# 2020

# University of North Carolina Wilmington

# Master of Science in

# Computer Science and Information Systems

# Proceedings

https://csbapp.uncw.edu/mscsis

# **PTSARS**: Police Traffic System and Analysis Reporting System

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A Capstone Project Submitted to the University of North Carolina Wilmington in Partial Fulfillment of the Requirements for the Degree of Master of Science Computer Science & Information Systems

University of North Carolina Wilmington

2020 / 2021

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## ABTRACT

Some members of minority demographics believe that police officers engage in disparaging treatment and racial profiling during traffic stops. Police departments are responsible to insure such illegal action doesn't take place. As the nature of police traffic stops are dynamic and dispersed; this is a difficult undertaking. I propose exploiting digital analytics to assist police departments with this compliance undertaking.

This paper describes the development of a digital reporting and analysis system of police traffic stops. The system will use data directly from the North Carolina State Bureau of Investigation (NCSBI) police traffic stops database. The system will be organized around data variables of police traffics stops, stops by race, stops by gender, stops by ethnicity and enforcement actions by police officers. This system will display tables, graphs and analysis based on the PowerBi digital analytical platform. The paper will provide an explanation of the data collection process, the technologies used, the system architecture and the challenges encountered during the creation process. The paper also explores several analytical methods.

The successful result of this project is a robust cloud-based digital reporting and analysis system available on a self-service portal to assist police leadership with management of officer traffic stops.

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# 1 INTRODUCTION

In today's modern American urban environment, some community members believe that police officers engage in racially bias based behavior during traffic stop interactions with minority demographics. It is therefore incumbent on police executive leadership to take managerial action to actively suppress such unlawful behavior; it is their moral responsibility. This will enhance community support and cooperation, or at the least, allow police departments to affirmatively defend against charges of racially disparaging treatment. It is important that police executives actively and continuously scan the environment for unsanctioned behavior by officers. As the main public / police interface is the 'police traffic stop'; police departments should have a formal monitoring system for these contacts. Due to the volume of such contacts only a digital automated system has any real possibility of success.

Modern police executives need digital screening tests to help monitor and analyze officers' behavior during police traffic stops to insure they don't engage in disparaging treatment of minority demographics. Police departments are greatly dependent on the support and cooperation of their communities. The mere perception of police racial bias by members of the community will greatly impede its effectiveness. It is incumbent on the police executive leadership to develop and maintain an active digital officer monitoring system; so, the police department may rapidly intervene at inception of bias based behavior.

A digital monitoring system has several benefits to the police department and thus to the community as whole. The existence of the system would signal to all

concerned parties that the police leadership is serious about the prohibition of racially biased police traffic stop behavior. It allows for the early discovery of officer behavior issues during traffic stops and for rapid managerial corrective action. It offers a defense in litigious situations. It provides guidance and direction for administrative, supervisory, and operational officers. It implements departmental administrative orders on the subject. (Donaldson, 2017) It would help police executives by providing statistical data on police criminal and traffic suppression initiatives.

## 2 BACKGROUND

Police traffic stops are an important and proper topic for study and analysis. America is a motoring nation. Most adults are licensed drivers. The drivers' license is a rite of adulthood! With the driving privilege comes a legal obligation to obey all traffic laws. (North Carolina Department of Transportation, 2020) Society charges police departments with enforcing traffic laws. (CriminalJusticDegree.com , 2020) It is one of their prime duties. This sets up an obvious interaction between the police and the motoring public. At some point in our motoring lives, we all have seen or will see a police officer stopping a motorist. We have seen the emergency blue flashing lights and wondered what's happened. This is the Police Traffic Stop. It has influence on all who see it.

Traveling by motor vehicle can be a dangerous business. Americans have a greater chance of dying in a traffic accident than being killed in a criminal homicide. (Center for Disease Control and Prevention, 2020) The CDC also estimated that another 2 million

Americans were injured in motor vehicle accidents. (Center for Disease Control and Prevention, 2020)

The most common way the police and the public meet is through the 'Traffic Stop'. (Project, 2020) Absent the traffic stop most of the public will never have direct contact with the police. Traffic law enforcement can cause friction between some elements of society and the police. Some demographics distrust the police and resent being stopped. (Ortiz, 2019) They have lost faith in the legitimacy of the police. The traffic stop can become violent and can develop into a criminal altercation. It can even cause civil unrest in the local community. These topics all raise the importance of the study of traffic stops.

Minimizing traffic accidents through traffic law enforcement is a prime duty of police departments. (CriminalJusticDegree.com , 2020) This enforcement duty is implemented through the Police Traffic Stop. Upon observing violations of traffic laws, police officers are expected to stop motorists and take corrective action. Two common examples of this are 'Running a Red Light / Stop Sign Violation' or 'Speeding Violation'. (NHTSA, 2020) The police traffic is numerically the most common public – police contact. (Bureau of Justice Statistics, 2018) (NC SBI Traffic Unit, 2020)

Police departments make use of traffic stops (TS) as a tool for the Department to suppress illicit activity. (NHTSA, 2020) At large college fraternity parties, police departments will enforce traffic laws and engage in highly visible traffic stops in the area of the party to suppress drunk driving (DWI) and other illegal behavior. Departments will engage in DWI Check Points or Checking Stations. (NC Legislature, 2020) In known high crime areas, officers will legally stop vehicles for traffic violations with the intention

of discovering criminal activity after the stop and disrupting other criminal activity. Officers are trained to look for the indicators of criminal activity after stopping the vehicle. (North Carolina Justice Academy, 2020) The idea is that officers are highly unlikely to catch criminals in the act, but there is a likelihood that officers will catch criminals going to the crime and or coming from a crime. All vehicle DWI, Drug, Alcohol and Weapon violations will begin with a simple traffic stop.

Traffic stops are the number one category numerically of police - public contact. There were over one million (1,279,951) traffic stops in North Carolina in 2019 alone. (NC SBI Traffic Unit, 2020) In 2015, approximately 10.8% (over 27 million) of motorists, reported being stopped by police officers for traffic violations during the previous year. (Bureau of Justice Statistics, 2018) Every motorist can attest to seeing a police car with blue lights activated on the side of the road at least once in their motoring life. The high visibility of police cars with blue lights activated has a deterrence effect on other motorist passing through the area. (NHTSA: National Highway Traffic Safety Administration, 2020) They drive slower and are more careful. They are afraid of getting stopped themselves.

Police traffic stops are random. They can happen any time and any place. They are self-initiated by individual officers. Police traffic stops can be routine ending in a verbal discussion between the officer and the driver. However, they can explode into extreme violence. (Fedschun, 2018) They can end in shootings with the officer and or the motorist lying dead on the side of the road. Communities have rioted over this phenomenon. (wlrn.org, 2020) Some segments of the community believe that police officers illegitimately stop them. They believe that police officers stop them because of

their race, sex and or ethnicity. (Muccari, 2019) I believe, for right or for wrong, police departments must address this perception.

This community's perception is in direct conflict with police departments' policies and legal statutes. Officers may only make traffic stops for observed behaviors of traffic violations. They must have reasonable suspicion of some unlawful behavior. They may not stop by a motorist for their race, sex or ethnicity. This is prohibited by statute and policy. (U.S. Code, 2020) (U.S. Code, 2020) (Donaldson, 2017) (International Association of Chiefs of Police, 2020) Any officer who engages in bias-based traffic stops is operating outside their scope authority. However, simply creating a written policy prohibiting police officer racial profiling in their traffic stops is insufficient: Police departments are obligated to ensure officers are complying with these traffic stop policies. However, the only way departments will know if officers are not in compliance is to actively monitor their behavior for patterns and trends. This is easier said than done. Police traffic stops occur 24 hours a day, seven days a week, and 365 days a year. They are random and can occur anywhere under many different conditions.

The study and management of the police traffic stops are a prime responsibility of the police supervisor and administrator. They are responsible for all police officer actions. However, there are some issues that hinder their traffic stop management. Supervisors have both *transactional* and *emerging trends* responsibilities for traffic stops review. The transactional responsibilities refer to the reviewing all the written documentation and digital evidence generated from each stop. Each traffic stop may generate written documentation such as 'Offense' reports, 'Arrest' reports, 'Traffic citations, 'Magistrate orders', 'Arrest warrants' and 'Traffic stop' reports, see Exhibit #17.

At the very least, every traffic stop generates a 'Traffic stop report, see Exhibit#3. Every piece of documentation must be reviewed for sufficiency and legal compliance. This review takes time out of the supervisory workday. All police departments have written specific organizational policies and procedures which detail supervisory review of written reports and documentation: They are not the subject of this analysis.

With the recent addition of police dash and body cameras; there is also digital evidence to be reviewed. All police traffic stops generate both body and dash video clips. The review of these video clips are time consuming, they have to be viewed in real time for both video and audio. They take even more time out of the supervisory workday! There are written policies and procedure in all police departments for the supervisory review of digital evidence and video evidence. They are not the subject of this analysis.

The dictionary defines 'Emerging' as newly formed or prominent. (Merriam Webster, 2020) It also defines 'Trend' as a prevailing tendency or inclination. (Merriam Webster, 2020) I am defining 'Emerging Trend' as the supervisory responsibility to review aggregate traffics stops for patterns of behavior and tendencies on concerning specific data points. This is the main topic of discussion for this analysis. While police supervisors are proficient with the 'Transactional review', they have limited 'Emerging Trends review' capabilities. Most police departments in the United States are small, usually less than 50 officers. (Hyland & Davis, 2019) . They are undercapitalized. They usually don't have the digital analytical tools to track Traffic Stops in a timely manner.

As discussed, police administrators and supervisors are pressed for time. They spend an inordinate amount of time focusing on their transactional review duties of police

traffic stops and have limited capabilities to monitor traffic stop emerging trends. They are in need of some type of digital objective method of measuring traffic stops and their effect on motorist behavior and what trends are emerging.

# 3 Traffic Stop Monitoring and Analysis - Use Cases & Prototypes

Police departments monitor traffic stop (TS) data to determine its effect on traffic accidents. They also monitor TS data as a measure of crime in their communities; how many DWIs, Alcohol Cases, Drug Cases and or Weapons Cases are occurring in their jurisdiction because of traffic stops. They use TS data as a measure of the number of citizen contacts between departments and the public. They monitor TS data to ensure officers aren't engaging bias based traffic stops.

At a minimum, the Chief and Administrator will want information on the Department's Count of Traffic Stops (TS) by Year, Quarter and Month etc. While, the Chief would have interest in officers individual traffic metrics; I believe that TS information about specific officers would probably be delegated more to Administrators and Supervisors. Supervisors would also view this information, but I believe they would be more interested in the TS information of their assigned officers. I believe that individual police officers would probably have a superficial interest in the department's TS information. However, they would be interested in their personal TS information and probably that of their squad peer officers.

Chiefs and administrators would be interested in their Department's traffic stops information as compared to peer police departments. Peer departments would be defined as those of the same geography and or those same types of police

department. While supervisors and officers would probably have minimal interest in the traffic stops information of other departments: Chiefs and administrators most certainly would. They would want to compare their department metrics to other comparable departments. Chiefs, administrators and supervisors would be interested in maximum, minimum, and average number of traffic stops by various date ranges and by officers. I also believe that they would want to rank individual officers count of traffic stops numbers by comparing them to different data / time periods and to their peers.

The count of traffic stops by Race, Gender, and Ethnicity (RGE) would be a subset of the whole traffic stop (TS) dataset. Chiefs and administrators would certainly be interested in measuring traffic stops by RGE. Officer stops by racial profiling is prohibited, is a departmental priority, and is written into departmental policy. (Donaldson, 2017) They would want the count of traffic stops by RGE. They would be interested in the traffic stop information for these sub-categories at both the departmental level and at the individual officer level. They would want to measure officers various RGE metrics against their peer officers. They would be interested in developing a departmental standard for RGE stops. They would be looking to develop, at the very least, acceptable minimums, maximums, and averages.

It has been my experience that operational supervisors and officers would have less of an interest in RGE metrics. Their focus of interest would be on enforcement priorities. An inconsistency to this lack of interest is the fact that supervisors and officers will be greatly influenced by the priorities and interests of the Chief and the

administrator. There is an axiom in police work that says, "If it's important to the Chief, it better be important to me." The greater the importance the Chief places on the analysis of RGE traffic stops, the greater the importance of RGE stops will be to officers.

### 3.1 Level of Interest in Traffic Stop (TS), Race, Gender, Ethnicity (RGE) Data

| | Departmental TS / RGE Data | Unit / Squad TS / RGE Data | Individual Officer / Peer TS / RGE Data | Other Police Departmental TS / RGE Data |
|---|---|---|---|---|
| Chief | **X** | **X** | **X** | **X** |
| Administrators | **X** | **X** | **X** | **X** |
| Supervisors | | **X** | **X** | |
| Officers | | **X** | **X** | |
| Internal Affairs Investigator* | **X** | **X** | **X** | |

**Interest is related to investigative case data only.*

The initial 'purpose' of the stop, as well as the RGE traffic metrics would be of interest. What is the initial purpose of the traffic stop and how does that compare to the RGE of the motorist being stopped? This would be an extension of the analysis of the traffic stop by RGE. The Chief and the administrator would be interested in the purpose of the stop. The supervisor would be interested, as part of the analysis of individual officer's traffic stop behavior. The Individual officers would have little or no interest in studying the initial purpose of the stop. They are interested in the enforcement priorities.

The Chief and the administrator would be interested in the 'enforcement action' (EA) of the whole department. How does the department compare to the peer departments? What enforcement actions are the officers, as a departmental composite, performing? They would also be interested in any racial components of the enforcement action. Does race have an influence on enforcement actions? Supervisors would be interested in the enforcement actions of their officers for performance evaluation purposes and to ensure compliance and conformity to departmental standards. They would be looking for atypical behavior. Officers would follow departmental enforcement action standards. Some traffic violations allow for the discretion of officers; however, others allow for no discretion. Most officers generally downgrade the enforcement action, if possible, to aid the motorist.

The internal affairs (IA) investigator is a specialized assignment. The department has received a citizen complaint against a specific officer and the investigator has been assigned to investigate it. The investigator would need the traffic stop data if the complaint was so relevant. The investigator would be focusing on all relevant traffic stop metrics and would be looking for (digital or otherwise) evidence to either refute or corroborate the officer actions. (Deputy Chief Beau Thurnauer, 2020)

### 3.2 Level of Interest in (TS) Initial Purpose & Enforcement Action (EA) Data

| | Initial Purpose | Enforcement Action |
|---|---|---|
| Chief | **X** | **X** |
| Administrators | **X** | **X** |
| Supervisors | **X** | **X** |
| Officers | | **X** |
| | | |
| | | |

## 3.3 Prototypes

In the early developmental stages of the project, I created several prototype traffic stop report pages to test concepts, workout implementations and to create a developmental feedback loop with the end users. I used a Microsoft Excel (MS) workbook with a very limited data set, one police department and one month's worth of traffic stop data. Using MS Power Pivot procedures and protocols, I created various demonstration pages with tables, graphs and charts using the standard traffic stop data fields taken from the survey instrument. I met with approximately a dozen different stake holders and showed them the sample pages. I sought their feedback and solicited their advice to improve the final traffic stop pages. Their feedback focused on several salient points.

My original thought was to present the data in a standardized format. However, during the developmental meetings, I discovered that there was no consensus of opinion. They wanted the same data presented in different forms. Some wanted tables of data, while others wanted charts and graphs of data. I was able to create custom versions of the data reports to accommodate their requests. This created overlap and redundancy with several reports targeting the same data elements. This gave the end users the option to select which report best suited their purposes.

During developmental meetings, they requested the ability to rapidly review and scrutinize different time frames. They wanted to look at different years and months. The original data set only contained entries for individual records, so this aggregation had to be added to the dataset. To facilitate this request, I added time slicers / filters to

each page of the prototype. These slicers aggregated the individual records as needed. This allowed the end users to review different years, months and quarters of data. They also wanted the slicers' controls on the right side of the page along the margin. Several separate users claimed that having the slicers on the left side of the page negatively affected them. Ergonomically, they explained their computer mouse was the right side of their physical desk top: They wanted the slicer controls to match up with their computer mouse. I easily facilitated these requests.

During the developmental meetings, they requested large colorful pages with contrasting colors to facilitate their viewing. They emphasized that they would in some case be viewing on mobile devices in a vehicle. They wanted officers' names for identification purposes on each page when appropriate. Within the limits imposed, I maximized the font size and attempted to use standard contrasting colors, especially for the end user manipulative controls, (the slicers). The original report pages used anonymous traffic stop ID numbers to identify the individual officers. This is standard throughout the entire North Carolina Traffic Stop Data Base. However, all of the end users were emphatic that they wanted names to identify individual officers. For internal distribution only, I created a custom alias field that matched officers' names to their traffic stop ID numbers. The screen shots in the final publication will have the officers' names redacted.

They also wanted pages grouped adjacent to each other by purpose. I organized the entire project around the Traffic stop (TS) reports adjacent to each other, the stops by race (SbR) adjacent to each other, the stops by gender (SbG) grouped adjacent to each other, the stops by ethnicity (SbE) adjacent to each other and enforcement action

by officer (EbO) adjacent to each other. I was able to successfully implement all the requested changes into the various PowerBi Visual pages.

## 4 North Carolina Bureau of Investigation (NCSBI) Traffic Stop Database

In North Carolina, there exists a digital framework for recording traffic stops. The North Carolina State Bureau of Investigation, NCSBI, maintains a digital database for traffic stop statistics for North Carolina Police Department. (NC SBI, 2020) This database was established January 1, 2000 as an implementation of North Carolina General Statute 143B-903. (North Carolina Legislature, 2020) This statute, basically, commands police departments to submit to the NCSBI various demographic statistics concerning the driver of each traffic stop. The NCSBI, to implement this statute, established both traffic stops database and the traffic stop report' (Form SBI-122, see Exhibit #3). (NCSBI Forms, 2020) The traffic stop report is a survey instrument completed by police officers at the conclusion of each traffic stop. The survey is then manually keyed into a WEB page portal.[1] The imputed data is stored in an enterprise digital database. The NCSBI offers limited traffic stop reports. (NC SBI, 2020)

This survey instrument captures many data points, however, but for this analysis, I am focusing on the stop date, the stop officer ID number, the demographics of the drivers, (Race, Sex, and Ethnicity), the purpose of the stop and the enforcement action taken by the officer. Please review the survey instrument for all the captured data points at (Exhibit #3).

[1] https://www.trafficstops.ncsbi.gov/Admin/Login.aspx?ReturnUrl=%2fAdmin%2fAdmin.aspx%3fpageid%3d0&pageid=0

## 4.1 Survey Data

From the '*Stop Date*' data collected in the survey, police managers will be able to monitor traffic stops (TS) for trends and patterns. They can monitor for date and time patterns. Are TS trending, up, down or flat year over year? Is there a quarterly trend on TS? Is there a seasonality to TS? Do TS trend up or down year over year during certain months consistently? Which months are below average or above average for TS? Can this information be used to predict future months, quarters and or years? How do these numbers compare to measures of crime. This information is used in management planning.

Using the traffic stop *'Officer ID Number'* data, police managers will be able to monitor for individual officer TS trends. The Officer ID number is a pseudonym for the officer's name. The enabling statute calls for the officer making the traffic stop to be identified by in the public record by an 'anonymous identifying number'. The officer's name shall not be a public record. (North Carolina Legislature, 2020)

Are certain officers skewing the TS data? Are the officers proactive TS behaviors distributed through the police department? Are all officers doing a sufficient amount of TS work? Can these officers be factored out for planning purposes? Are high performing TS officers not performing other required duties? Are their high TS numbers indications of officer aggression or proactivity? Are high performing officers TS duties taking up a disproportional amount of their work day? Are specific officers trending up or down over time?

Using the '*Race, Gender & Ethnicity*' (RGE) demographics data, police managers may illuminate officers engaging in disparaging treatment of minority demographics. RGE disparaging treatment could be indicated by numerical imbalances of 'White', 'Black', 'Asian', 'Native American', 'Other', 'Male', 'Female', 'Hispanic' and or 'Non-Hispanic' demographics. Police managers, upon becoming aware of this disparaging treatment, will formally investigate the matter. To investigate the suspicion of disparaging treatment, police departments will need a formal digital measuring system. The RGE data will be invaluable in this type of investigation.

Using the '*Purpose*' and the '*Enforcement action'* (EA) data, police managers can further scrutinize officers' behavior for disparaging treatment by '*unequal outcomes'* and by the '*purpose of stop'*. The range of '*purpose of stop*' are outlined in exhibit#2 and the '*enforcement action outcomes*' are outlined in exhibit#4. Officers are not authorized to consider RGE demographics when considering purposes or the outcomes of the traffic stop. To do so would be to engage in disparaging treatment of minority demographics by subjecting them to unequal treatment of outcomes. Police managers will review officers' TS data for unequal EA treatment of outcomes and purpose as indicated by numerical imbalances of the officers EA actions and or purposes by RGE factors. Officers must state the purpose of the traffic stop on the survey form. Officers may terminate traffic stops with one of several different outcomes, please see exhibit #4 for further details. Police managers shall review the survey data to analyze officers EA behavior by outcome and demographic looking for unequal treatment.

## 4.2 SBI DATA Download

The traffic stop data files must be downloaded from the State Bureau of Investigation (SBI) Traffic Analysis SQL traffic server. The SBI has developed a protocol to download the traffic database. This requires the use of some type of File Transfer Protocol (FTP) program. Both the 'Filezilla' and or 'WinSCP' have been successfully used in the download process. Enter the IP Address, login id and password in the program. This information shall be received from the manager of the SBI Traffic Unit. The download is in the form of a zip file.

The File Transfer Protocol program requires an initial setup. Upon activating the program, the user will be faced with a blank form. The user must enter IP address of the server in the 'Host' block of form. The protocol must be set to 'FTP – File Transfer Protocol'. The Encryption block must be set to 'TLS/SSL Explicit encryption'. The port number will be set 21 automatically. The Logon Type is set to 'Normal'. The user info is provided by the SBI TSU Manager and will be entered into the 'User' block of the form. The password information is provided by the SBI TSU Manager and will be entered into the 'password' block of the form. The user will then select (left click) 'login'.

The FTP program then connects to the remote site. The user will be logged into the root folder as indicated by the '/<root>' directory. The user will see on the right side of the screen a folder 'TSTOPextract'. This is the desired folder. The user will then double left click the folder. This will take the user from the root directory to the subdirectory '/<root>' '/TSOPextract'. The user will see the file 'STOPS_Extract.zip'; this is the desired file. Right click on this file, a popup menu opens. Left click on

'download' or 'F5' and a download box opens. The user will select a local location for the download and click OK. The download will commence. This is an automated process until completion. This is a quick process in seconds. The user will then log off and close the program. The program has saved the session and all the information. The desktop short cut icon to the 'saved session' is now visible. The next login is preconfigured. The next session only requires maneuvering to the subdirectory as described above.

