consent (17.8%) were the least likely to be successful in terms of discovering contraband.
 - Searches most likely to produce seizures of contraband included those based on canine alerts (42.8%), plain view (56.7%), and probable cause (65.9%).
- The overall Type II search success rate for DPS was 44.8%, but success rates varied significantly by race/ethnicity:
 - Outcome test analyses showed that DPS Type II searches of Hispanic drivers were the *least* likely to be successful in the discovery of contraband, compared to all other racial/ethnic groups.
 - Conversely, contraband was *most* likely to be discovered in Type II searches of Blacks and Caucasians.
- Analyses of consent searches revealed racial/ethnic differences in those asked for consent to search as well as refusals to consent:
 - Specifically, Hispanics were significantly more likely than other racial/ethnic groups to be asked for consent to search and significantly less likely than members of other racial/ethnic groups to refuse consent to search.
- Because consent searches are not solely dependent on officer's discretion (i.e., a citizen may refuse), analyses of consent search success rates are not recommended. They were, however, conducted, at the request of DPS administrators.
 - Results indicated racial/ethnic differences. Specifically, Type III searches of Native American drivers (4.3%) and Hispanic drivers (9.4%) were less likely to be successful in the discovery of contraband, compared to Blacks and Caucasians (16.5% and 16.7%, respectively), when compared to Hispanics and Native Americans.
- Finally, undocumented aliens (the majority of whom are Hispanic) were significantly more likely to be searched than those with legal residency status.
 - Type II and III searches of undocumented aliens were less likely to result in seizures of contraband than searches of those in the country legally.

The descriptive findings reported in Section 7 also suggest that some racial/ethnic disparities in searches are localized in particular organizational units. For example, across all types of searches, canine handlers assigned to the North squad were significantly more likely to report contraband seizures (40.7% of all searches) compared to handlers assigned to Central/South squads (19.8% of contraband seizures). It is also noteworthy that over 77% of the searches based on canine alerts resulted in seizures for North canine handlers, compared to 31.6% of searches based on canine alerts for Central/South canine handlers. DPS administrators must

closely examine the differences across divisions, bureaus and district/shifts and attempt to determine if these differences are due to legitimate factors. With the specific information provided in Section 7, DPS administrators should be able to accurately identify potential problem areas.

Based on these findings, it is the conclusion of this report that some racial and ethnic disparities exist for searches conducted during officer-initiated traffic stops. These findings, however, do not address the legality of individual searches. That is, the data collected and reported within this document only examine trends and cannot address questions of whether or not individual searches conducted by DPS officers were legally justified or based on discrimination.

RECOMMENDATIONS

Based on these findings, a series of recommendations to DPS administrators related to data collection, training and policy are provided below.

Data Collection

The data audit indicates a number of recurring problems with data collection. The UC research team strongly recommends that a committee within DPS be formed to discuss alternative data collection options. Information-driven policing relies on quality data. Multiple analyses of these data indicate that the quality of the information gathered needs to be substantially increased.

Specifically, the data audit and analyses of 2006 data conducted by the UC research team indicates a number of inconsistencies and problems that could be corrected with a streamlined data collection effort, proper training of DPS officers, consistent and immediate field supervisory oversight, and managerial level review. The proposed DPS committee would work directly with the UC research team to develop and implement changes to the current data collection process and the information gathered. The text recognition system currently in use is a primary source of errors. Based on the previously issued data audit, DPS has already begun exploring modifications to the current data collection system in order to reduce the error rate immediately. In the event that the current system cannot provide an acceptable error rate, it is recommended that this committee explore alternative methods of data collection and transfer.

Through both informal conversations with DPS officials, and data analyses of 2006 traffic stops, it has become readily apparent that similar situations are coded differently on the data collection forms. That is, there is questionable consistency across officers and organizational units regarding data collection. It is recommended that once the data collection committee alters the data collection system and possibly the information collected, that a second committee be developed to disseminate proper training material and establish a system for direct and immediate supervisory oversight.

Regardless of the specific data collection method used, one of the most commonly used and effective methods for reducing data error rates is to implement a supervisory oversight and feedback mechanism. This process involves scrutiny of all data generated during policecitizen encounters, and an associated feedback system (i.e., frequent, detailed reports) to highlight the sources of these errors and produce greater accountability for the data submitted. Often this task is conducted by either supervisors or the independent research team. Past experience has demonstrated that this is the most effective and timely approach to reducing error rates. It is the recommendation of the research team that the current oversight mechanism be reviewed, and a new, more effective system be immediately implemented. It also remains critical to routinely conduct data audits (similar to that conducted by the UC research team reported in Section 2). Continual supervisory oversight and routine data audits are necessary to ensure the accuracy and validity of these data.