Once the 'STOPS_Extract.zip' file is downloaded to the local network drive, right click it and select 'extract all' to extract the files contained in it. This is a built in Windows OS feature, no other software is needed. The extraction process will automatically create a local subfolder called "STOPS_Extract". This is a large amount of data in the zip file and it will take several minutes to complete. The extract process will compile 10 files, (9 .txt files and 1 excel spreadsheet file). These data files have all been compressed and stripped down for transport. They all have to be rebuilt. The headers have been removed and will have to be added back in to identify the data rows and columns. 'F' refers to field.

The individual files are outlined as follows.

- The '**Stop**.txt' file needs the following headers: F1: StopID; F2: AgencyDescription; F3: StopDate; F4: Purpose; F5: Action; F6: DriverArrest; F7: PassengerArrest; F8: EncounterForce; F9: EngageForce; F10: OfficerInjury; F11: DriverInjury; F12: PassengerInjury; F13: OfficerId; F14: StopLocation; F15: StopCity; F16: Blank; F17: Blank;
- The '**Person**.txt' file needs the following headers: F1: PersonID; F2: StopID; F3: Type; F4: Age; F5: Gender; F6: Ethnicity; F7: Race;
- The '**Search**.txt' file needs the following headers: F1: SearchID; F2: StopID; F3: PersonID; F4: Type; F5: VehicleSearch; F6: DriverSearch; F7: PassengerSearch; F8: PropertySearch; F9: VehicleSeized; F10: PersonalPropertySeized; F11: OtherPropertySeized;
- The '**Contraband**.txt' file needs the following headers: F1: ContrabandID; F2: SearchID; F3: PersonID; F4: StopID; F5: Ounces; F6: Pounds; F7: Pints; F8: Gallons; F9: Dosages; F10: Grams; F11: Kilos; F12: Money; F13: Weapons; F14: DollarAmt;

- The '**SearchBasis**.txt' file needs the following headers: F1: SearchBasisID; F2: SearchID; F3: PersonID; F4: StopID; F5: Basis;
- '**Traffic Stop Data Tables Reference Key.xlsx**': This is excel spreadsheet that is index of the fields into the other files. This is the main reference key file. This is required for all other data files as the headers have been stripped out of the other files.
- '**RefStopsCodeNumber.txt**': This field contains common codes use in other files; Action type, Age Group Range, Search Type, StopPurpose.
- '**RefCommonCode.txt**': This field contains common codes use in other files.
- **'Query_README.txt'**: This file contains all of the years included in the data base, 2000-2020.
- '**RefCodeType.txt**': This file provide definitions of verbs used in the other files.

## 4.3 Extract, Transform & Load (ETL)

For the purpose of this project, only the stop.txt and the person.txt data files will be analyzed. As both of these files are very large, (stop.txt is 2.4 gb and person.txt is 0.75 GB); only an enterprise database would be suitable for the analysis. For this project, I used a SQL server, SQL Server Management Studio (SSMS) v18.5. Please note that the other extracted files, (search.txt, contraband.txt & searchbasis.txt), will be reserved for future analysis.

Originally, I wanted to use 'DirectQuery' with the intention of connecting PowerBi directly to the SQL Server. However, this required a personal gateway to be installed on a personal computer attached to the University network. This computer would have to be on constantly powered up and the whole system would dependent upon it. This would hinder the strength of the system. In addition, the University Manager of Infrastructure objected to a personal gateway that an outside data service could access the University Network. After discussions, because of the reduced size, (only around a quarter million records), of the data set that I was using for this project; it was decided to use the 'import data' connection type. (RADACAD, 2017) This would also facilitate system strength, as it would be totally cloud based. The final decision was to import the original dataset into the SQL server, modify it, extract the desired dataset and then export it to a generic data format for it to be later imported into the PowerBi.

I logged into SSMS using a windows authentication. I previously had the server administrator set up a blank database for this project. The first task was to import the two flat files, stop.txt and person.txt. Using the import wizard, I successfully imported

the txt files. The SQL data tables, dbo.Stop and dbo.Person were created. Please see the SQL import section for specific import details.

The dbo.Stop table contains approx. 25.9 million records and the dbo.Person table contains approx. 26.3 million records. Each record in the tables represents a police traffic stop. However, there were several problems with these new tables as they contained records for police departments and data years which are not part of this analysis. It was necessary to find a way to filter out these non-desired records. Also, the records in each table contained only part of the desired data set. The dbo.Stops table contains information about the stop itself, such as date and time etc. While the dbo.Person table contains information about the person being stopped, such as age, gender, race etc. Please see SSMS Instruction Set section of the paper for a complete listing of the fields in each table.

It was clear that to complete desired data set, the two tables would have to be joined in some fashion. The 'stopID' is the only common field for both the dbo.Person and dbo.Stop tables. It is the unique control number for each of the police records. *I decided that this would be the field used for joining the two tables to complete the data set.* Also, the 'AgencyDescription' field contains the names of the police departments that will be reviewed in this analysis. These are university police departments of the University of North Carolina (UNC) system and the police departments holding jurisdiction in New Hanover County, NC. Please see SSMS Instruction Set section of the paper for a complete listing of the fields in each table.

To facilitate extracting all the records for the desired police departments, dbo.Stop1, (which is structurally an exact copy to the 'dbo.Stop' table), and sql.Script#1

were created. Dbo.Stop1 will be a temporary storage location for only the records of the police departments being analyzed. This one action alone reduced the size of the table from 26 million records to approximately 250,000 records. Select Script#1 will copy all records for the desired police departments from dbo.Stop to dbo.Stop1. Dbo.Stop will no longer be used for further transformations. At this point in the process, dbo.Stop is deleted from the database as is no longer needed or used. It will be recreated next month as part of the data import process.

The dbo.Stop1 is still incomplete. It doesn't contain the desired fields, ('PersonID', 'StopID', 'Type', 'Age', 'Gender', 'Enthnicity' & 'Race'), from the dbo.Person table. Also it contains too many years, (2000 to the present) of records in it. To facilitate the further reduction of the data set size, and for adding the additional fields of select records from dbo.Person to the data set, sql.Script#2 was created. Script#2 is a select query for all fields in both the dbo.Stop1 and dbo.Person tables: It joined the two tables, dbo.Stop1 and dbo.Person on the 'stopID' field. This had the effect of limiting the records in dbo.Person to only those police departments in dbo.Stop1. It further filtered the records limiting them to the desired years, 01/01/2015 to the present. This removed all Y-2000 to Y-2014 records from the query. The script query output was around 250,000 records with all the required fields of both the 'dbo.Stop' and 'dbo.Person' tables. The output contains only the records for the desired departments and the desired years. The output was then exported to a CSV file which is very small, only around 23,000 KB in size. This 'CSV' file will then become the main import data source for the Power BI visuals. The whole process downsized the size of the dataset from 3 GB of data to 23 KB of data.

The stop1.csv file will need a further transformation. It was opened in Microsoft Excel and all the desired data was viewable. However, the file contained no headers. I inserted a blank row and typed in the names of the columns. The columns are taken directly from the SBI 'Traffic Stop Data Tables Reference Key.xls' file. Upon completion there were 22 columns: C1- '*StopID'*, C2- '*AgencyDescription'*, C3- '*StopDate'*, C4- '*Purpose'*, C5- '*Action'*, C6- '*DriverArrest'*, C7- '*PassengerArrest'*, C8- '*EncounterForce'*, C9- '*EngageForce'*, C10- '*OfficerInjury'*, C11-'*DriverInjury'*, C12- '*PassengerInjury'*, C13- '*OfficerID'*, C14- '*StopLocation'*, C15- '*StopCity'*, C16- '*PersonID'*, C17- '*Type'*, C18- '*Age'*, C19- '*Gender'*, C20- '*Ethnicity'*, C21- '*Race'*,

The stop1.csv is then saved. The file format was changed to the .XLSW format for full features. The columns are all formatted to 'General' or 'Text'. Either is acceptable. They can be later changed in PowerBi, if needed. One notable exception is the ''StopDate'' column. The ''StopDate'' column **must** be formatted to the 'Date format'. PowerBI will automatically, upon importation of the dataset, create a 'DateHierchy' based on the 'StopDate' column. The 'DateHierchy' will allow for aggregation on the year, quarter, month and or the day. However, if the 'StopDate' column is not properly formatted, upon importation, PowerBi will not automatically create the date 'DateHierchy'. This is a critical issue as all the PowerBi visuals in this analysis require aggregation on different date schemes, (Year, Quarter and or Month).

The last step is to open the PowerBi desktop program to a blank screen. Import the stop1.xlsw file into the program by 'get data' command, select excel and then connect to the excel file. This will take you to the navigator window and allow you select 'sheet1' in the workbook for importation. You may either load the data or transform it. For purposes of this analysis, I loaded the data. There are options for later

transformation of fields, if so desired. Once you select close and apply, the PowerBI program will import the excel data file. Save the file to a unique name and the process is complete. The file is saved as a .pbix file. The basic data set has been imported and saved. Assorted visuals can now be built in the PowerBi desktop. Note: For this analysis, this will comprise the vast majority of the dataset. *See Section 11.2 for a graphical representation of these steps.*

However, I developed a couple of specialized data tables to populate a couple of the visuals. The file 'Population-projections-by-race-age-groups-vintage-2019(NH-Pen-BR).xlsw' contains population data for the tri-county area of New Hanover, Pender and Brunswick. This file was also loaded into PowerBi as a separate table. This information was incorporated into one of the Stops by Race (SbR) visual pages. The file 'Count-2016-2021.xlsw' is a data file for one of the PowerBI tables. This data was used in the page 'TS- UNCW PD Z Scores'. It is used to calculate the average, standard deviation and the Z scores of officers' traffic stops

## 4.4 Dataset Enhancements

The basic data model needed some enhancements. I created several DAX calculated fields, which were needed in various PowerBi visuals. I created the DAX fields 'Stop_Year', 'Stop_Month' and 'Stop_Quarter' fields based on the 'stopdate' field, see Exhibit #1. One caveat to this was the 'stopdate' - Date Hierarchy' field. PowerBI created this field from the 'stopdate' field. The original dataset had only had a 'stopdate' field, there was no 'Year', 'Month' or 'Quarter' fields: As all of the visuals required an aggregation to at least the month time frame, this was huge problem!

There is an automatic PowerBi *date hierarchy* feature that reads imported 'date/time' fields and creates the date hierarchy. (PowerBI - doc.microsoft.com, 2019) When I originally created the 'sheet1' table, I made an error. I didn't format the 'stopdate' field correctly. All fields in the downloaded source text files are formatted as text fields. When I first imported them into MS Excel, they were formatted to the 'General' format. This included the 'stopdate' field. I used this excel (sheet1) workbook as the source data file for the PowerBi 'sheet1' data table. This had the effect of PowerBi interpreting this field as text during the initially creation of the 'sheet1' table; therefore it didn't automatically create the date hierarchy. After some research, I modified the excel workbook, (sheet1) adjusting the 'stopdate' field from general format to the 'date' format. (PowerBI - doc.microsoft.com, 2019) I then repeated the PowerBi 'refresh' command. After doing so, I had the newly created DAX fields 'Date Hierarchy' with Year, Quarter, Month and Day fields. This is a critical issue as all of the visuals have date slicers included with them. Without this hierarchy, the date slicers won't function and the data couldn't be aggregated or sliced.

The 'Month_Name' field is a DAX calculated field. It extends the 'Month' field. The Month field only returns a number from 1-12. The 'Month_Name' field returns Jan. to Dec. depending on the date. The syntax for the 'Month_Name' field was a switch table, see Exhibit #1. 'Officer_Name' is a DAX field that uses a switch command to create a table column that links Officer ID numbers from the original data set to an officer name, see Exhibit #1.

The 'Purpose_name' was created using a switch command, see Exhibit#1. The 'Purpose' field only had numeric field identifiers (1-10) corresponding to each type of

purpose. This was done to facilitate the zip transport of data. The Purpose_name field extended the stop purpose data and allowed for the creation of a DAX calculated column which provided a more descriptive label for each type of stop purpose. The stops purpose labels were taken from the SBI 'RefStopsCodeNumber.txt' file. The fields are outlined in, see Exhibit#2.

I created the PowerBi page 'SbR UNCW PD – Race Proportions' to report on race proportions. It is based on a series of calculated DAX Fields: 'Race_ASN_Prop', 'Race_Blk_Pro', 'Race_NA_Prop', 'Race_OTR_Prop', 'Race_Wht_Prop'. The fields creates proportions of Count of Stops by Race (A, W, B, N/A, OTR), divided by the Count of Stops Total. The Count of Stops by Race fields; ('Race_ASN, Race_Blk1', 'Race_OTR', 'Race_NA', 'Race_Wht', 'Race_Count_T') are also DAX calculated fields, see Exhibit #1. They filter the stops by race to each individual race and one for the total. They are used in the proportions calculations.

I created a PowerBi page, 'EbO – UNCW PD – (N/W vs W) P/I Ratio', which deals with 'Enforcement Action' by police officers. The 'EA_Information', 'EA_Penalty' & 'EA_P/I_Ratio' are DAX calculated fields based on the 'Action' original dataset field. They filter 'Enf_Action' by type and then aggregate it into the new 'EA_Penalty' and 'EA_Information' DAX calculated fields. The 'EA_P/I_Ratio' divides the 'EA_Penalty' field by the 'EA_Information' field, see Exhibit #1.

'Average_TS_Ofcr_Mon' is a calculated DAX field. It determines the average number of traffic stops per officer. It determines the total number of traffic stops for a particular time period and then divides the number by the 'Distinctcount' of officer. Each

officer can stop many vehicles, but the officer will only be counted once for the purpose of this calculation see, Exhibit #1.

As there was no ‘Officer_Name’ in the original dataset, I had to create it. There was only an Officer ID number. In my experience and during meetings, police managers wanted to see officers’ names and not their ID numbers on these types of reports. To facilitate this I added a new DAX calculated column in the ‘sheet1’ table and created the field ‘Officer Name’. Using a switch command, I created the switch names table and populated it manually by inputting officers’ names, matching them up with the corresponding officer ID number. This new field was now available to be used in any visual.

# 5 PowerBi Visuals

The goal of the PowerBi Visuals was to create a self-service information analytics portal available 24 hours, 7 days a week for use by the manger. The visuals will all default to five years' worth of data, (2016-2021). They will contain various analysis and information derived directly the NCSBI Traffic Stops database. The goal is for the managers to discover anomalies and data outliers that may be indicative of police officer disparaging behavior concerning racial minority demographics. All of the PowerBi visuals are organized around three subject areas, the count of Traffic Stops (TS), count of Stops by Race, Gender & Ethnicity (SbRGE) and count of Enforcement Actions by Officer (EBO). They all will be filtered by UNCW Police Department, UNC System Police Departments and or New Hanover County Police Departments. The user need not view all the pages. There is some redundancy to them. Some users prefer tables while some users prefer charts or graphs. There are stand-alone pages or in combination with other complementary pages.

All visuals will have assorted slicer controls built into them allowing the user to manipulate the data as desired. The slicer controls filter the 'Year', 'Quarter', 'Month', 'Enforcement Action', 'Race', 'Gender', 'Officer Name', and 'Police Agency Name'. The visuals in general will be organized around tables, charts and graphs. The data defaults to all five years of the dataset, unless otherwise noted by the use of a slicer. The slicers are critical as they allow the user to filter and manipulate the data to the date range of interest. The visuals become interactive. The use of the '*multiselect*' feature allows the visuals can be customized by the user. The '*multiselect'* feature is invoked by selecting the first data category on the slicer, holding down the 'ctrl' key and

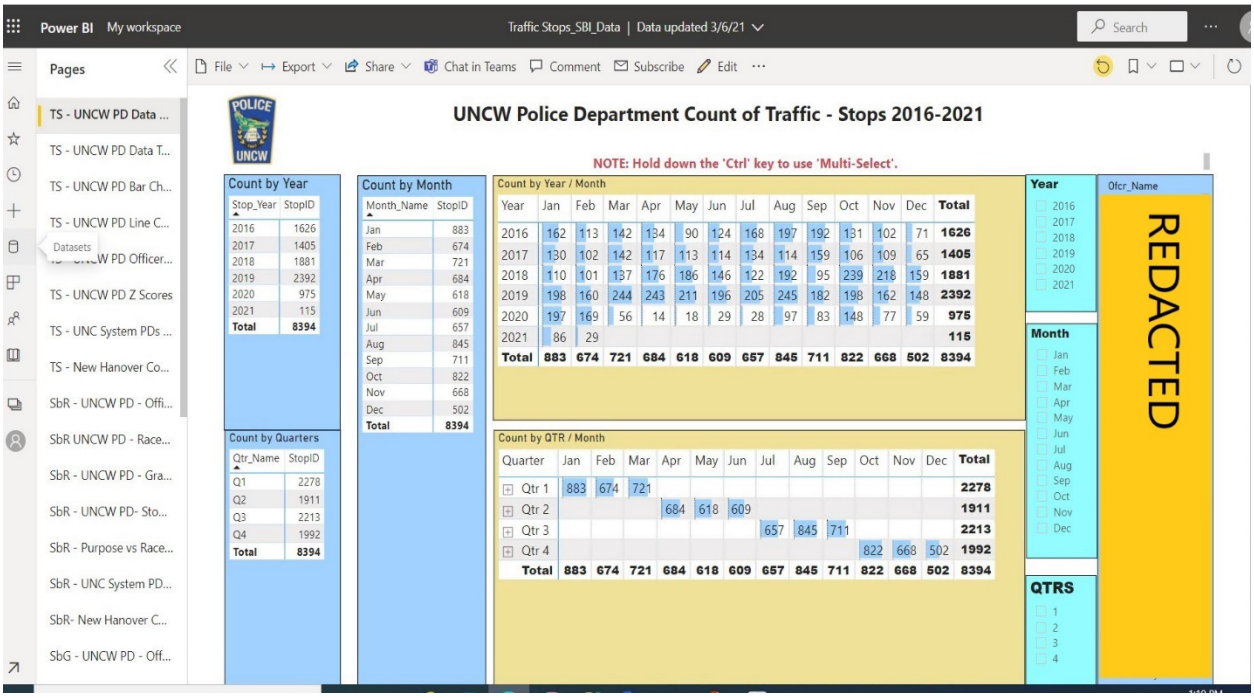
selecting the data category on the slicer. All other categories are filtered out. In the following are descriptions of the pages and the visuals and a screen shot of them.

## 5.1 Data Table – Traffic Stops (TS)

### 5.1.1 TS - UNCW PD Data Table

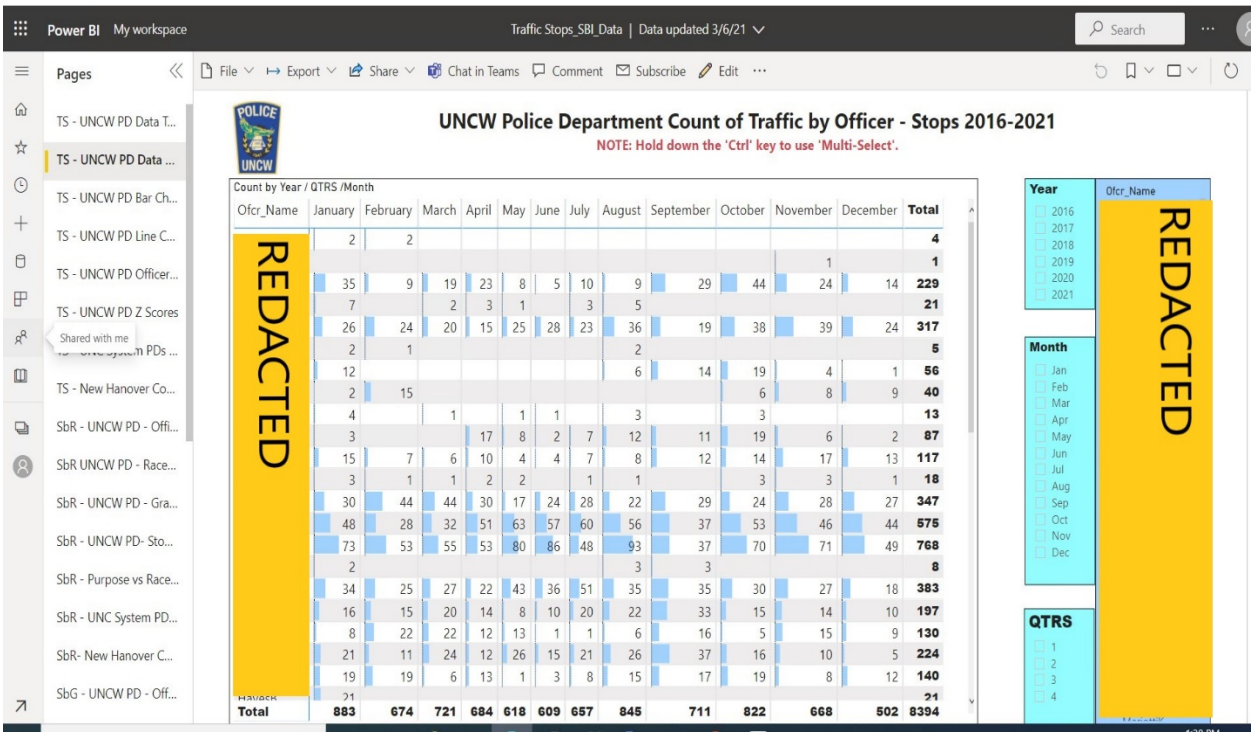
This page is a tabular report built on the 'matrix' visualization. It is a base report that counts traffic stops (TS) and aggregates them by year, by quarters and by months. The police executive would use to determine the count of traffic stops by a specified time period. The 'Ofcr_Name' slicer would also allow the consumer of the report to filter the count of traffic stops down to the officer(s) level. It contains six visuals on it. All of these visuals count the Traffic Stop (TS) ID field. The 'Count by Year' visual aggregates the count of stops by Year. Each Year is a row. Column#1 is the Year name and column#2 is the total Yearly count. The 'Count by Quarter' visual aggregates the count of stops by quarter. Each Quarter is a row. Column#1 is the quarter and column#2 is the total quarterly count. The 'Count by Month' visual aggregates the count of stops by month. Each month is a row. Column#1 is the month and column#2 is the total monthly count. The Count by Year / Month visual is a variation on the above theme. This is a tabular report that also counts traffic stop IDs, but it aggregates multiple rows and columns. The years are counted in the rows and the columns count for each month. Column#13 is a yearly total. These are all variations on a theme and redundancy is built into the page. The blue data bars are a quick visual guide. The greater the blue shading means the higher the number and vice versa. The Count by 'QTR / Month' is a variation on the 'Year / Month' visual, except the rows are quarters and not years. The

month columns and data bars are the same in both visuals. The page is equipped with required Year, Month, Quarter, Officer Name slicers. **See screen shot below.**



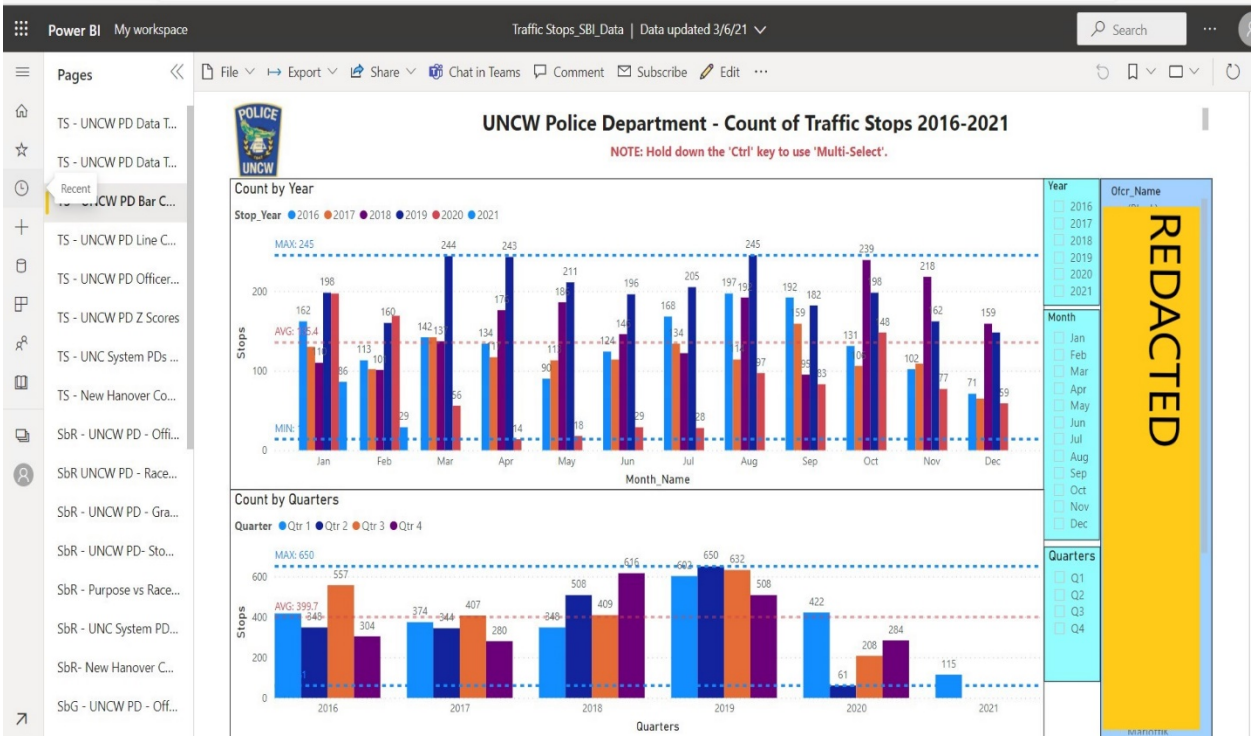

### 5.1.2 TS - UNCW PD - Data Table – Officer Data Table

This page is a tabular report built on the 'matrix' visualization. It is an extension of the previous page. The rows in column#1 detail the officers' names. Columns #2-#12 detail the officers' individual count of traffic stops. Column #13 details that total count of traffic stops for each officer. The bottom row totals the count of traffic stops for each particular month. The page is equipped with the Year, Month, QTRS and Officer_Name. The manager shall slice the data as desired. The page defaults to the entire five years of data unless one of the slicers is activated. An instruction note is included to remind the user of the 'Multi-Select' capability. **See screen shot below.**



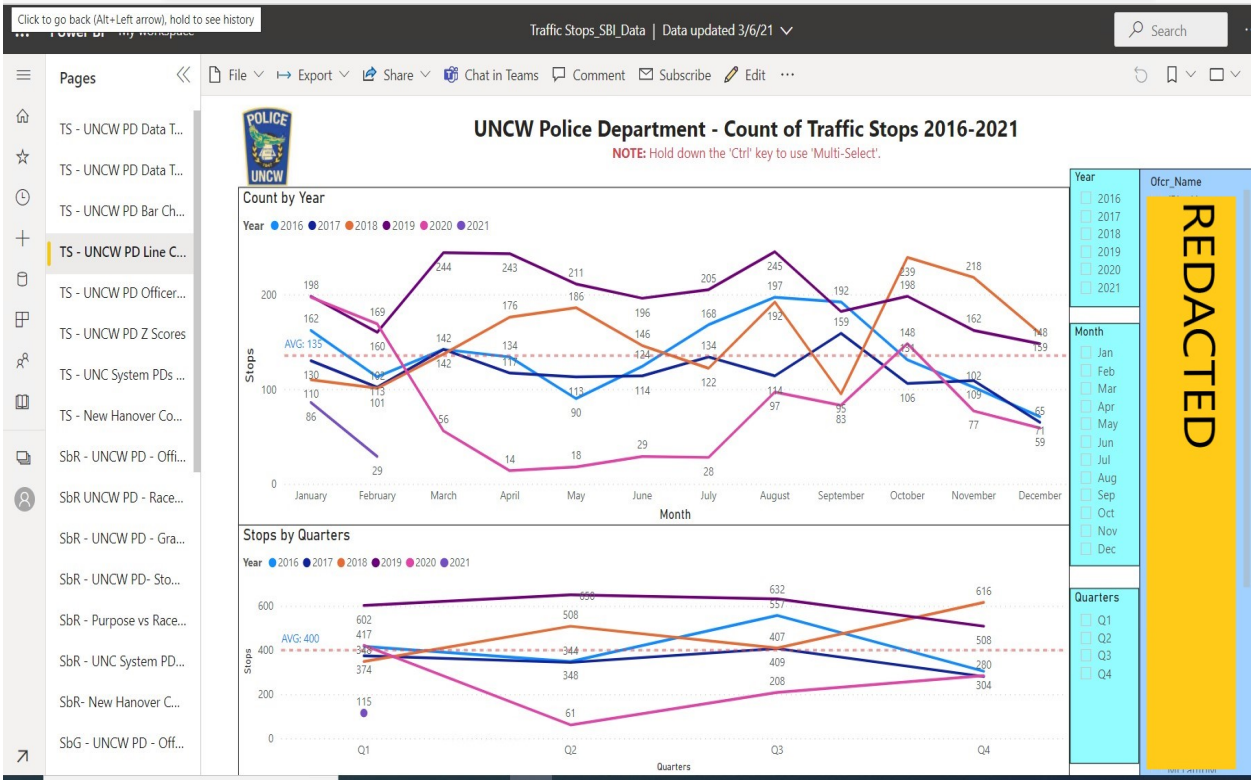

### 5.1.3 TS-UNCW PD 'Bar Chart'

This page is Clustered Column Chart report. It displays the counts of traffic stops graphically. It presents traffic stop counts on the 'Y' axis and months / quarters on the 'X' axis. It then clusters the bar elements by each month / year. Each cluster has one bar for each year / quarter in the analysis. There are legends for each color identifying the year / quarter. There is a built in analytics identifying the MIN, MAX and AVG number of stops. The page comes equipped with the perfunctory slicers; Year, Month, Quarters and 'Ofcr_Name'. This enables the user to customize the data view. This is a companion to the next page displaying line charts. The user need not view both. They both display the same data. **See screen shot below.**



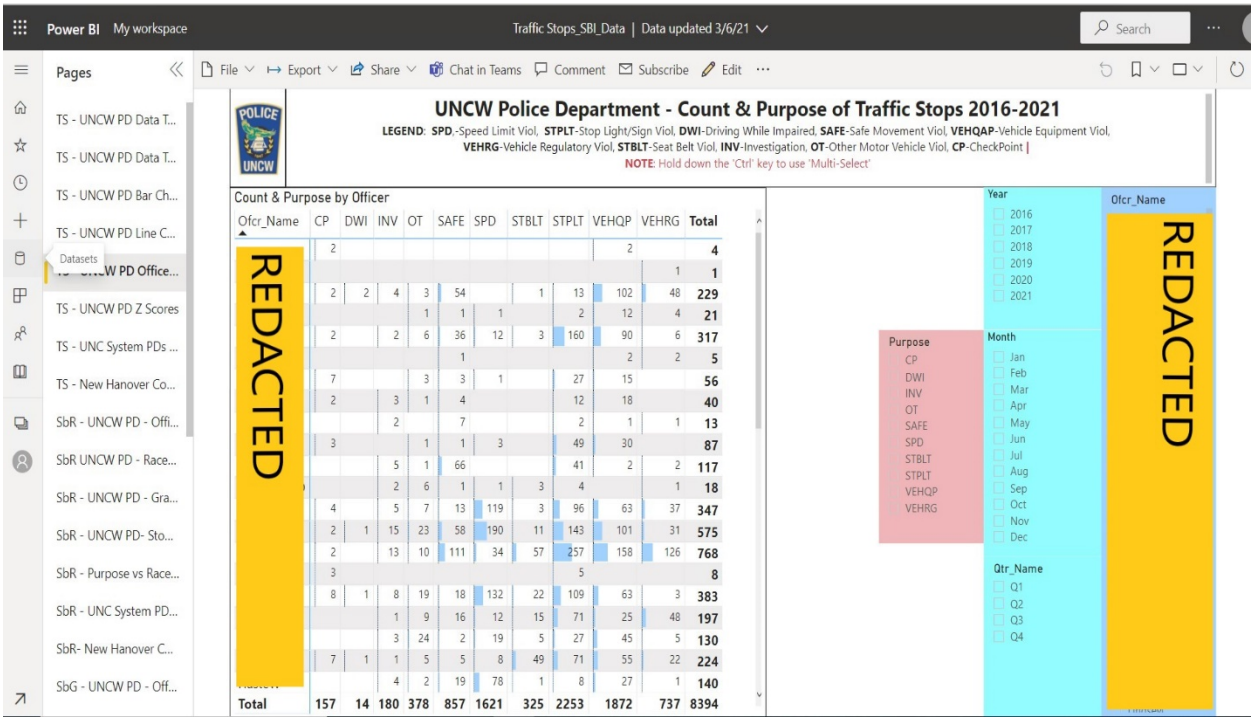

### 5.1.4 TS-UNCW PD Line Charts

This page is similar to previous one. These visuals are produced from the same data as the previous page (BAR charts), but are in the form of line charts. It is the same count of traffic stop data and the same elements on each axis. The data is all aggregated by Years, Quarters and Months. However, it is the form of line charts. This gives the users the ability to select which visual type they prefer. The line charts are better for observing trend lines. There is a built in analytics identified the AVG number of stops. The page comes equipped with the perfunctory slicers; Year, Month, Quarters and 'Ofcr_Name'. This enables the user to customize the data view. Again, this is a companion to the previous page displaying bar charts. The user need not view both. They both display the same data. **See screen shot below.**




### 5.1.5 TS-UNCW PD Data Officer / Purpose – Data Table

This page is a tabular report built on the 'matrix' visualization. It counts traffic stops and the purpose of the stop for each officer. Each of the rows identifies an individual officer by name in column #1. The visual aggregates the stops by purpose in column #2 - #11 and totals them all up in column #12. The blue data bars are a quick visual guide. The greater the blue shading means the higher the number and vice versa. There is a scroll bar across right-side that can be dragged up or down to show additional officers. There are totals by type of stop in the last row and by officer name in the last column. There is also a series of slicers, Year, Month, 'Qtr_Name', 'Purpose' and 'Ofcr_Name'. They allow users to filter the data as they desire. The visual will default to the entire five year data set unless one of the slicers is activated. **See screen shot below.**




### 5.1.6 TS- UNCW PD Z Scores

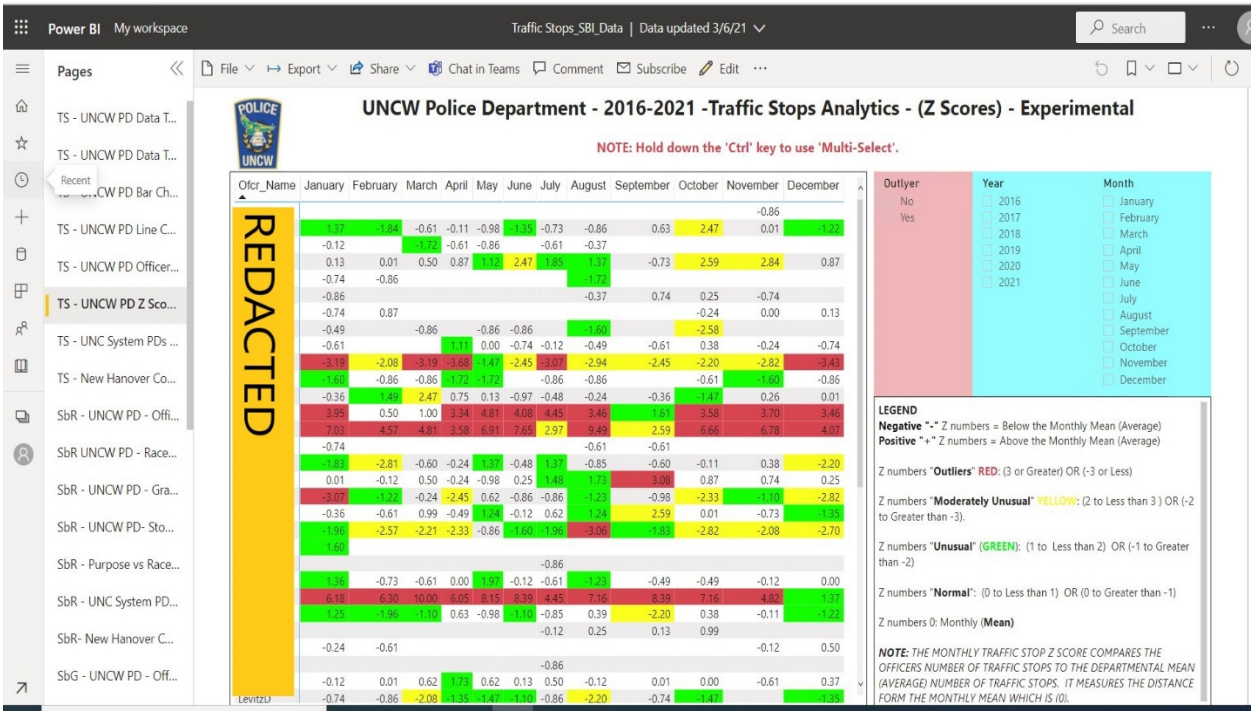
This page is a tabular report built on the ‘matrix’ visualization. As there is no objective standard for the number of traffic stops an officer makes each month, there is no obvious way to equivocate the numbers of stops between the officers. There are many variables such as assignment & number of work days per month that will affect the raw number of stops. The level of acceptability for officers’ traffic stops is subjective to the whims of the individual police supervisor. The introduction of the Z scores is an attempt to add some ranking to each officer’s count of stops. There is no hypotheses or threshold of acceptability. It is just a comparison of them to the police departmental traffic stop average and standard deviation. The color coding is simply rules based conditional formatting. It is believed that the user looks to the RED before YELLOW and GREEN in that order. All Z numbers above 3.0 are considered Outliers and can be

factored out through the use of a specialized slicer. There is legend / explanation text box explaining the numbering system and color coding.

The visuals on this page are created from a specialized data table, 'Count_Ofcr_2016-2021.xlsw'. The raw 'count of Name_Count' data included the year, month, 'Ofcr_Name' and 'Ofcr_Name_Count' and exported from PowerBi. They are then aggregated by year, month and officer name. Each Year/Month combo aggregated is presented for each officer for each time period. In essence, this give the number of stops for each month of the five year period, some sixty observations. Not every officer will have stops for each time period. This information is then imported back into PowerBi into a new table, 'Count_Ofcr_AGR'. In PowerBI the DAX calculated measures 'Ofcr_Name_AVG' and 'Ofcr_Name_SD' were created for the average and the standard deviation for the count of officer stops. The DAX calculated fields 'Z_Scores' and 'Outliers'. The 'Z_Scores' are DAX calculated by subtracting the DAX calculated average from the monthly officer count of traffic stops and then dividing by the standard deviation. This table is then saved and is the underlying data for the PowerBI visuals.

While this process is functional and requires a minimal amount of developer time; it can be improved in the next update. In the future, my goal is to make the whole specialized table a calculated PowerBI table. PowerBi can create and update all of the fields in the table automatically from the data of the 'sheet1' table. All of this can be done, once created, with *no* intervention from the developer. Also, the calculations are based on a five year average and a five year standard deviation. I am unsure if this is

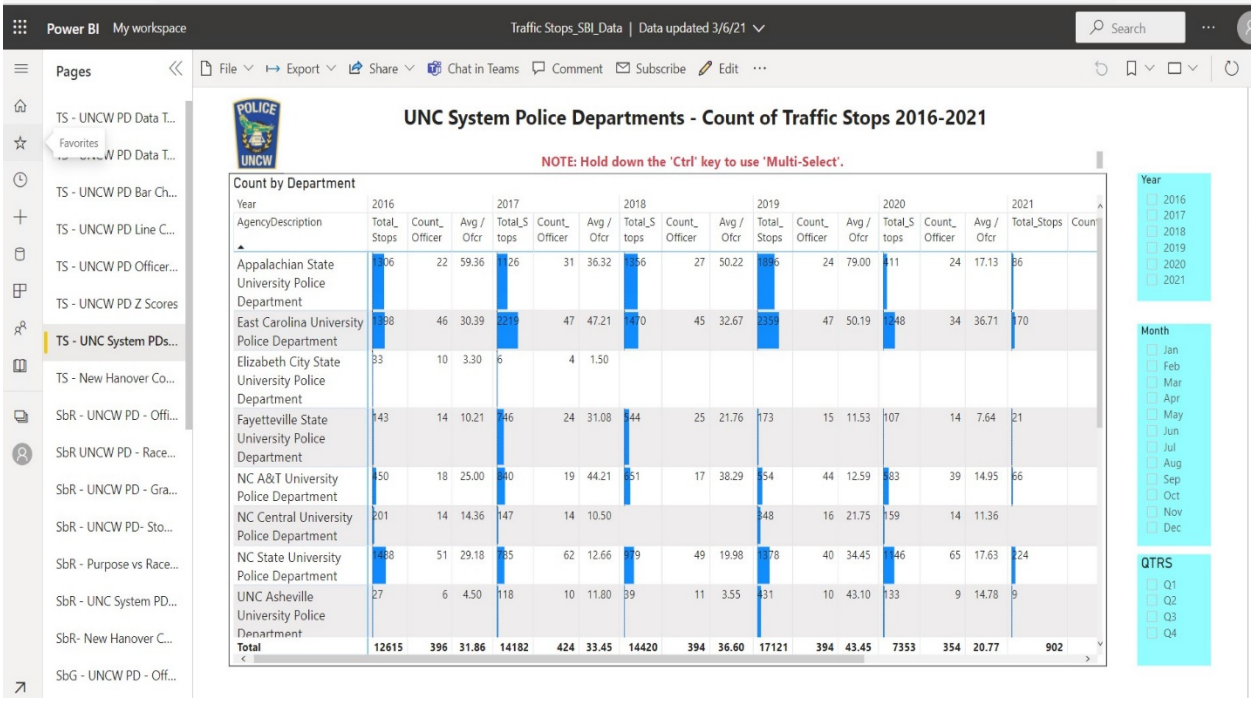
optimal. This issue will be presented to the Police Chief to explore suitable alternatives, maybe a one year average would be desired. **See screen shot below.**




### 5.1.7 TS - UNC System PDs – Data Table

This page is a tabular report built on the 'matrix' visualization. It shows traffic stop data for all the university police departments of the University of North Carolina (UNC) system for the years of the analysis. It shows the total stops per year, the 'distinctcount' of officers making the traffic stops and the average number of stops per officer for each year. The average statistic is included because total stops are misleading. Each of the departments are of different size and thus have different levels of contribution per officer. This visual is included in an attempt to compare the number of traffic stops between peer departments of 'type'. All of these departments are university police departments, so it is reasonable that there should be some similarities. The page

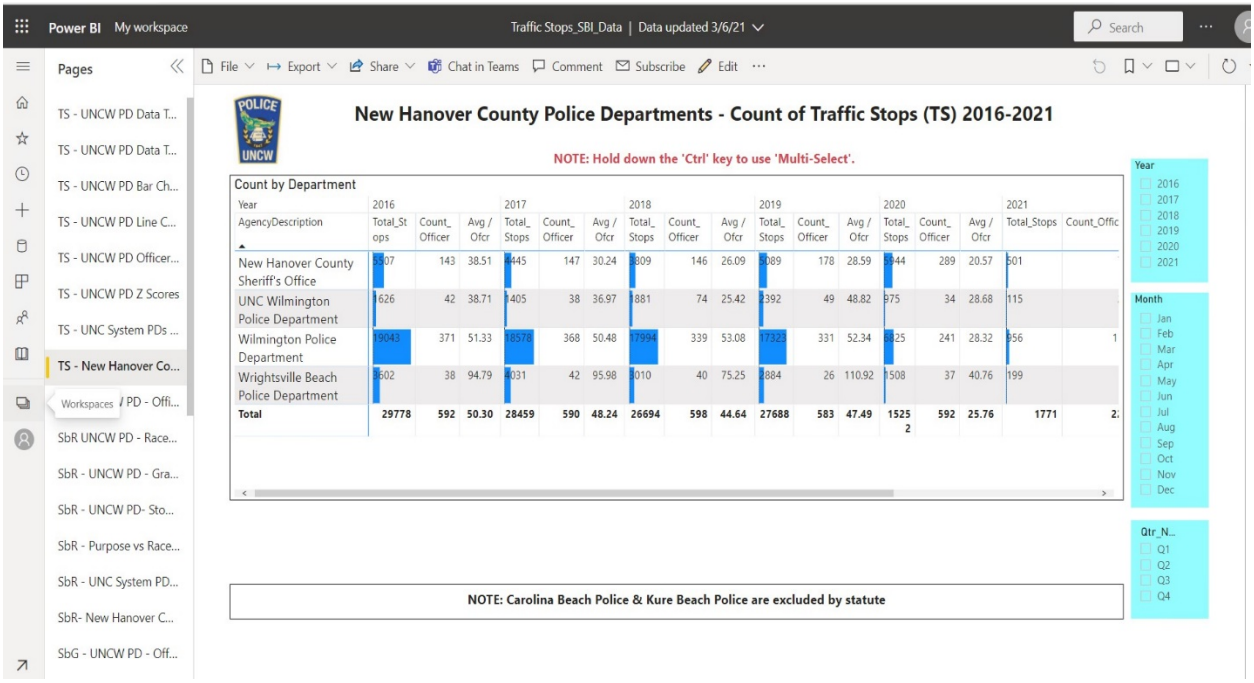
contains all of the perfunctory slicers; Year, Month & Quarters. This enables the user to customize the data view. This is a companion visual to the next page. **See screen shot below.**