Alternative Methods for Benchmarking Traffic Stops

As noted in *Traffic Stop Data Analysis Study Interim Report: Literature Review and Review of Other Jurisdictions* (Engel, et al., 2007), there are a number of alternative methods of benchmarking that have not been conducted. The strengths and weaknesses of these various approaches have been presented to DPS. Due to the problems associated with benchmarking analyses, research teams have most recently recommended very limited attempts while focusing more directly on analyses of post-stop outcomes. This continues to be the recommendation of the UC research team.

Further Examination of Post-Stop Outcomes

DPS administrators should examine the specific organizational units identified in Sections 5 -7 as demonstrating statistically significant increases in the percentages of minority drivers stopped, cited, arrested, and searched in their jurisdictions. As mentioned previously, there are a number of possible legitimate explanations for these trends. It is incumbent upon DPS officials to consider the likely sources producing statistically significant increases in minority stops.

In addition, better understanding of the racial/ethnic disparities in post-stop outcomes is warranted. Across the department, Hispanic, Native American, and Black motorists are significantly more likely to be issued citations, arrested, and searched compared to Caucasians, even after statistically controlling for reasons for the stop, vehicle, and stop characteristics. That is, these racial/ethnic disparities in citations, arrests, and searches cannot be explained by factors currently collected on the current data forms. It will be important for DPS administrators to better understand and examine these trends. The first step in this process has been achieved through the commitment by DPS officials to continue data collection indefinitely. Additional information gathered in the second year of this research project (e.g., from focus groups with officers, ride-alongs, and citizen surveys) will aid DPS administrators in an effort to examine possible explanations for the reported
racial/ethnic disparities, and to develop changes in policy and training where appropriate to reduce these disparities.

DPS should continue to explore the reasons for these racial/ethnic disparities in post-stop outcomes. Field supervisory staff should be made aware of racial/ethnic disparities in citation, arrest, search, and seizure rates within their jurisdictions. It is recommended that the specific findings documented in this report be disseminated to DPS supervisory personnel for their consideration.

Racial/ethnic disparities in outcomes may be explained by other factors not currently collected by DPS (e.g., severity of the traffic offense, motorists' compliance with officers' requests, officer characteristics, organizational characteristics, community characteristics). All of these factors have the potential to mitigate the racial/ethnic disparities currently reported. DPS should investigate modifications to data collection to improve the collection of details that might explain better the disparities. It is important for DPS officials to consider even minor alterations to the data collection forms to gather additional information that may at least partially explain racial/ethnic disparities. Further, it is recommended that DPS officials reconsider the inclusion of officer data for examination. These data would not be used to identify any individual officers. Rather these data would allow for hierarchical linear modeling that accounts for differences across organizational units as a possible explanation for disparities in post-stop outcomes. Finally, the UC research team will continue to pursue options for better integration of geographic location information (i.e., the location of the stop) into the analyses. Specifically, spatial analyses and hierarchical linear models will be attempted after additional information regarding geocoding of locations is acquired from the Department of Transportation

Examination of Search and Seizure Activities

The analyses of 2006 data indicated that even after considering the reason for the stop and other stop characteristics that can be measured with these data, Hispanic, Native American, and Black drivers were all more than two times more likely to be searched compared to Caucasians. The contraband seizure rates of Type II searches suggest that the elevated search rates for Black and Native American motorists are justified in terms of contraband seizures. The higher rates of Hispanic searches, however, do not produce comparable rates of seizures. Although Hispanic motorists were significantly more likely to be searched during officer-initiated traffic stops compared to Caucasians, they were significantly less likely to be found in possession of contraband. There are a number of reasons that might account for these racial/ethnic disparities, including legitimate explanations, along with possible officer discrimination / bias. In an effort to better understand racial/ethnic disparities in search and seizure rates, the UC research team plans to conduct focus groups with canine handlers and officers assigned to the Highway Division that are actively engaged in search and seizure activity. In addition, focus groups with GITTEM are currently planned in early 2008. The purpose of these focus groups is to provide a better understanding and context in which to interpret the statistical findings. Through the use of focus groups, this research will explore the reasons why DPS troopers initially conduct searches, and what verbal, non-verbal, and behavioral cues (not captured on data collection forms) are perceived

by troopers as the most effective in predicting criminal behavior. In addition, these focus groups will explore how troopers were trained and their perceptions regarding the usefulness and accuracy of the training they received. Based on the research findings, specific actionable policy and training recommendations will be provided. Particular attention will be given to understanding differences in search and seizure activities across organizational units.

Expedient implementation of these recommendations will assist in future data collection and analyses, and assist in developing greater knowledge regarding the issues raised in this report. Moreover, implementation of these recommendations will demonstrate the agency's commitment to providing unbiased police service to the citizens of Arizona. As described previously, future reports will assist in providing context to the findings of this report (i.e., based on the focus groups), and will assess all police-citizen interactions during 2007.

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