### 5.1.8 TS – New Hanover County PD's – Data Table

This page is a tabular report built on the 'matrix' visualization. It shows traffic stop data for all police departments operating in New Hanover County, North Carolina for the years of the analysis. It shows the total stops per year, the 'distinctcount' of officers making the traffic stops and the average number of stops per officer for each year. The average statistic is included because total stops are misleading. Each of the departments are of different size and thus have different levels of contribution per officer. This visual is included in an attempt to compare the number of traffic stops between peer departments of 'Geography'. All of these departments work in the same geography, so it is reasonable that there should be some similarities. The page

contains all of the perfunctory slicers; Year, Month & Quarters. This enables the user to customize the data view. This is a companion visual to the previous page. **See screen shot below.**



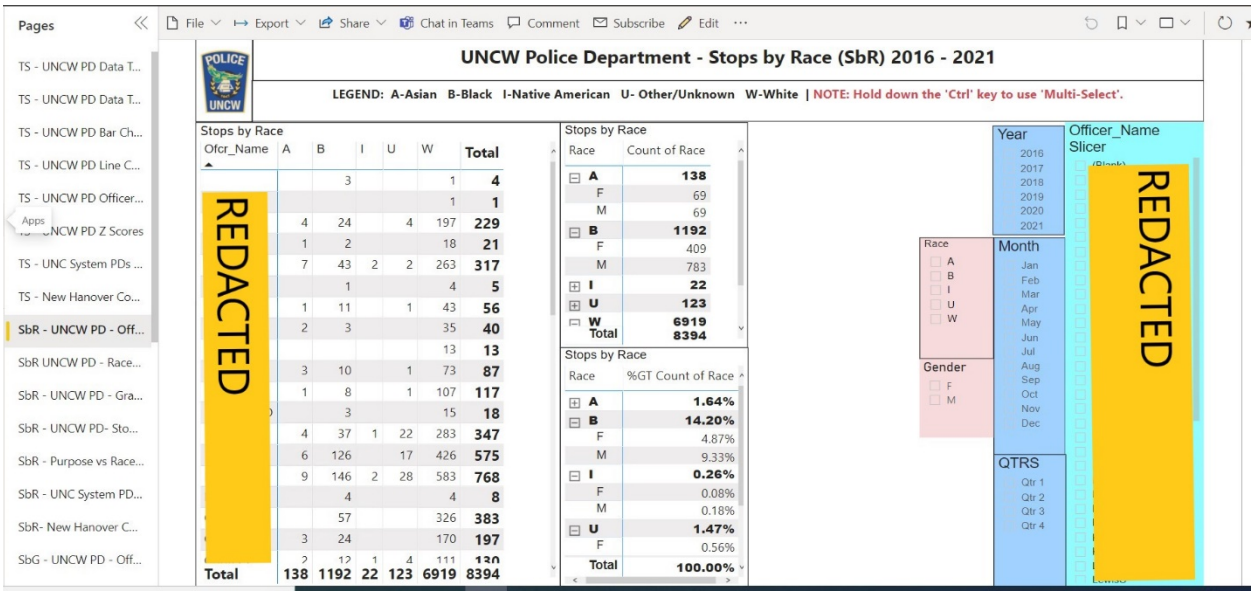

## 5.2 Stops by Race – (SbR) | Stops by Gender – (SbG) | Stops by Ethnicity – (SbE)

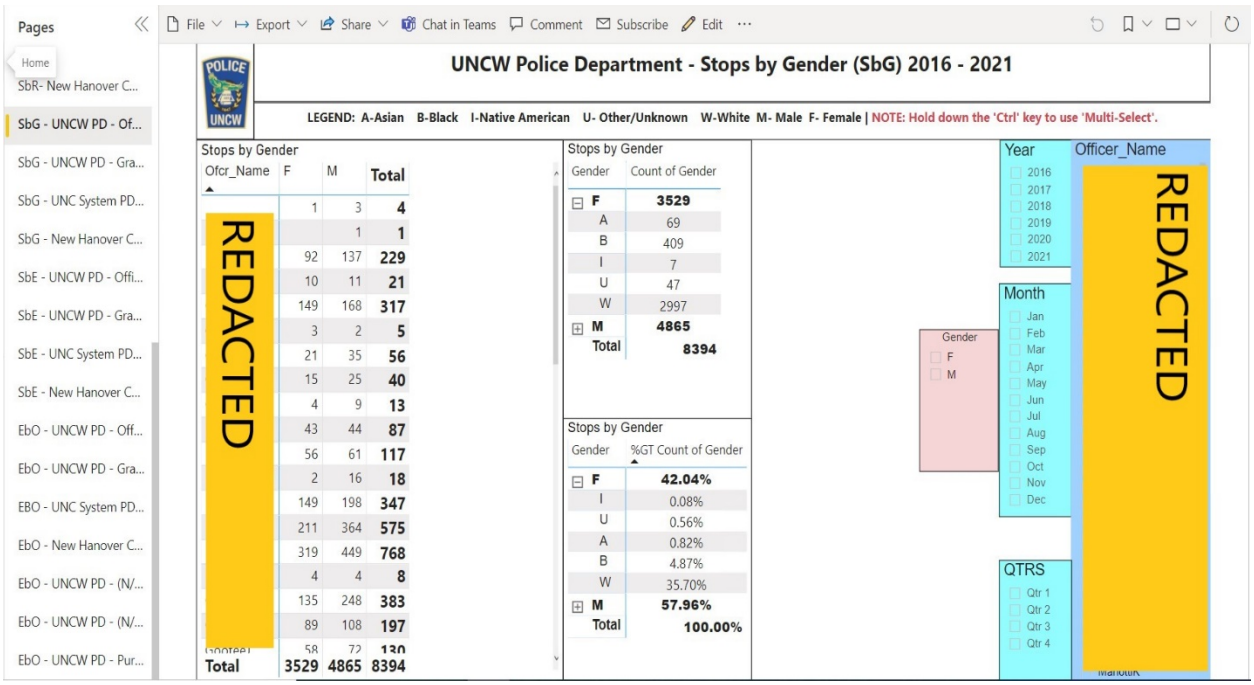
### 5.2.1 Data Tables: UNCW PD – SBR, SBE, SBG & EBO

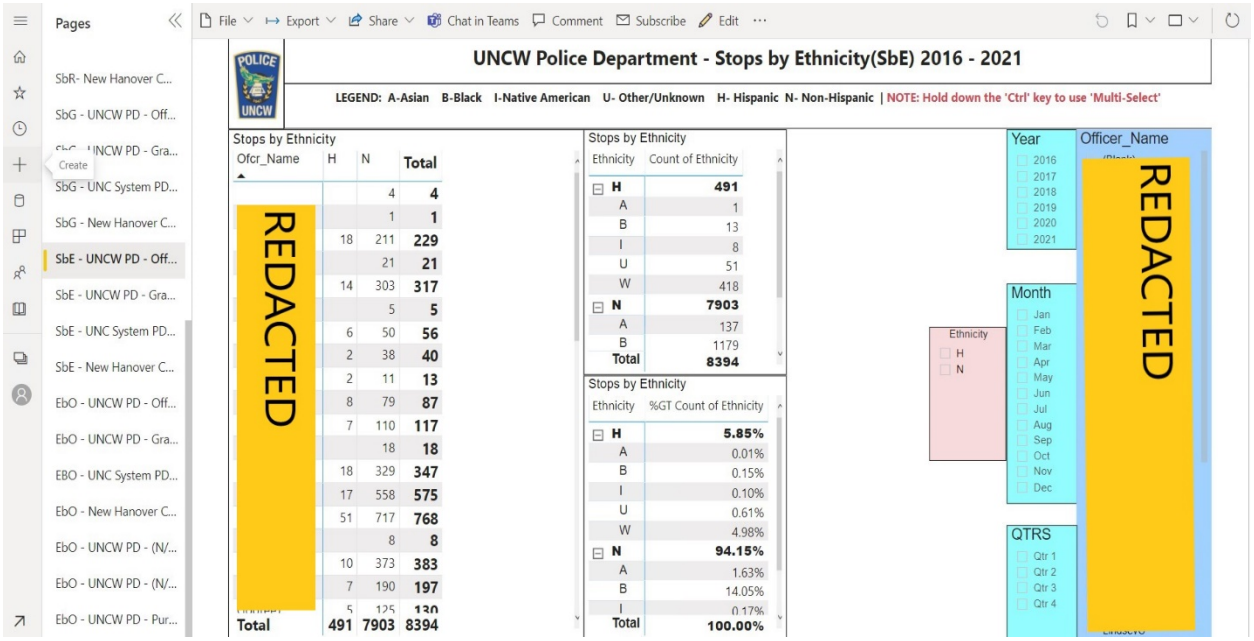
The pages UNCW PD Data Tables for Race, Gender and Ethnicity, ('SbR – UNCW PD Data Table', 'SbG – UNCW PD Data Table' and 'SbE – UNCW PD Data Table') pages are clones of each other. They are structurally identical. These pages are tabular reports built on the 'matrix' visualization. The only variable that is changed in each case is the data values of 'Race', 'Gender' or 'Ethnicity' (R.G.E.). These are tabular visuals that count the aggregate number of traffic stops by R.G.E. There are three visuals per page. The main one is composed of columns by R.G.E. and rows by officer name. The columns aggregate the officers' number of stops by each designated

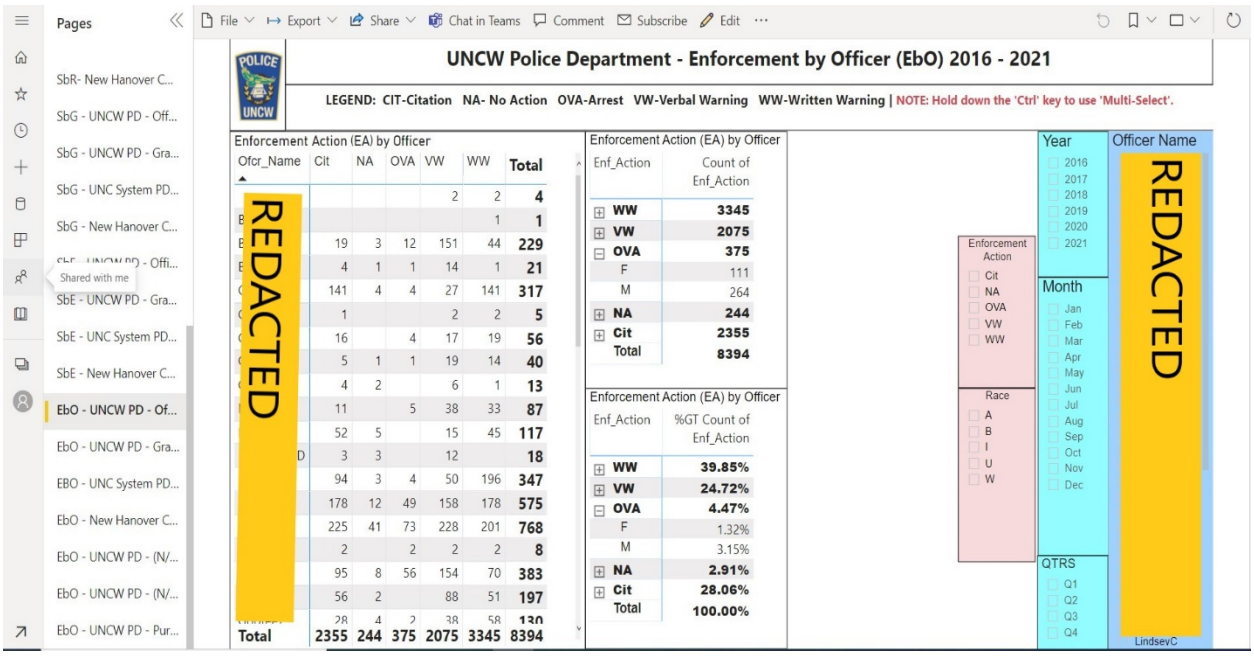
R.G.E. demographic value and the last column totals them all up. The visual defaults to the entire five year dataset; unless one of the slicers is applied in which case, the visuals will automatically be updated. Each R.G.E. column is totaled up at the bottom of the page. As not all officers worked all the Year/Month combos, applying a slicer may cause some officers to drop off and be omitted from the visuals.

The second visual per page reflects the count of stops by R.G.E. for the entire police department. Each number is the total count for the time period for each R.G.E. demographic being reviewed. Each R.G.E. has a sub-hierarchy. The race visual has a gender sub-hierarchy demographic; while both the gender and ethnicity visuals have race as a sub-hierarchy demographic. There is a total count of stops at the bottom of the visual. The final visual per page is a duplicates of the departmental stops by R.G.E. visual previously described. The only difference is the number of stops are reported as percentages. Each sub-hierarchy percentage represents the percentages of the total. The page comes with all the required slicers, Year, month, quarter, officer name, race, gender and ethnicity. Users may customize the data at they desire. **See 4 screen shots below.**


Pages
TS - UNCW PD Data T...
TS - UNCW PD Data T...
TS - UNCW PD Bar Ch...
TS - UNCW PD Line C...
TS - UNCW PD Officer...
TS - UNCW PD Z Scores
TS - UNC System PDs ...
TS - New Hanover Co...
SbR - UNCW PD - Off...
SbR UNCW PD - Race...
SbR - UNCW PD - Gra...
SbR - UNCW PD- Sto...
SbR - Purpose vs Race...
SbR - UNC System PD...
SbR- New Hanover C...
SbG - UNCW PD - Off...
File
Export
Share
Chat in Teams
Comment
Subscribe
Edit
UNCW Police Department - Stops by Race (SbR) 2016 - 2021
LEGEND: A-Asian B-Black I-Native American U- Other/Unknown W-White | NOTE: Hold down the 'Ctrl' key to use 'Multi-Select'.
Stops by Race
Ofcr_Name A B I U W Total
REDACTED
Total 138 1192 22 123 6919 8394
Stops by Race
Race Count of Race
A 138
F 69
M 69
B 1192
F 409
M 783
I 22
U 123
W 6919
Total 8394
Stops by Race
Race %GT Count of Race
A 1.64%
B 14.20%
F 4.87%
M 9.33%
I 0.26%
F 0.08%
M 0.18%
U 1.47%
F 0.56%
Total 100.00%
Year
2016
2017
2018
2019
2020
2021
Officer_Name Slicer
REDACTED
Race
A
B
I
U
W
Gender
F
M
Month
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
QTRS
Qtr 1
Qtr 2
Qtr 3
Qtr 4


Pages
File
Export
Share
Chat in Teams
Comment
Subscribe
Edit
UNCW Police Department - Stops by Gender (SbG) 2016 - 2021
LEGEND: A-Asian B-Black I-Native American U- Other/Unknown W-White M- Male F- Female | NOTE: Hold down the 'Ctrl' key to use 'Multi-Select'.
Stops by Gender
Ofcr_Name F M Total
REDACTED
Total 3529 4865 8394
Stops by Gender
Gender Count of Gender
F 3529
A 69
B 409
I 7
U 47
W 2997
M 4865
Total 8394
Stops by Gender
Gender %GT Count of Gender
F 42.04%
I 0.08%
U 0.56%
A 0.82%
B 4.87%
W 35.70%
M 57.96%
Total 100.00%
Year
2016
2017
2018
2019
2020
2021
Officer_Name
REDACTED
Month
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Gender
F
M
QTRS
Qtr 1
Qtr 2
Qtr 3
Qtr 4


Pages
File
Export
Share
Chat in Teams
Comment
Subscribe
Edit
UNCW Police Department - Stops by Ethnicity(SbE) 2016 - 2021
LEGEND: A-Asian B-Black I-Native American U- Other/Unknown H- Hispanic N- Non-Hispanic | NOTE: Hold down the 'Ctrl' key to use 'Multi-Select'
Stops by Ethnicity
Ofcr_Name H N Total
REDACTED
Total 491 7903 8394
Stops by Ethnicity
Ethnicity Count of Ethnicity
H 491
A 1
B 13
I 8
U 51
W 418
N 7903
A 137
B 1179
Total 8394
Stops by Ethnicity
Ethnicity %GT Count of Ethnicity
H 5.85%
A 0.01%
B 0.15%
I 0.10%
U 0.61%
W 4.98%
N 94.15%
A 1.63%
B 14.05%
I 0.17%
Total 100.00%
Year
2016
2017
2018
2019
2020
2021
Officer_Name
REDACTED
Month
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Ethnicity
H
N
QTRS
Qtr 1
Qtr 2
Qtr 3
Qtr 4

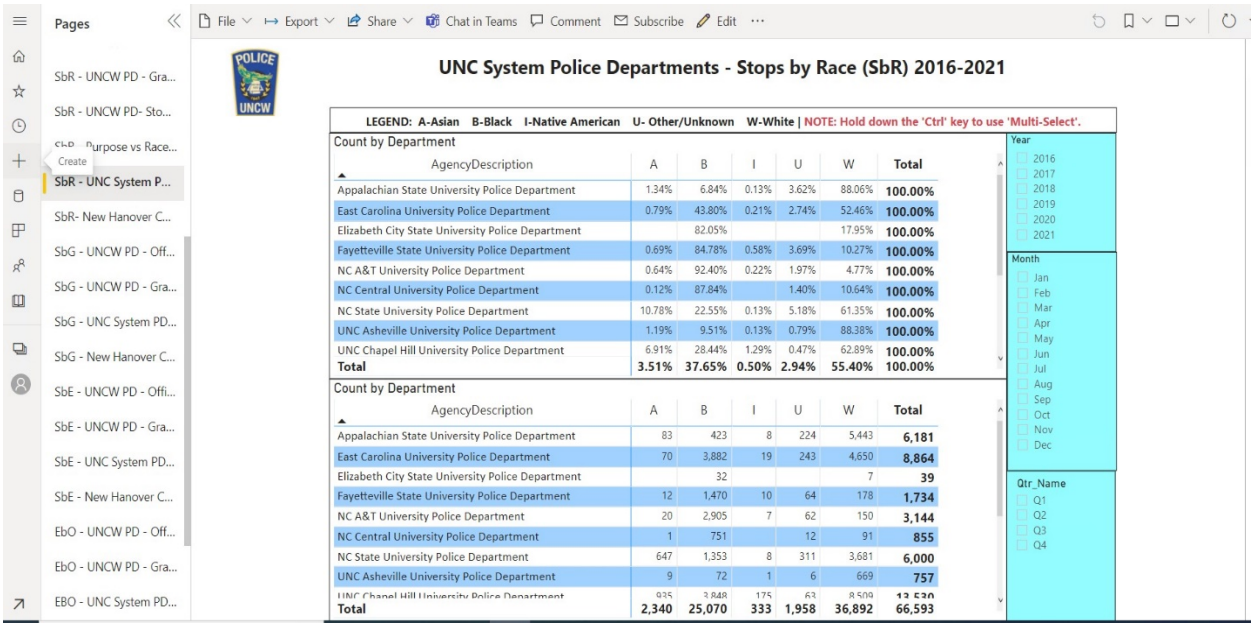


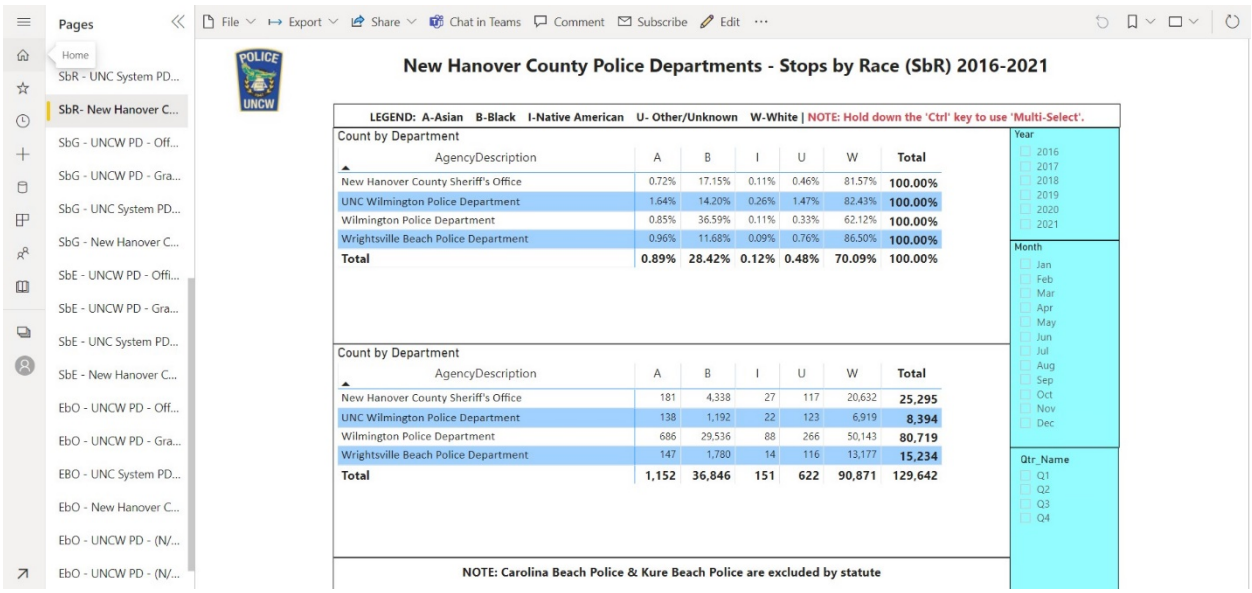

### 5.2.2 Data Tables: UNC System & New Hanover County PDs – SBR, SBE & SBG

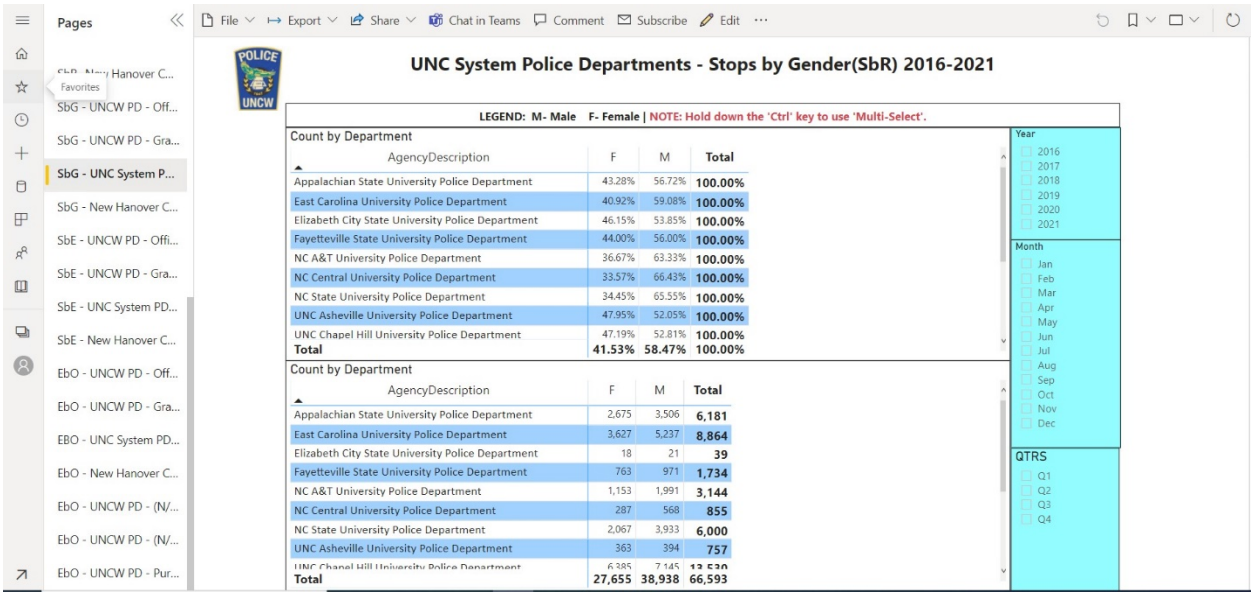
The ‘SbR – UNC System – Data Table’, ‘SbR – New Hanover County PDs – Data Table’, ‘SbG – UNC System – Data Table’, ‘SbG – New Hanover County PDs – Data Table’, ‘SbE – UNC System – Data Table’ and ‘SbE – New Hanover County PDs – Data Table’ are cloned tables they are identical in every way except the ‘Values’ and ‘Agency Description’ being evaluated. The values for each page which are analyzed are ‘Race’, ‘Gender’ and ‘Ethnicity’, (R.G.E.). There are two sets of police departments being evaluated UNC System University Police Departments and the New Hanover County Police Departments. Other than these two data points, these six report page are identical.

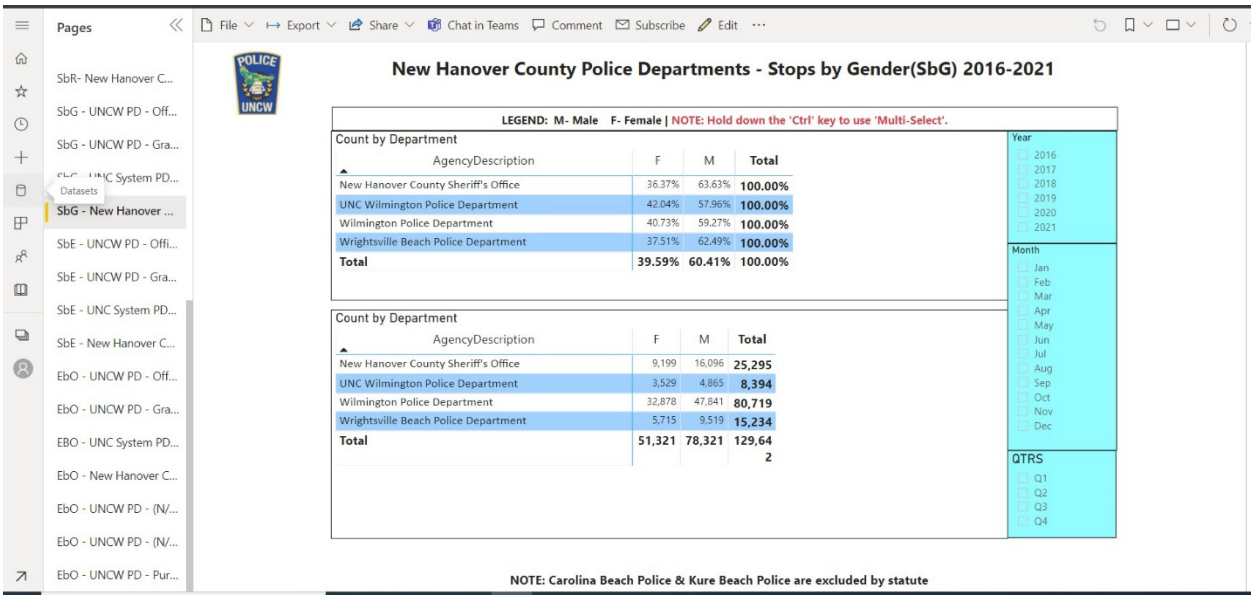
Each of these pages details two tabular visuals per page; the first details raw count of stops by the specified R.G.E. data points formatted as percentages of the whole number of stops and the second visual details this same data point, but formats

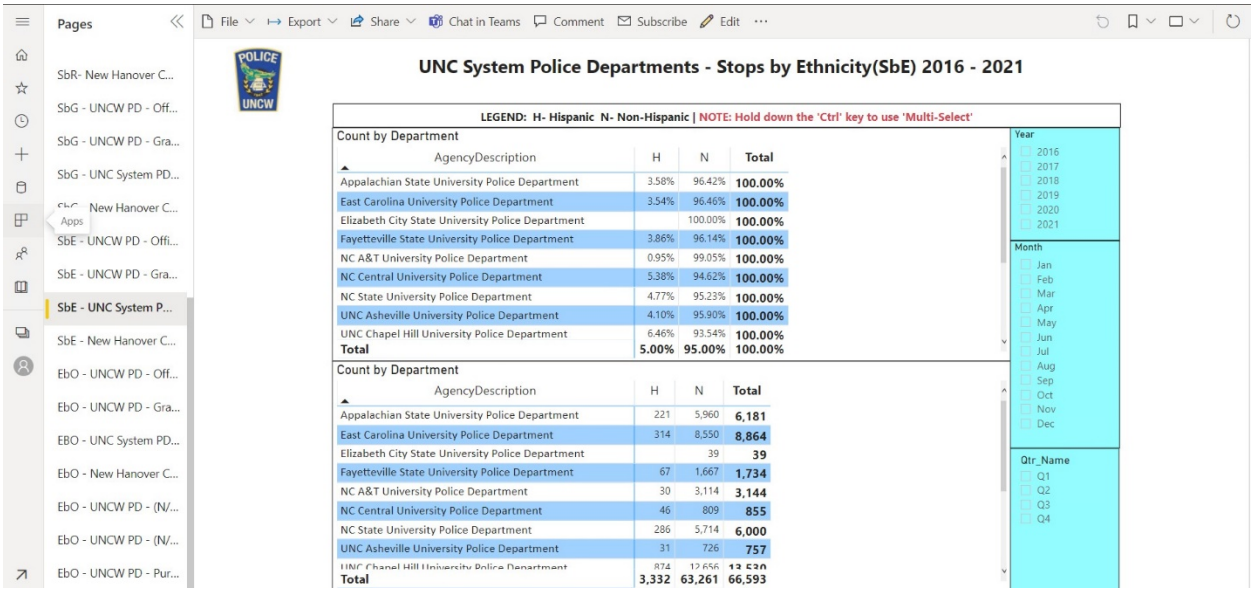
the output to the actual stops by race numbers. As these departments are all of varying sizes, I believe that percentage would be a more accurate comparison metric than actual numbers. However, both formats are included for the users review. The information on this page defaults to the entire dataset unless one of the slicers are activated. Both of these visuals are affected by the companion 'Year, Month & Qtr' slicers. **See 6 screen shots below.**

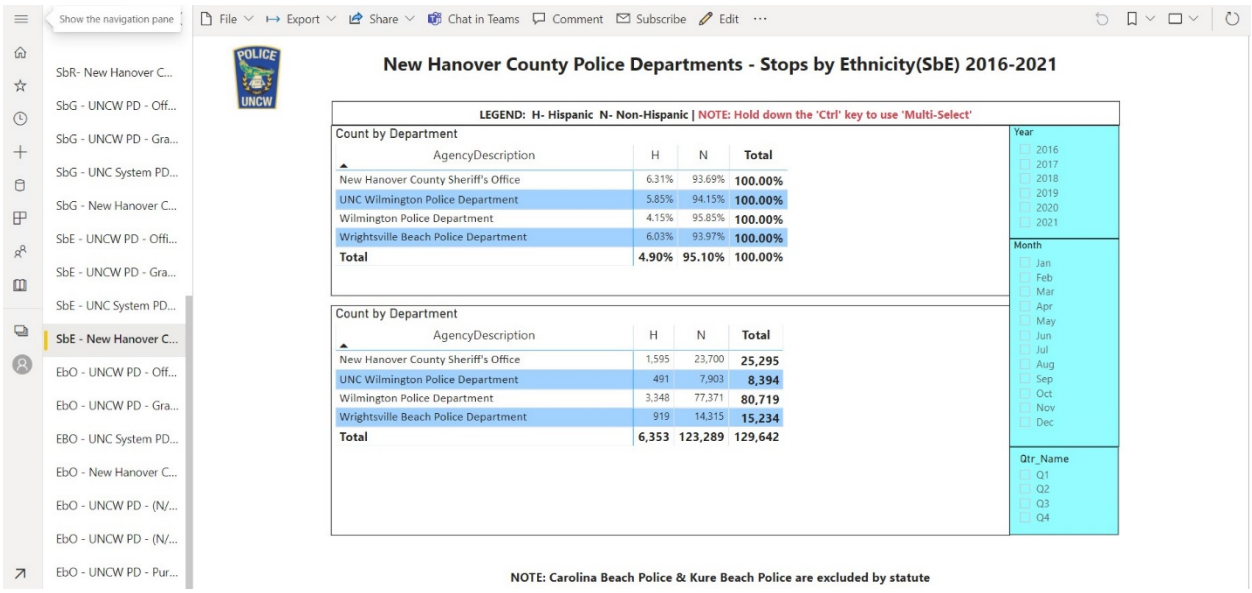



Pages
Home
SbR - UNC System PD...
SbR- New Hanover C...
SbG - UNCW PD - Off...
SbG - UNCW PD - Gra...
SbG - UNC System PD...
SbG - New Hanover C...
SbE - UNCW PD - Offi...
SbE - UNCW PD - Gra...
SbE - UNC System PD...
SbE - New Hanover C...
EbO - UNCW PD - Off...
EbO - UNCW PD - Gra...
EBO - UNC System PD...
EbO - New Hanover C...
EbO - UNCW PD - (N/...
EbO - UNCW PD - (N/...
File
Export
Share
Chat in Teams
Comment
Subscribe
Edit
New Hanover County Police Departments - Stops by Race (SbR) 2016-2021
LEGEND: A-Asian B-Black I-Native American U- Other/Unknown W-White | NOTE: Hold down the 'Ctrl' key to use 'Multi-Select'.
Count by Department
AgencyDescription A B I U W Total
New Hanover County Sheriff's Office 0.72% 17.15% 0.11% 0.46% 81.57% 100.00%
UNC Wilmington Police Department 1.64% 14.20% 0.26% 1.47% 82.43% 100.00%
Wilmington Police Department 0.85% 36.59% 0.11% 0.33% 62.12% 100.00%
Wrightsville Beach Police Department 0.96% 11.68% 0.09% 0.76% 86.50% 100.00%
Total 0.89% 28.42% 0.12% 0.48% 70.09% 100.00%
Count by Department
AgencyDescription A B I U W Total
New Hanover County Sheriff's Office 181 4,338 27 117 20,632 25,295
UNC Wilmington Police Department 138 1,192 22 123 6,919 8,394
Wilmington Police Department 686 29,536 88 266 50,143 80,719
Wrightsville Beach Police Department 147 1,780 14 116 13,177 15,234
Total 1,152 36,846 151 622 90,871 129,642
NOTE: Carolina Beach Police & Kure Beach Police are excluded by statute
Year
2016
2017
2018
2019
2020
2021
Month
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Qtr_Name
Q1
Q2
Q3
Q4


Pages
Favorites
SbG - UNCW PD - Off...
SbG - UNCW PD - Gra...
SbG - UNC System P...
SbG - New Hanover C...
SbE - UNCW PD - Offi...
SbE - UNCW PD - Gra...
SbE - UNC System PD...
SbE - New Hanover C...
EbO - UNCW PD - Off...
EbO - UNCW PD - Gra...
EBO - UNC System PD...
EbO - New Hanover C...
EbO - UNCW PD - (N/...
EbO - UNCW PD - (N/...
EbO - UNCW PD - Pur...
File
Export
Share
Chat in Teams
Comment
Subscribe
Edit
UNC System Police Departments - Stops by Gender(SbR) 2016-2021
LEGEND: M- Male F- Female | NOTE: Hold down the 'Ctrl' key to use 'Multi-Select'.
Count by Department
AgencyDescription F M Total
Appalachian State University Police Department 43.28% 56.72% 100.00%
East Carolina University Police Department 40.92% 59.08% 100.00%
Elizabeth City State University Police Department 46.15% 53.85% 100.00%
Fayetteville State University Police Department 44.00% 56.00% 100.00%
NC A&T University Police Department 36.67% 63.33% 100.00%
NC Central University Police Department 33.57% 66.43% 100.00%
NC State University Police Department 34.45% 65.55% 100.00%
UNC Asheville University Police Department 47.95% 52.05% 100.00%
UNC Chapel Hill University Police Department 47.19% 52.81% 100.00%
Total 41.53% 58.47% 100.00%
Count by Department
AgencyDescription F M Total
Appalachian State University Police Department 2,675 3,506 6,181
East Carolina University Police Department 3,627 5,237 8,864
Elizabeth City State University Police Department 18 21 39
Fayetteville State University Police Department 763 971 1,734
NC A&T University Police Department 1,153 1,991 3,144
NC Central University Police Department 287 568 855
NC State University Police Department 2,067 3,933 6,000
UNC Asheville University Police Department 363 394 757
Total 27,655 38,938 66,593
Year
2016
2017
2018
2019
2020
2021
Month
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
QTRS
Q1
Q2
Q3
Q4


Pages
File
Export
Share
Chat in Teams
Comment
Subscribe
Edit
SbR- New Hanover C...
SbG - UNCW PD - Off...
SbG - UNCW PD - Gra...
SbG - New Hanover ...
SbE - UNCW PD - Offi...
SbE - UNCW PD - Gra...
SbE - UNC System PD...
SbE - New Hanover C...
EbO - UNCW PD - Off...
EbO - UNCW PD - Gra...
EBO - UNC System PD...
EbO - New Hanover C...
EbO - UNCW PD - (N/...
EbO - UNCW PD - (N/...
EbO - UNCW PD - Pur...
New Hanover County Police Departments - Stops by Gender(SbG) 2016-2021
LEGEND: M- Male F- Female | NOTE: Hold down the 'Ctrl' key to use 'Multi-Select'.
Count by Department
AgencyDescription F M Total
New Hanover County Sheriff's Office 36.37% 63.63% 100.00%
UNC Wilmington Police Department 42.04% 57.96% 100.00%
Wilmington Police Department 40.73% 59.27% 100.00%
Wrightsville Beach Police Department 37.51% 62.49% 100.00%
Total 39.59% 60.41% 100.00%
Count by Department
AgencyDescription F M Total
New Hanover County Sheriff's Office 9,199 16,096 25,295
UNC Wilmington Police Department 3,529 4,865 8,394
Wilmington Police Department 32,878 47,841 80,719
Wrightsville Beach Police Department 5,715 9,519 15,234
Total 51,321 78,321 129,642
Year
2016
2017
2018
2019
2020
2021
Month
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
QTRS
Q1
Q2
Q3
Q4
NOTE: Carolina Beach Police & Kure Beach Police are excluded by statute

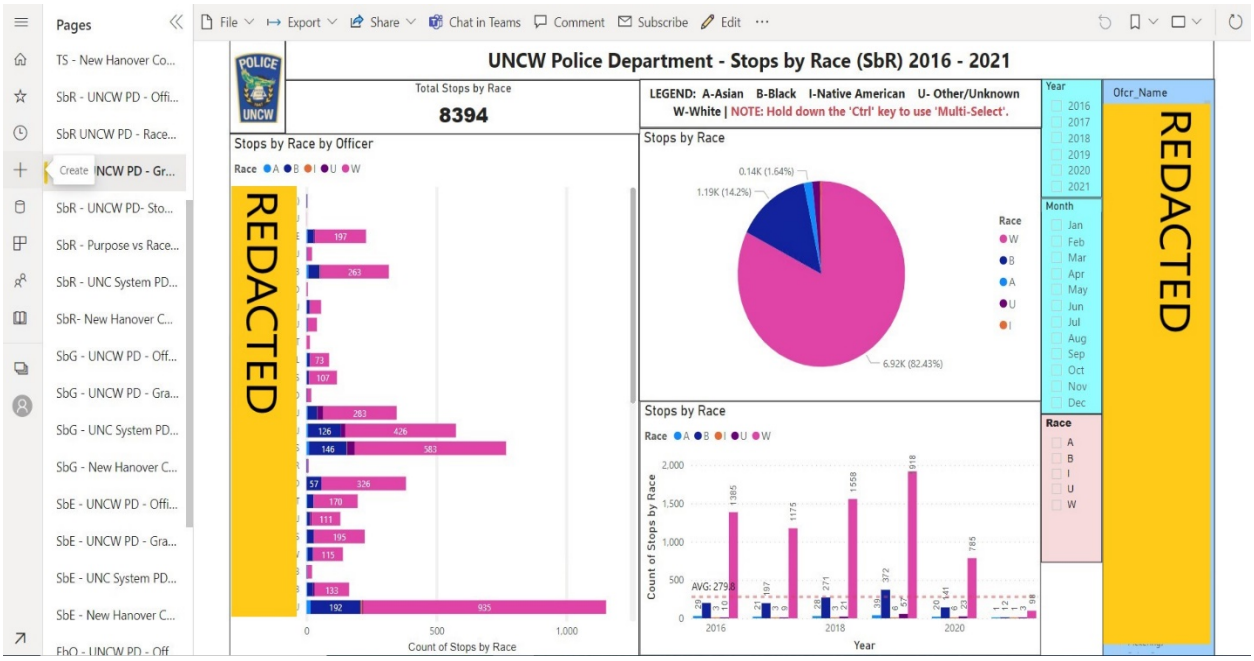

Pages
File
Export
Share
Chat in Teams
Comment
Subscribe
Edit
SbR- New Hanover C...
SbG - UNCW PD - Off...
SbG - UNCW PD - Gra...
SbG - UNC System PD...
SbE - New Hanover C...
SbE - UNCW PD - Offi...
SbE - UNCW PD - Gra...
SbE - UNC System P...
SbE - New Hanover C...
EbO - UNCW PD - Off...
EbO - UNCW PD - Gra...
EBO - UNC System PD...
EbO - New Hanover C...
EbO - UNCW PD - (N/...
EbO - UNCW PD - (N/...
EbO - UNCW PD - Pur...
UNC System Police Departments - Stops by Ethnicity(SbE) 2016 - 2021
LEGEND: H- Hispanic N- Non-Hispanic | NOTE: Hold down the 'Ctrl' key to use 'Multi-Select'
Count by Department
AgencyDescription H N Total
Appalachian State University Police Department 3.58% 96.42% 100.00%
East Carolina University Police Department 3.54% 96.46% 100.00%
Elizabeth City State University Police Department 100.00% 100.00%
Fayetteville State University Police Department 3.86% 96.14% 100.00%
NC A&T University Police Department 0.95% 99.05% 100.00%
NC Central University Police Department 5.38% 94.62% 100.00%
NC State University Police Department 4.77% 95.23% 100.00%
UNC Asheville University Police Department 4.10% 95.90% 100.00%
UNC Chapel Hill University Police Department 6.46% 93.54% 100.00%
Total 5.00% 95.00% 100.00%
Count by Department
AgencyDescription H N Total
Appalachian State University Police Department 221 5,960 6,181
East Carolina University Police Department 314 8,550 8,864
Elizabeth City State University Police Department 39 39
Fayetteville State University Police Department 67 1,667 1,734
NC A&T University Police Department 30 3,114 3,144
NC Central University Police Department 46 809 855
NC State University Police Department 286 5,714 6,000
UNC Asheville University Police Department 31 726 757
Total 3,332 63,261 66,593
Year
2016
2017
2018
2019
2020
2021
Month
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Qtr_Name
Q1
Q2
Q3
Q4

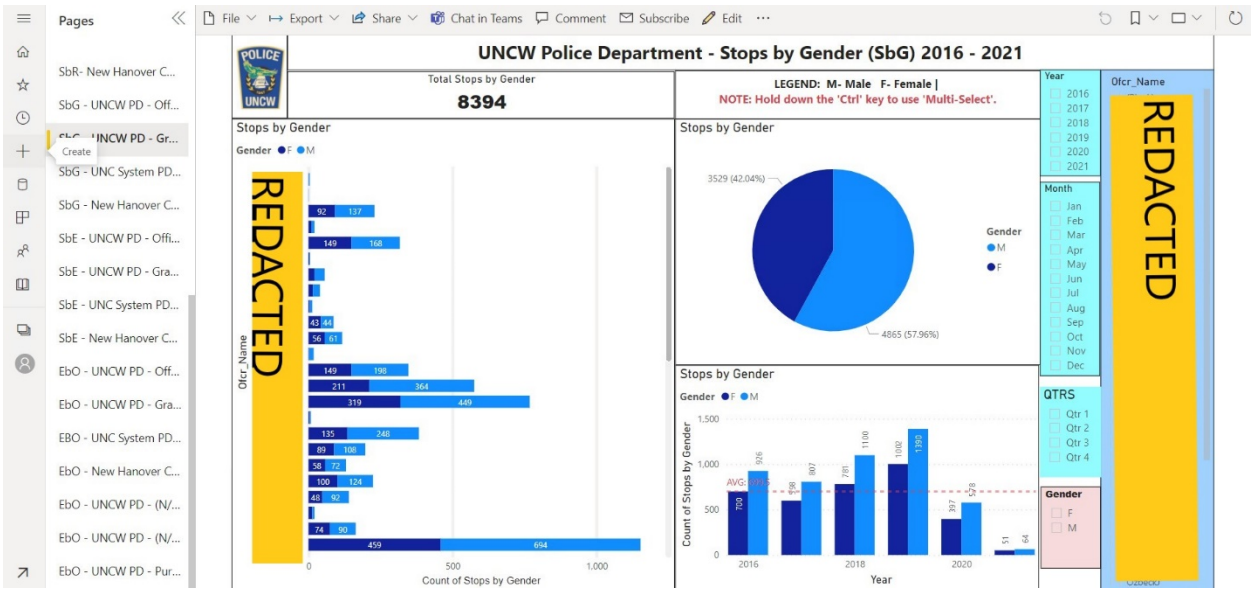


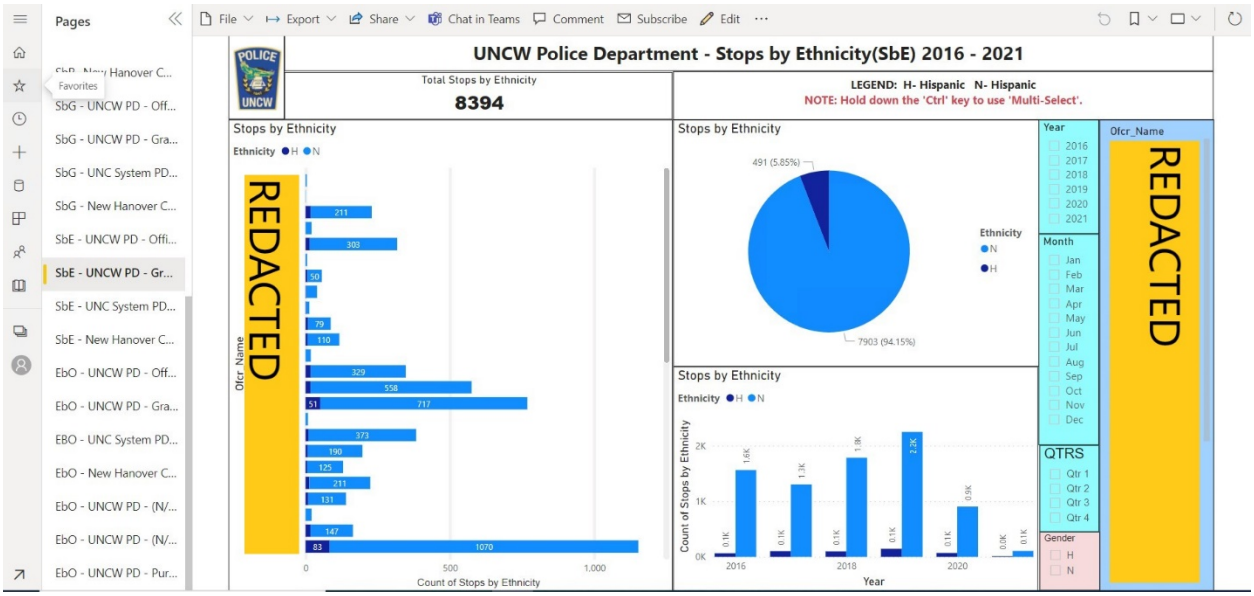

### 5.2.3 Graphs: SbR, SbE & SbG (R.G.E.)

The Stops by Race UNCW PD Graph (*SbR - UNCW PD – Graphs*), Stops by Gender UNCW PD Graph (*SbG - UNCW PD – Graphs*) and Stops by Ethnicity UNCW PD Graphs (*SbE - UNCW PD – Graphs*) pages are clones of each other. The values for each page which are analyzed are 'Race', 'Gender' and 'Ethnicity (R.G.E.)'. The Stops by R.G.E. pages measure traffic stops by race, gender & ethnicity and contain four visuals on them each. Visual #1 is a stacked bar chart that lists officers on the vertical axis and their count of traffic stops on the horizontal axis. It adjusts when any of the slicers are activated. Each race color is coded as described in the legend. Visual #2 is a pie chart color coded by race and labeled by number and percentage. The visual's legend explains the colors by race. The visual defaults the whole dataset. If the dataset is sliced, then the pie chart adjusts accordingly. Visual #3 is a clustered column chart with the count of traffic stops on the 'Y' axis and years on the 'X' axis. The races are all clustered by each year. There is an analytics average 'AVG' line. It also adjusts if any

of the slicers are activated. There is also a miscellaneous card visual that lists total count of traffic stops. The page contains several slicers which adjust all four visuals; year, month, race and officer name. All three of the graphic visuals have a uniform color scheme and are affected by all of the slicers. The clustered column charts is better at comparing the sub categories side by side, while the stack bar chart is better at displaying categories totals. (Rad, 2017) The pie charts show the aggregate composition of the data set by percentages (Yang, 2019). **See 3 screen shots below.**





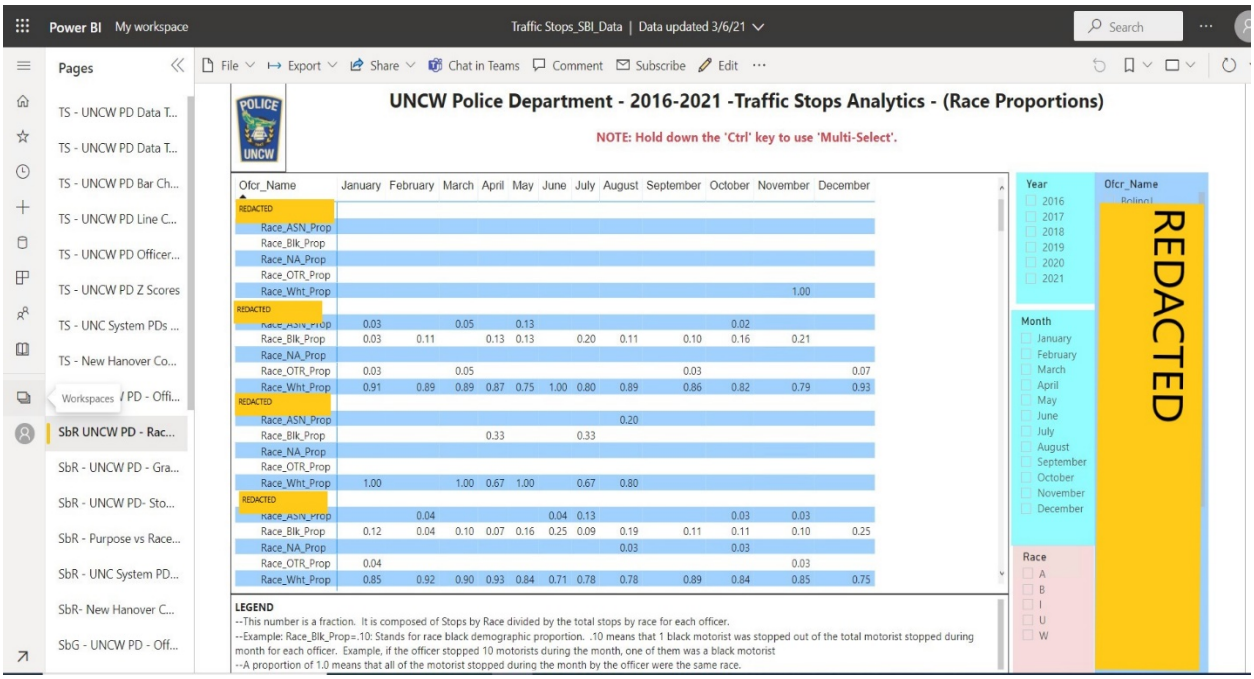




### 5.2.4 Race_Proportions: SbR – UNCW PD

This page creates a DAX calculated field called ‘Race Proportions’. It takes the officers’ monthly number of traffic stops by race and divides it by the officers’ total number of stops for the same month. It creates a decimal number for each race representing the number of stops for that race out of the whole number of stops. As an example, a White demographics number of 0.90 means the officer stopped 9 out of

every 10 motorist stopped were of the white demographic. A number of 1.00 means to the officer only stopped one demographic that month. It is far from being comprehensive. It is meant only as a visual reference for the police managers. It is a simple way to display the proportion of the demographics stopped by the officers' stop totals. It has some short comings and I believe its validity is limited when an officer makes a relatively small number of stops in a given period. However, used in conjunction with the previous 'Stop by race' visuals; if an officer is engaging in a high number of traffic stops and has a high race proportion: Then it may be indicative of disparaging treatment by the officer and may be investigated in detail by the police supervisory authority.

The race proportions are all DAX calculated fields. The ('*race field*') is aggregated for the total of all the combine demographics under 'Race_Count_T', see Exhibit #1). Each race demographic, ('*race field*') is aggregated and then filtered by the specific desired race demographic, (A,B,NA,OTR,W; see Exhibit #1). The proportions are the created by dividing each demographic race count by the total race count of all the race demographics. Please see the Exhibit #1 for the DAX fields. **See screen shot below.**




### 5.2.5 'Stop Rate': SbR – UNCW PD

This page contains several tabular visuals. They reflect some abstract but valid concepts. These visuals link the traffic stops race demographics to the community's population. The raw stop count by race for the police departments in this analysis has been introduced and is observable. However, this metric is not the comprehensive. While it documents the count of each traffic stop by race aggregate for a designated time period; it fails to account for the pool of potential motorists of each race demographic that could potentially be stopped.

Each stop demographic should also be evaluated by the size of its population pool. The rhetorical argument is that while a police department may be stopping a particular demographic as a small percentage of their total stops; this doesn't tell the whole story. The department should give consideration to the size of the various demographics. The department then should adjust the *raw* racial stop count by the

population. This gives a truer picture of the departmental stops by race for the managers to evaluate. The 'Stop Rate' can also be used to adjust and standardize the raw racial stops counts from different police departments.

Law Enforcement has traditionally reported 'Crime Rates' per 1,000 on a local basis, per 100,000 on a state basis and per 1,000,000 on a national basis. (Calculations of Rates and Trends, 2020). I created the metric of Police Traffic 'Stop Rate per 1000'. This will be calculated by dividing the police department's count of stop by race, (for each demographic), by the matching population demographic and then multiplying by one thousand. This will adjust each racial stop count by population and provide a more comprehensive stop by race metric.

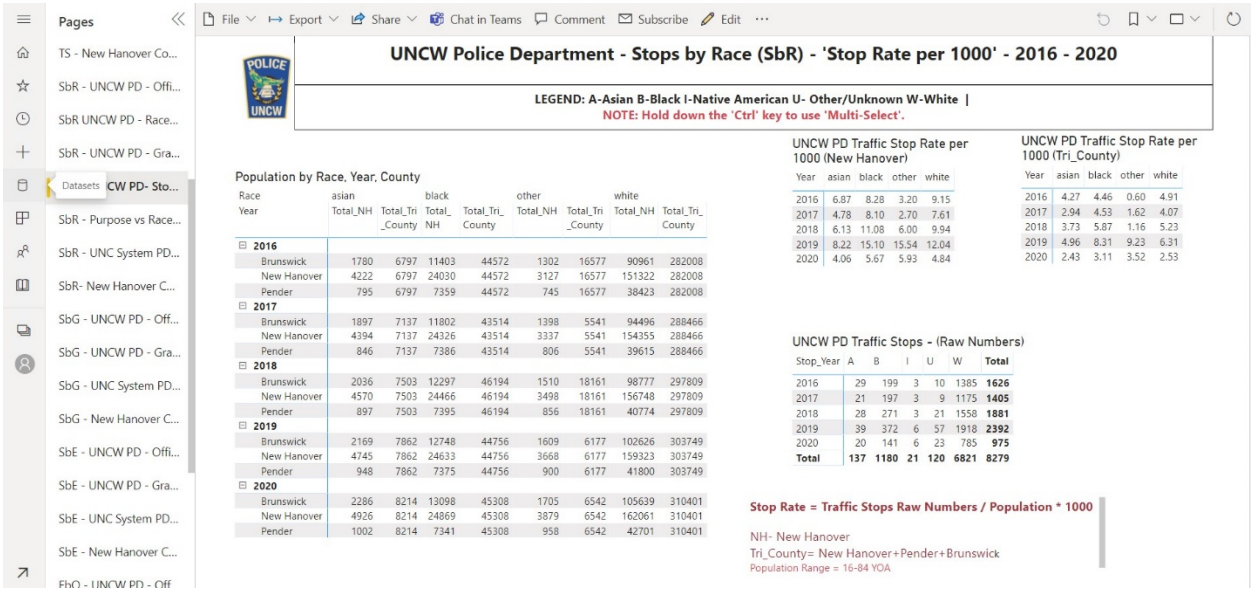
The second part of the equation is population. This is, ideally, the population of the police department's jurisdiction. I believe that past studies on police traffic stops have erred in that they used too large of a population pool, as exemplified by a recent Justice Analysis Review Study. (Justice Analysis Review, 2020). Both the National population and the individual states populations are too large and are not homogeneous. I believe that the correct population pool to adjust by is the local motoring public. The population pool for the City, County or even Region would be acceptable. For this analysis, the local population is defined as City of Wilmington, New Hanover County and the Tri-County region: (Pender, New Hanover & Brunswick Counties). Also, we are attempting to capture the motoring public, so the local population will be defined at sixteen (16) years of age to eight four (84) years of age. The assumption in this statement is that everyone in this age range is a licensed driver. The North Carolina demographer WEB site maintains a relevant database (North

Carolina Office of State Budget & Management, State Demographer, 2019) t. I exported the dataset from the site as an excel spread sheet, downloaded it, modified it, and imported it into the PowerBi. It provided the information for the population table and part of the stop rate calculation.

This page has four visuals. 'Stops by Race, Year, County' is a table that details the local population from 16-84 years of age, by race, by New Hanover County and for the Tri-County region during the years of the analysis. 'UNCW PD Traffic Stops – Raw Numbers' is a tabular visual that documents the department's actual count of traffic stops by race and year. UNCW PD Traffic Stop Rate per 1000 (New Hanover) is a table that details the UNCW Police Department 'Stop Rate' by race: The Count of Stops by Race was divided by the population and then multiplied by 1000. UNCW PD Traffic Stop Rate per 1000 (Tri-County) is a companion to the New Hanover Stop Rate table but this one divides the count of stops by the total population for the Tri-County region. To aid the reader, a small text box is located on the page. It details the stop rate mathematical formula, NH & Tri-County abbreviations and definition of the age range used. There is also a legend text box detailing the racial abbreviations used in the visuals.

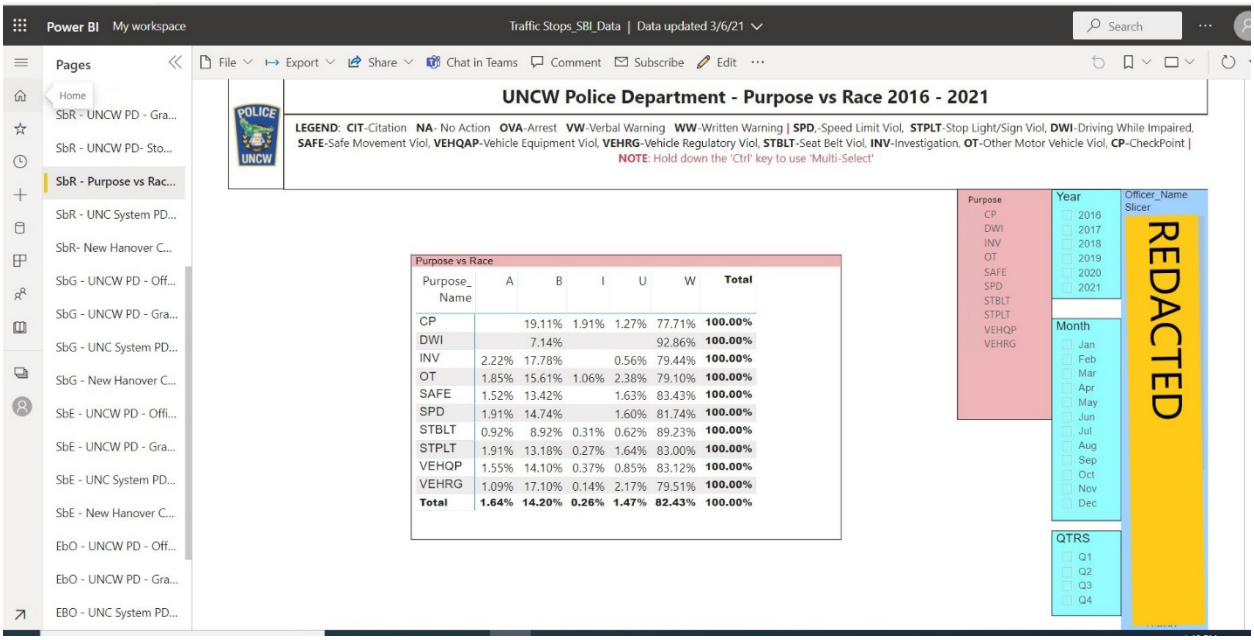
During the next system upgrade, I want to upgrade this page to include the City of Wilmington population also. I am still seeking a Wilmington City dataset the breaks down the population by race and age. While the population data set is somewhat static, (it's a yearly measure, so a yearly update will be needed); I would like to upgrade it. The state demographer WEB page provided an excel download for the dataset, so out of expediency, I downloaded and used it for a data source for the PowerBi visuals

(population-projections-by-race-age-groups-vintage-2019(NH-PEN-BR).xlsx). However, PowerBi has the capability to link to the WEB page and mine the data. This would be preferred as any WEB page updates would be captured upon refreshment of the PowerBi data. Also, I want to create a page the shows the 'stop rates' for all of the New Hanover police departments. **See screen shot below.**




### 5.2.6 SbR – Purpose vs Race - UNCW PD – Data Table

This page contains a tabular report built on the 'matrix' visualization. The dataset delineates the 'purpose' of the stops by rows and the 'race' by columns. The count of traffic stops is reported as percentage of the row totals. This visual provides police managers with a breakdown of the stops by purpose and the racial breakdown for each purpose. The page contains the Purpose, Year, Month, QTRS and Ofcr_Name. This page would bring to the managers' attention any numerical anomalies, which can be indicative of racial bias. **See screen shot below.**

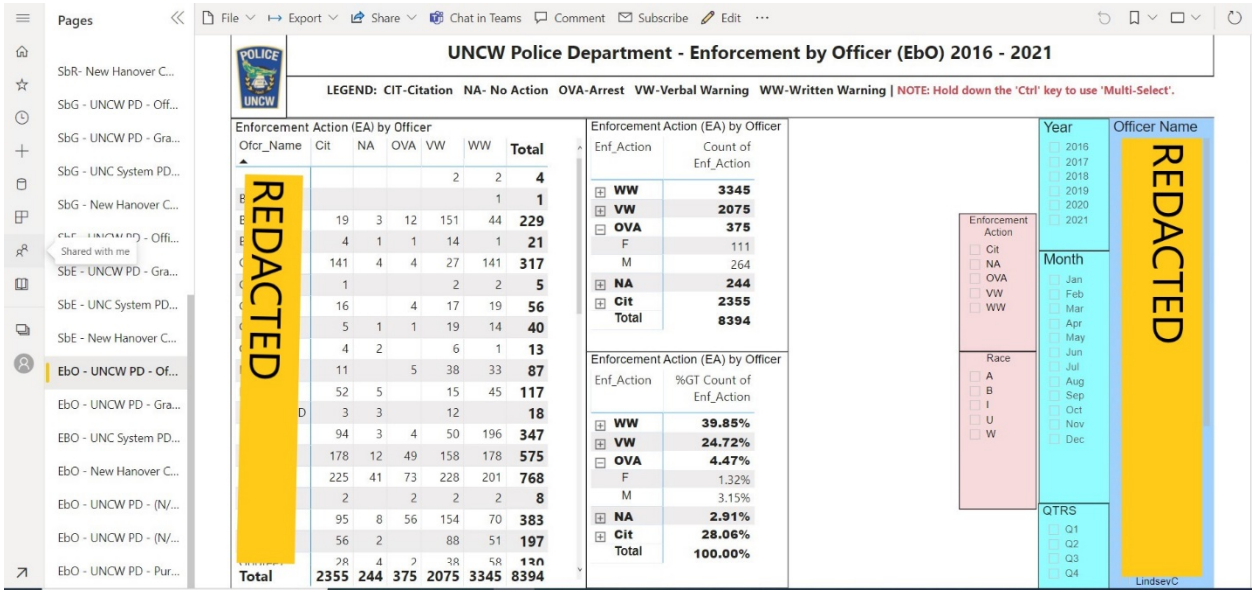



## 5.3 Enforcement by Officer

### 5.3.1 Data Table: EBO – UNCW PD

The UNCW PD Data Table for Enforcement Action (EA), ('EBO – UNCW PD – Data Table') pages are structurally similar to other data tables. It is built on the 'matrix' visualization. The data variable being evaluated is 'Enforcement Action' (EA). It is a tabular visual that counts the aggregate number of traffic stops by EA. This page has three visuals. The main one is composed of columns by EA and rows by officer name. The columns aggregate the officers' number of stops by each type of EA value and last column totals them all up. The visual defaults to the entire five year dataset; unless one of the slicers, is applied in which case the visuals will automatically be updated. Each EA type column is totaled up at the bottom of the page. As not all officers worked all the Year/Month combos applying a slicer may cause some officers to drop off and be omitted from the visuals.

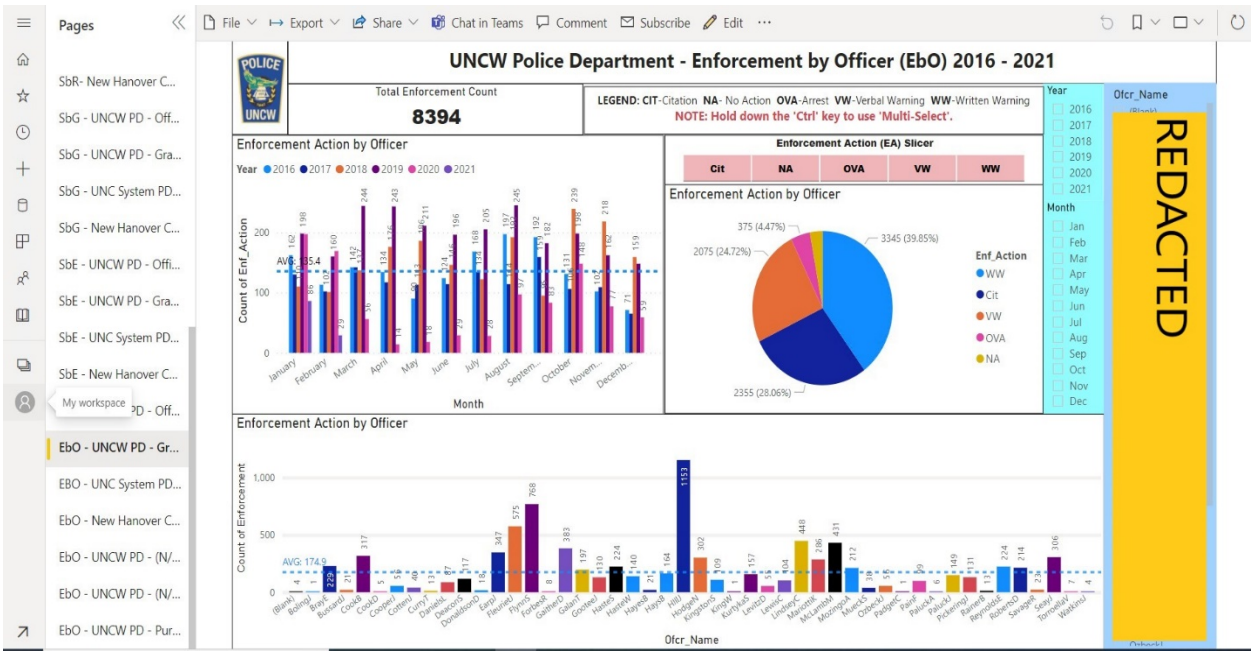
The second EA page visual reflects the count of stops by EA for the entire police department. Each number is the total count for the time period for each EA type being reviewed. Each EA type has a gender sub-hierarchy. There is a total count of stops at the bottom of the visual. The final visual per page is a duplicate of the departmental stops by EA visual previously described. The only difference is the number of stops are reported in percentages. Each sub-hierarchy percentage represents the percentages of the total. The page comes with all the required slicers, Year, month, quarter, officer name, race, gender and ethnicity. Users may customize the data at they desire. **See screen shot below.**




### 5.3.2 Graphs: EbO - UNCW PD

The Enforcement by Officer (EbO) page is similar to other graph pages. The Enforcement Action (EA) value is being analyzed. The EA Graph page is contains #3 visuals. Visual #1 is a clustered column chart that lists the total count EA of the police department by month on the 'Y' axis. The month is listed on the 'X' axis. Each month of

each year in the dataset is clustered together to facilitate comparison. Each month column in the cluster is color coded by year to differentiate it. Its count is labeled on the top of the bar. There is a legend matching the color to the year. There is an analytics average 'AVG' line. Visual #2 is a pie chart color coded by EA and labeled by number and percentage. The visual's legend explains the colors by EA. The visual defaults to the whole dataset. If the dataset is sliced, then the pie chart adjusts accordingly. Visual#3 is a column chart identifying the total count of EA actions on the 'Y' axis and officer names on the 'X' axis. There is an analytics average 'AVG' line. The bars adjusts automatically if any of the slicers are activated. Each Bar has a different color to differentiate it and is labeled with a count on top. The visual default to the whole dataset. If the dataset is sliced, the visual adjust accordingly. There is also a miscellaneous card visual that lists the total count of EA. The page contains several slicers which adjust all four visuals; year, month, EA and officer name. All three of the graphic visuals have a uniform color scheme and are affected by all of the slicers. The clustered column chart compares categories side by side. (Rad, 2017) The pie charts show the aggregate composition of the data set by percentages and count (Yang, 2019). The Column or Bar chart is ubiquitous; it has been widely distributed to the population via the media and the educational system for the modern era. This has the effect of making it easy to understand by users. (Dragani, 2018) There is a miscellaneous note instructing on 'Multi Select' and a legend explaining each EA label. **See screen shot below.**

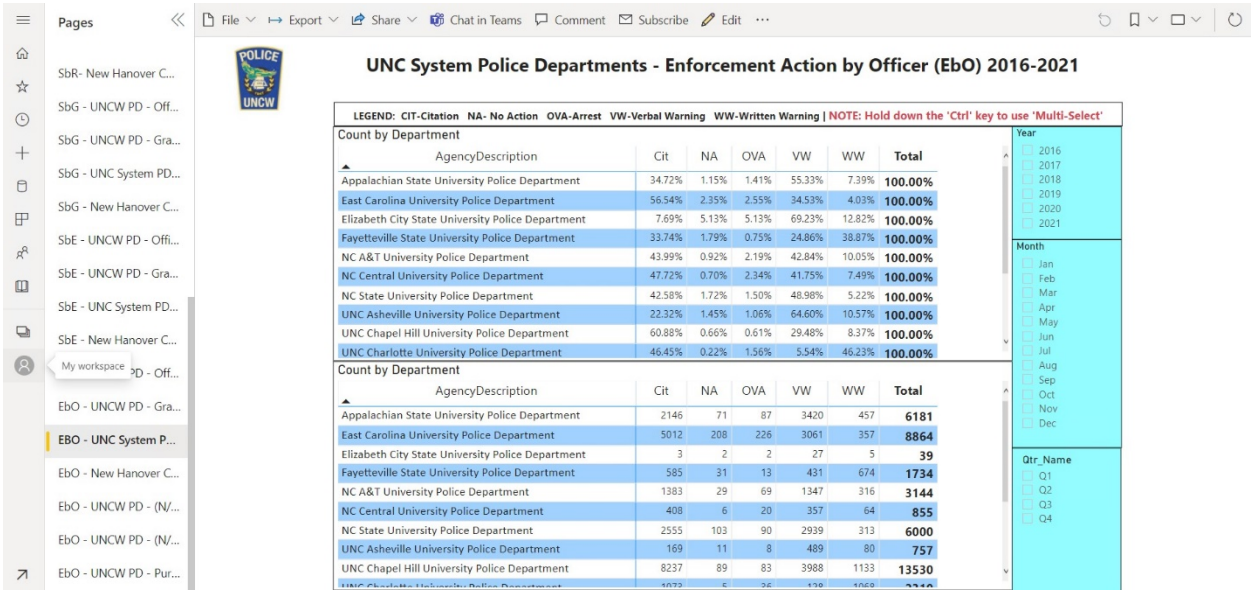


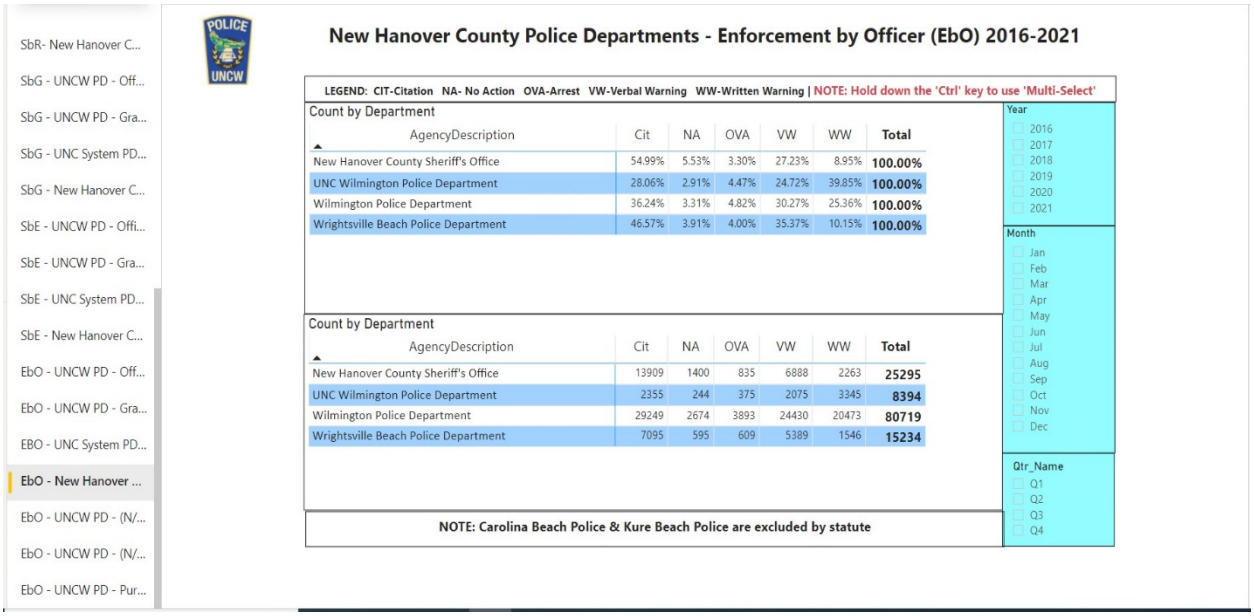

### 5.3.3 Data Table – EbO – UNC System & EbO – New Hanover County PDs

The ‘EbO – UNC System PDs – Data Table’ and ‘EbO – New Hanover County PDs – Data Table’ pages are structurally identical in every way except the ‘Agency Description’ being evaluated. The values for each page, which are being analyzed, are the counts of ‘Enforcement Actions’ (EA). There are two sets of police departments being evaluated are UNC System Police Departments and the New Hanover County Police Departments. Other than these data points, these pages are identical.

Each of these pages’ details two tabular visuals per page. The first details raw count of stops by EA data points formatted as percentages of the whole number of stops. The second visual details this same data point but formats the output to the actual stops by EA category numbers. The row percentages and numbers are aggregated in the final column. As these departments are all of varying sizes, I believe that percentage would be a more accurate comparison metric than actual numbers.

However, both formats are included for the users review. The information on this page defaults to the entire dataset unless one the slicer are activated. Both of these visuals are affected by the companion 'Year, Month & QTR' slicers. **See 2 screen shots below.**



### 5.3.4 EbO – UNCW PD – (N/W vs W) Data Table | EbO – UNCW PD – (N/W vs W) P/I Ratio | SbR – Purpose vs Enforcement Action (EA) (Not-White vs White)

The page 'Data Table: EbO – UNCW PD – (N/W vs W)' is an attempt to directly compare individual officers' Enforcement Actions (EA) when dealing with White demographic motorists vs Not-White demographic motorists to see if there is a consistent significant difference. The implicit meaning in this difference is that the individual officer may be engaging disparaging treatment of 'Non-White' demographics by subjecting them to different levels of EA than 'White' demographics. 'Not-White' is a database term meaning that the White demographic is filtered out. In this case 'Not-White' is an aggregate of the 'B-Black', 'I-Native American', 'A-Asian' & 'U-Other/Unknown' demographics. As other EA pages detail officer count of EA, the visuals on this page will only detail percentages.

This is an imperfect comparison as not all officers worked all of the Year/Month combos of the period. If a slicer is applied, the officer may drop off and be omitted from the visual. Not all of the officers stopped all of the represented demographics for each of the periods reviewed. This is indicated when an officer's name only appears on one visual and not the other. I am unsure how valid cross EA categories are when comparing White vs Non-White demographics: Is a 'White' 'No Action - NA' category relevant vs 'Not-White' 'Written Warning - WW' for example?

There are four visuals on the Data Table: EbO – UNCW PD – (N/W vs W) page. The ones on the left side detail the EA on the 'White' demographic and ones on the right-side detail EA on the 'Not-White' demographic. The one on the top of the page details EA of the individual officers; while, those on the bottom of the page detail EA of

the entire police department. These are tabular reports built on the 'matrix' visualization. The top two visuals detail the officers in column #1, while columns #2 - #6 detail each of the EA count of the EA categories. Column #7 details the total of the previous columns by percentage, which is obviously 100%. The two bottom Visuals detail the EA action by category by the whole department. They detail the same data points as columns #2 - #6 of the above Visuals. They are also formatted as percentages and total by row to 100%. All of the data points on all the visuals default to the entire five-year dataset unless at least one of the slicers is applied. The page is equipped with all the required slicers; Year, Month, QTRS, EA, Purpose & Officer Name. There is a legend explaining the EA labels.

In the page, (*EbO – UNCW PD – (N/W vs W) P/I Ratio*, I created new DAX calculated fields to upgrade this 'W' vs 'N/W' analysis to correct the above described short comings. 'Penalty' will be the aggregate of the 'Cit' and 'OVA' categories, while 'Information' will be the aggregate of 'NA', 'VW' & 'WW'. 'Cit' / Citation and 'OVA' / On View Arrest have a penalty attached to them. However, 'NA' / "No Action'', 'VW' / "Verbal Warning" and 'WW' / "Written Warning" have no penalty attached to them. I then plugged in these new fields into the officers EA (W vs N/W) comparison to see if there is a significant difference between 'White' and 'Not-White'.

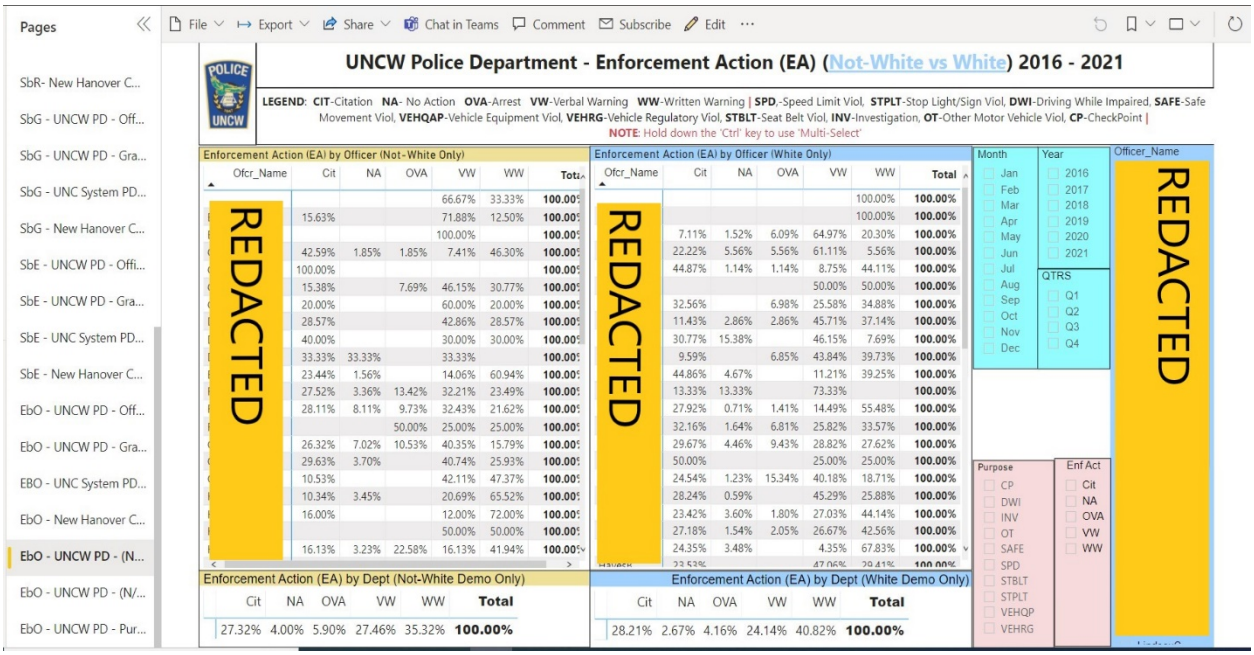
The 'UNCW PD – (N/W vs W) P/I Ratio' page has two tabular visuals on it, which are built on the 'matrix' visualization. They are identical except for the race demographics. The EA by Ofcr (Not-White) visual examines officer EA for the (Not-White) demographics; while the EA by Ofcr (White) visual examines officers EA for the (White) demographic. Both visuals have four columns on it. The first is the officer

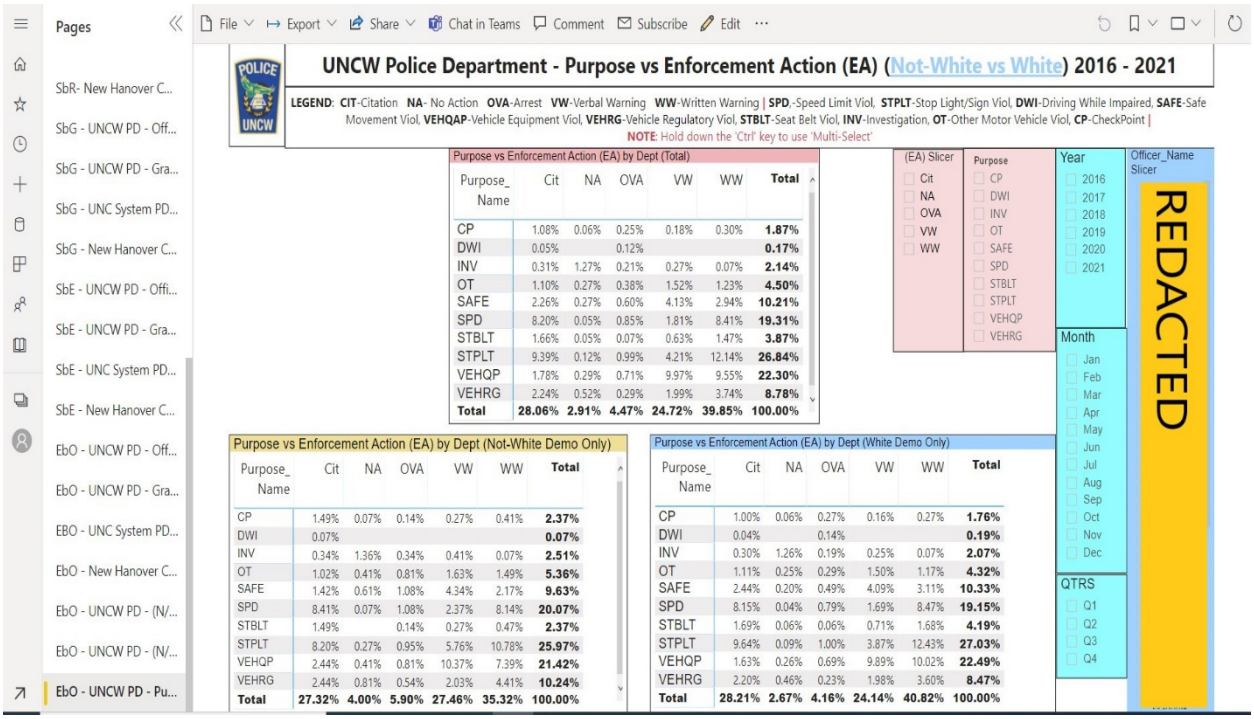
names, the second is the ’Penalty’ Info field, the third is the ‘Information’ field Info and the final is the P/I Ratio. The P/I Ratio is a DAX field calculated by dividing the ‘Penalty’ field by the ‘Information’ to get a unified ratio. The manager then needs only to review the ‘N/W’ vs ‘W’ P/I ratios to see if there is a significant difference. There are all the required slicers; Year, Month, Qtrs, Purpose and Ofcr Name. The manager can activate a slicer to filter the dataset for the time period desired. The dataset defaults to the entire five years unless a slicer is activated. Finally, there is a legend at the top of the page that explains various EA / Purpose abbreviations and formulas used in the calculations.

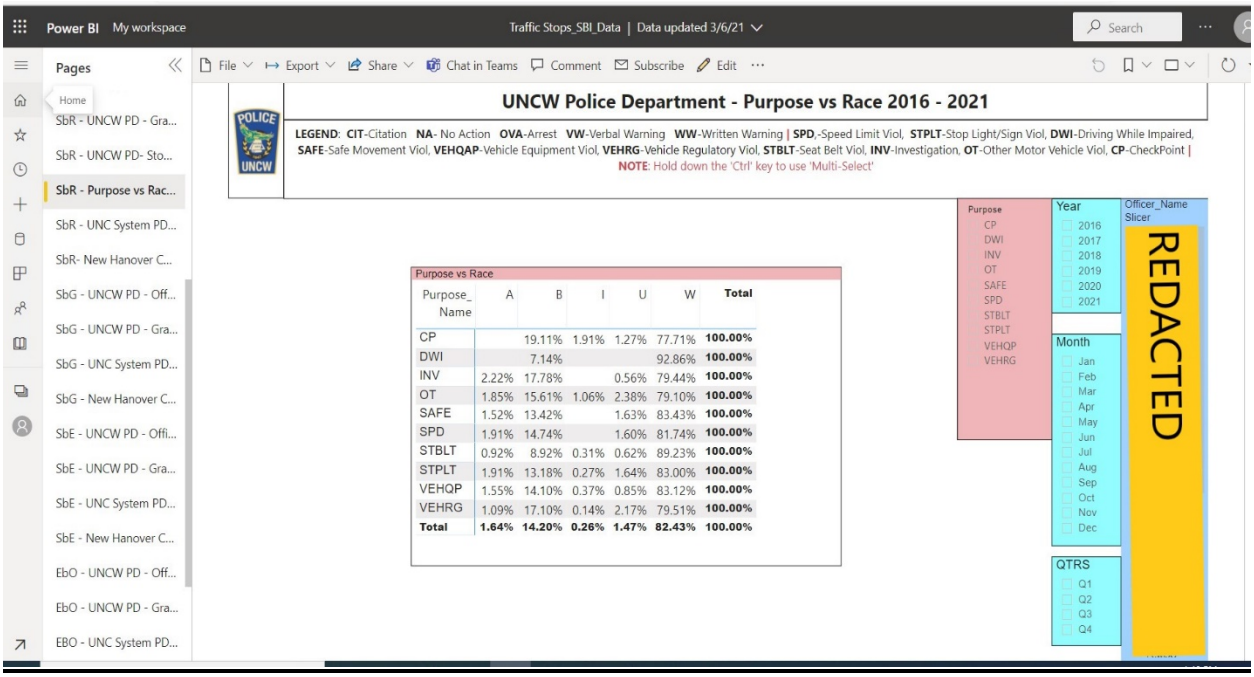
The EbO – Purpose vs Enforcement Action (EA) (Not-White vs White) page contains three tabular reports built on the ‘matrix’ visualization. It details the reason for the traffic stops and then the corresponding outcomes. Its purpose is to discover if there is a significant difference between the ‘Not-White’ vs ‘White’ demographic with regards to purpose of stop and the corresponding enforcement action.

The visuals on this page are all very similar in that they detail enforcement actions (EA) vs stop purpose. The stop purposes are detailed in the rows while the enforcement actions (EA) are detailed in the columns. The count of traffic stops is reported as percentages of the total. Each row details a purpose type, while each column details the enforcement actions. Each column details the enforcement action by percentage for the purpose type and the last column details the total percentage for the purpose type. The bottom row details the total percentage of each type of enforcement action taken. All enforcement actions and all types of purpose aggregate up to one

hundred percent (100%). The only difference between the three visuals is the racial demographics. The visual Purpose vs Enforcement Action (EA) by Dept. (**Total**) is unfiltered and counts all traffic stops. The visual Purpose vs Enforcement Action (EA) by Dept. (**Not-White Demo Only**) is filtered and counts ***all*** traffic stops, BUT the 'White' demographic. The 'White' demographic is filtered out. The visual Purpose vs Enforcement Action (EA) by Dept. (**White Demo Only**) is filtered and counts *all* 'White' demographic traffic stops, BUT the 'Non-White' demographics. The page contains all the required slicers; 'Year', 'Month', 'Qtrs', 'Officer_Name', 'Purpose' and 'Enforcement Action' (EA). The manager may activate these slicers singularly or in combination to filter the data as desired. The slicers allow the manager to focus in on individual officer's stops (EA) and purpose activities. There is a legend explaining all the abbreviations in the visuals. The page documents any differences by race in the percentages of the same traffic stops between the 'Not-White' and 'White' demographics. Any substantial difference by the 'Not-White' and 'White' demographics percentages should be evaluated for demographic disparity. **See 3 screen shots below.**


Pages
File
Export
Share
Chat in Teams
Comment
Subscribe
Edit
UNCW Police Department - Enforcement Action (EA) (Not-White vs White) 2016 - 2021
LEGEND: CIT-Citation NA- No Action OVA-Arrest VW-Verbal Warning WW-Written Warning | SPD.-Speed Limit Viol, STPLT-Stop Light/Sign Viol, DWI-Driving While Impaired, SAFE-Safe Movement Viol, VEHQAP-Vehicle Equipment Viol, VEHRG-Vehicle Regulatory Viol, STBLT-Seat Belt Viol, INV-Investigation, OT-Other Motor Vehicle Viol, CP-CheckPoint |
NOTE: Hold down the 'Ctrl' key to use 'Multi-Select'
Enforcement Action (EA) by Officer (Not-White Only)
Enforcement Action (EA) by Officer (White Only)
Enforcement Action (EA) by Dept (Not-White Demo Only)
Enforcement Action (EA) by Dept (White Demo Only)
REDACTED
Month
Year
QTRS
Officer_Name
Purpose
Enf Act


Pages
File
Export
Share
Chat in Teams
Comment
Subscribe
Edit
UNCW Police Department - Purpose vs Enforcement Action (EA) (Not-White vs White) 2016 - 2021
LEGEND: CIT-Citation NA- No Action OVA-Arrest VW-Verbal Warning WW-Written Warning | SPD.-Speed Limit Viol, STPLT-Stop Light/Sign Viol, DWI-Driving While Impaired, SAFE-Safe Movement Viol, VEHQAP-Vehicle Equipment Viol, VEHRG-Vehicle Regulatory Viol, STBLT-Seat Belt Viol, INV-Investigation, OT-Other Motor Vehicle Viol, CP-CheckPoint |
NOTE: Hold down the 'Ctrl' key to use 'Multi-Select'
Purpose vs Enforcement Action (EA) by Dept (Total)
Purpose_Name Cit NA OVA VW WW Total
CP 1.08% 0.06% 0.25% 0.18% 0.30% 1.87%
DWI 0.05% 0.12% 0.17%
INV 0.31% 1.27% 0.21% 0.27% 0.07% 2.14%
OT 1.10% 0.27% 0.38% 1.52% 1.23% 4.50%
SAFE 2.26% 0.27% 0.60% 4.13% 2.94% 10.21%
SPD 8.20% 0.05% 0.85% 1.81% 8.41% 19.31%
STBLT 1.66% 0.05% 0.07% 0.63% 1.47% 3.87%
STPLT 9.39% 0.12% 0.99% 4.21% 12.14% 26.84%
VEHQP 1.78% 0.29% 0.71% 9.97% 9.55% 22.30%
VEHRG 2.24% 0.52% 0.29% 1.99% 3.74% 8.78%
Total 28.06% 2.91% 4.47% 24.72% 39.85% 100.00%
Purpose vs Enforcement Action (EA) by Dept (Not-White Demo Only)
Purpose_Name Cit NA OVA VW WW Total
CP 1.49% 0.07% 0.14% 0.27% 0.41% 2.37%
DWI 0.07% 0.07%
INV 0.34% 1.36% 0.34% 0.41% 0.07% 2.51%
OT 1.02% 0.41% 0.81% 1.63% 1.49% 5.36%
SAFE 1.42% 0.61% 1.08% 4.34% 2.17% 9.63%
SPD 8.41% 0.07% 1.08% 2.37% 8.14% 20.07%
STBLT 1.49% 0.14% 0.27% 0.47% 2.37%
STPLT 8.20% 0.27% 0.95% 5.76% 10.78% 25.97%
VEHQP 2.44% 0.41% 0.81% 10.37% 7.39% 21.42%
VEHRG 2.44% 0.81% 0.54% 2.03% 4.41% 10.24%
Total 27.32% 4.00% 5.90% 27.46% 35.32% 100.00%
Purpose vs Enforcement Action (EA) by Dept (White Demo Only)
Purpose_Name Cit NA OVA VW WW Total
CP 1.00% 0.06% 0.27% 0.16% 0.27% 1.76%
DWI 0.04% 0.14% 0.19%
INV 0.30% 1.26% 0.19% 0.25% 0.07% 2.07%
OT 1.11% 0.25% 0.29% 1.50% 1.17% 4.32%
SAFE 2.44% 0.20% 0.49% 4.09% 3.11% 10.33%
SPD 8.15% 0.04% 0.79% 1.69% 8.47% 19.15%
STBLT 1.69% 0.06% 0.06% 0.71% 1.68% 4.19%
STPLT 9.64% 0.09% 1.00% 3.87% 12.43% 27.03%
VEHQP 1.63% 0.26% 0.69% 9.89% 10.02% 22.49%
VEHRG 2.20% 0.46% 0.23% 1.98% 3.60% 8.47%
Total 28.21% 2.67% 4.16% 24.14% 40.82% 100.00%
(EA) Slicer
Purpose
Year
Officer_Name Slicer
Month
QTRS
REDACTED




## 6 Maintenance & Publishing

Once all pages and dashboards are complete, the report developer saves the file to local storage. The developer then publishes the report pages to the PowerBi Web Service. Each PowerBi report may have an unlimited number of pages, but it is considered one report. The only limit is its size, 1 gigabyte. (Microsoft Corporation, 2020) Theoretically, the only maintenance needed each month to the PTSARS report is updating the source tables as previous outlined. The developer would then invoke the data refresh command, save the report and then publish to the PowerBI service. The PTSARS already on the PowerBI service would be updated with the current data. The new report is immediately available to the report consumers.

# 7 PowerBI Web Service

The PowerBI Service is a companion to the PowerBI desktop. Any reports or dashboards developed on the desktop can be published (uploaded) on the web service. The developer then shares the report by inviting (emailing) the consumer of the report. The consumer of the report will receive an email invitation with a link. The consumer then clicks on the embedded link. A Web browser opens to the PowerBI WEB site. If the consumer already has a PowerBI account, they are automatically taken to the shared report. If not, they will be invited to create a PowerBI account with all the terms and conditions implicit.

The consumer users of the PTSARS system will exclusively access its report pages via the PowerBI Service. They will access it via a WEB browser. All the report manipulatives built into the reports are available to reports consumers. The service is available 24 hours a day, 7 days a week. The users can access it as they desire. There is also a PowerBI smart phone app if so desired. All shared PowerBI reports are also available on the phone app.

There is no cost to the developer of any PowerBi report or dashboard, the PowerBi desktop is free. (Microsoft Corporation, 2020) However, there is a cost for the PowerBi Service. Unless covered under a corporate or governmental plan, which starts at four thousand nine-hundred ninety five ($4995) per month, the PowerBI Pro Service costs $9.99 a month per user. (Microsoft Corporation, 2020) Both the developer user and the consumer user would need an account unless otherwise covered.

# 8 PTSARS User Training

I anticipate a 30-minute awareness level training session for the PTSARS consumer users.

I will review with them common elements of all the pages of the PTSARS report.

- I will review with them the concept of slicers, (Year, Month, QTRS and Ofcr_Name) and 'multiselect'.
- 'Multiselect' is a PowerBi slicer feature that allows the user to select two or more factors in each slicer by holding down the 'CRTL' key during the selection.
- They will be told that the pages can be reviewed singularly or as a group or in total.
- I will review each page and outline with them what information that page delivers:
    - TS-UNCW PD Data Table: Count of TS by time period and or by officer using the slicer.
    - TS-UNCW PD Data Table – Officer Data Table: Count of TS by time period and or by officer using the slicer. Using 'multiselect' this page the user can specify more than one officer or year or month or QTRS.
    - TS-UNCW PD Bar Chart: Count of TS by time period and or by officers using the slicer. MAX, MIN and AVG count of traffic stops are displayed. This chart shows frequency count by different time periods.
    - TS-UNCW PD Line Chart: Count of TS by time period and or by officer using the slicer. AVG count of traffic stops are displayed. This chart trends over time.
    - TS – UNCW PD Officer / Purpose – Data Table: This table shows the different purposes of each traffic stop by each officer and by the department as whole. Using the slicer, the user can 'multiselect' a subset of officers, purpose, date range.
    - TS – UNCW – PD Z Scores: This table shows how far away each officer's count of traffic stops is from the Departmental average for a particular time period.
    - TS - UNC System PDs –Data Table: This table displays the count of traffic stops by department in the UNC System.
    - TS - New Hanover County PDs –Data Table: This table displays the count of traffic stops and their averages for the New Hanover County police departments.
    - SbR-UNCW PD – Officer Data Table: This table show the officers count of traffic stops delineated by the various 'race' demographics. Using the slicer, the user can 'multiselect' a subset of officers, race, gender, date range.

- SbR UNCW PD – 'Race_Proportions': This table show the officer race proportions, (count of traffic stops by race divided by the total count of traffic stops). This number shows how many stops by demographic of the whole. As an example 0.60 would mean 6 out of every 10 stops made by the officer is a specific demographic. Using the slicer, the user can 'multiselect' a subset of officers, race and date range.
- SbR – UNCW PD Graphs - This page shows the count of 'stops by race' by officers in bar chart, by stops by race in a pie chart and stops by race in a column chart. Using the slicer, the user can 'multiselect' a subset of officers, race and date range.
- SbR – UNCW PD – Stop Rate. This table shows the count of traffic stop by race adjusted by population per 1000 for New Hanover and the Tri-County area. The departmental raw count of traffic stops is also presented for comparison.
- SbR – Purpose vs Race – UNCW PD Data Table: This table shows the count of traffic stops comparing race and purpose of stop. The information is reported in percentages. Using the slicer, the user can 'multiselect' a subset of race and purpose.
- SbR – UNC System PDs – Data Table: This table show the count of the stops by race for UNC System Police Departments, both as a percentage and by the raw numbers.
- SbR – New Hanover County PDs – Data Table: This table show the count of the stops by race for New Hanover County Police Departments, both as a percentage and by the raw numbers.
- SbG – UNCW PD – Officer – Data Table: This table show the officers count of traffic stops delineated by gender. Using the slicer, the user can 'multiselect' a subset of officers, gender, date range.
- SbG – UNCW PD – Graphs: This page shows the count of 'stops by gender by officers in a bar chart, by stops by gender in a pie chart and stops by gender in a column chart. Using the slicer, the user can 'multiselect' a subset of officers, race and date range.
- SbG – UNC System PDs – Data Table: This table show the count of the stops by gender for UNC System PDs, both as a percentage and by the raw numbers.

- SbG – New Hanover County PDS – Data Table: This table show the count of the stops by gender for New Hanover County PDs, both as a percentage and by the raw numbers.
- SbE – UNCW PD – Officer – Data Table: This table show the officers count of traffic stops delineated by Ethnicity. Using the slicer, the user can 'multiselect' a subset of officers, ethnicity, date range.
- SbE – UNCW PD – Graphs: This page shows the count of 'stops by ethnicity by officers in a bar chart, by stops by ethnicity in a pie chart and stops by ethnicity in a column chart. Using the slicer, the user can 'multiselect' a subset of officers, race and date range.
- SbE – UNC System PDS – Data Table: This table show the count of the stops by ethnicity for UNC System PDs, both as a percentage and by the raw numbers.
- SbE – New Hanover County PDS – Data Table: This table show the count of the stops by ethnicity for New Hanover County PDs, both as a percentage and by the raw numbers.
- EbO – UNCW PD – Officer – Data Table: This table show the officers count of traffic stops delineated by enforcement action. Using the slicer, the user can 'multiselect' a subset of officers, enforcement action, race, date range.
- EbO – UNCW PD – Graphs: This page shows the count of 'stops by enforcement action by officers in a bar chart, by stops by enforcement action in a pie chart and stops by enforcement action in a column chart. Using the slicer, the user can 'multiselect' a subset of officers, enforcement action and date range.
- EbO – UNC System PDS – Data Table: This table show the count of the stops by enforcement action for UNC System PDs, both as a percentage and by the raw numbers.
- EbO – New Hanover County PDS – Data Table: This table show the count of the stops by enforcement action for New Hanover County PDs, both as a percentage and by the raw numbers.
- EbO – UNCW – (N/W vs W) Data Table: This page contains parallel tables showing officers count of traffic stops by enforcement actions as a percentage. The tables are for comparison purposes to each other; one is filtered by all racial demographics (except 'white') and the other is filtered by only the 'white' demographics. With these tables, the users can compare officers' enforcement action behavior 'White' demographics vs 'Not-White' demographics. Is there a

difference between the two? Are officers subjecting Not-White demographics to a different standard than 'White' demographics? The bottom two tables with the single rows perform the same comparison, but at a departmental level.

- EbO – UNCW – (N/W vs W) P/I Ratio: This page contains parallel tables showing officers count of traffic stop by enforcement action 'EA_Penalty' vs 'EA_Information' in numbers and the 'EA_P/I_Ratio'. 'EA_Penalty' is defined as 'Citations' plus 'On View Arrests. 'EA_Information' is defined as 'Written Warnings', 'Verbal Warning' and 'No Action'. The 'EA_P/I_Ratio' divides 'EA_Penalty' by 'EA_Information'. EA_Penalty vs EA_Information ratio shows the difference in officers enforcements actions of penalty vs information. What is the ratio of penalty to information? There are two tables for comparison purposes to each other; one is filtered by all racial demographics (except 'white') and the other is filtered by only the 'white' demographics. With these tables, the users can compare officers' enforcement action behavior 'White' demographics vs 'Not-White' demographics. Is there a difference between the two (EA_P/I ratios)? Are officers subjecting Not-White demographics to a different standard than 'White' demographics?
- EbO – UNCW PD – Purpose vs EA (N/W vs W) Data Table: The three tables compare enforcement actions vs purpose of stops as percentages of rows. The last column totals up the purpose of stops by enforcement actions. The last row totals up enforcement actions by purpose of stops. However, the different tables are filtered differently. Table #1 is not filtered; it is all of the demographics. Table #2 filters out 'White' demographics and Table #3 filters out all demographics but 'White'. One is 'not-white' and the other is 'white'. The user can compare purpose vs enforcement action of 'white' vs 'not-white' to see if there is a difference. Are officers stopping and or enforcing differently by 'white' vs 'not-white'? The user can slice by 'officer_name', 'enforcement action', 'purpose', 'year', 'month', 'qtrs'. The user is looking for officer behavior that subjects 'not-white' demographics to different enforcement standards as compared to 'white' demographics.

# 9 Alternatives to PowerBi

There are alternatives to PowerBI that would probably deliver a comparable PTSARS product. The Tableau Analytics Software Platform is a leading competitor and

has a higher market share than PowerBi. (Datanyze Corporation, 2020) Tableau has a higher cost than PowerBi. (Pardo-Bunte, 2020) Tableau Public data sets are visible to the public, so they are not appropriate for use in police departments. There is a one-year limit on the educational trial. (Tableau, 2020) Also, I have no experience or training with Tableau. I would have to start from scratch to use this product.

However, I chose PowerBi for this project because the UNCW Police Department is an all Microsoft Shop. All products used in this project are from the Microsoft Corporation. Skills and training that I have a received in Microsoft Office, (MS Excel & MS Access) and MS SQL Server are applicable to PowerBi. PowerBi is compatible with all Microsoft products. UNCW maintains a PowerBi license. The effective result of this is that I could develop and deploy the PTSARS project to every member of the police department without having to budget and fund it.

## 10 SQL Server Management Studio Instruction Set

- Start up program- SQL Server Management Studio V 18.5
- Log into SQL Server – Windows authentication
- Select your database
- Right click on your database
- Left click on tables
- You should see dbo.Person, dbo.Stop and dbo.Stop1. These are left over from the previous month's data import.
- To facilitate this month's data import, select dbo.Person, dbo.Stop.
    - Right click on each table and select delete and follow the instructions. dbo.Stop1 is a copy of dbo.Stop structurally, but to facilitate data import, all records must be deleted.
- Open script flat file, SQLQuery_copy_data.sql. This file contains a series of data instructions.
    - Select "delete from Stop1", this is a delete command
    - Select the execute button.
    - Select "* from Stop1"
    - Select the execute button.
    - You should receive a blank screen listing columns, but no records. This is what you want.
- Next you will need a print out of the Stops_Extract Traffic Stop Data 'Tables Reference Key.xls' file. This is your guide for importing the stop.txt and the persons.txt flat files.
- Right select your database name
- Left click on tasks
- Left click on import Flat File
- Left click on Next
- Left click on Browse
- Navigate to the 'stops_Extract' folder
- Left click on stop.txt, click open.
- The file location is now populated
- The new table is now named as 'stop', don't change that, click next
- The preview data window opens, click next
- The modify columns window then opens
    - Column Names need to be updated: see below
    - The wizard assesses the needed data types, use these recommendations. After several cycles, I found these wizard recommendations are sufficient. There is no need to change them at this point. They can be updated in PowerBi if needed.
    - Click on allow nulls

- Update the column names to reflect the fields in the 'Traffic Stop Data Tables key.xlsx' file. Left click column 1 and update it. Repeat the process for each of the columns 1- 15.

| | | |
|---|---|---|
| Column#1= | FIELD1 | StopID |
| Column#2= | FIELD2 | AgencyDescription |
| Column#3= | FIELD3 | 'StopDate' |
| Column#4= | FIELD4 | Purpose |
| Column#5= | FIELD5 | Action |
| Column#6= | FIELD6 | DriverArrest |
| Column#7= | FIELD7 | PassengerArrest |
| Column#8= | FIELD8 | EncounterForce |
| Column#9= | FIELD9 | EngageForce |
| Column#10= | FIELD10 | OfficerInjury |
| Column#11= | FIELD11 | DriverInjury |
| Column#12= | FIELD12 | PassengerInjury |
| Column#13= | FIELD13 | OfficerId |
| Column#14= | FIELD14 | StopLocation |
| Column#15= | FIELD15 | StopCity |

  - Click next, a summary screen appears. Click the finish button.
  - The wizard will, for the next 10-15 minutes, import the stop flat file. This is approx. 26 million records and takes a while. Be patient. An in-progress message appears. This will change upon completion, to 'Success'.
  - Click close button.

- Repeat the process again with the person.txt
- Right select your database name
- Left click on tasks
- Left click on import Flat File
- Left click on Next
- Left click on Browse
- Navigate to the 'stops_Extract' folder
- Left click on person.txt, click open.
  - The file location is now populated
  - The new table is now named as 'Person', don't change that
  - Click next
- The preview data window opens, click next
  - The modify columns window then opens.
  - Column Names need to be updated: see below

| | | |
|---|---|---|
| Column#1= | FIELD1 | PersonID |
| Column#2= | FIELD2 | StopID |
| Column#3= | FIELD3 | Type |

Column#4= FIELD4 Age
Column#5= FIELD5 Gender
Column#6= FIELD6 Ethnicity
Column#7= FIELD7 Race

  - The wizard assesses the needed data types, use these recommendations. After several cycles, I found these wizard recommendations are sufficient. There is no need to change them at this point. They can be updated in PowerBi if needed.
  - Click on allow nulls
- Click next, a summary screen appears. Click the finish button.
- Click next, a summary screen appears. Click the finish button.
- The wizard will, for the next 10-15 minutes, import the stop flat file. This is approx. 26 million records and takes a while. Be patient. An in-progress message appears. This will change upon completion, to 'Success'.
- Click close button.
- Right click the database again and select refresh, select the tables sub-item, you should see the two new tables that you just made.
  - You should see: dbo.Person, dbo.Stop and dbo.Stop1.
  - If you see all three table, you did everything right-Congratulations!
- Test your new tables with the following SQL script.
  - Select *.person, select execute. If you did it right then you should see the script run for around 5 minutes and approx. 26 million records will populate the results screen.
  - Select *.stop, select execute. If you did it right then you should see the script run for around 3 minutes and approx. 26 million records will populate the results screen.
  - If these two tables test out, move on to the next step. Otherwise, go back to the previous steps and repeat the process

These two table contain excess data. In my original attempts, I tried to delete data, but this became problematic and time consuming. The tables contain approx. 2 million null records. Approx. 40 % of the database is submitted by three large police agencies, (NC Highway patrol, Raleigh Police, Charlotte Mecklenburg Police), and for the purposes of this project they are all irrelevant. Also, the years 2000-2014 are irrelevant for this project. For this project, I am focused on the years 2015-to the present. I am also focused only on the following police departments from the UNC System Police Departments and the local police departments located in New Hanover County, North Carolina, see below:

- 'Appalachian State University Police Department'
- 'East Carolina University Police Department'

- 'Elizabeth City State University Police Department'
- 'Fayetteville State University Police Department'
- 'NC A&T University Police Department'
- 'NC Central University Police Department'
- 'NC State University Police Department'
- 'UNC Asheville University Police Department'
- 'UNC Chapel Hill University Police Department'
- 'UNC Charlotte University Police Department'
- 'UNC Greensboro University Police Department'
- 'UNC Pembroke University Police Department'
- 'UNC Wilmington Police Department'
- 'UNC School of the Arts Police Department'
- 'Western Carolina University Police Department'
- 'Winston-Salem State University Police Department'
- 'Wilmington Police Department'
- 'Wrightsville Beach Police Department'
- 'Kure Beach Police Department'
- 'Carolina Beach Police Department'
- 'New Hanover County Sheriff's Office'

Also, the stop table and person table need to be joined as data from both will be needed. This could be done in PowerBi, but I have chosen to do it in the SQL Server. I included the 'join' in a custom script, see below. The purpose of this script is to extract and transform only the data desired and then load it for export.

### 10.1 Custom Sql.Script#1 – Copy Records from Stop to Stop1

The first custom script will be to extract all of the data for only these police departments as noted above from the 'dbo.Stop' table and copy it to the 'dbo.Stop1' table.

- Select the script in the script window and then select the execute button. The script will run for 21 seconds and copy 642,449 records.
- These are the only records that are of interest.
- This dramatically reduces the size of the data set.

#### 10.1.1 Script#1

```
insert into Stop1 (StopID,AgencyDescription,'StopDate',Purpose,Action,
DriverArrest,PassengerArrest,EncounterForce,EngageForce,OfficerInjury,DriverInjur
y,PassengerInjury,OfficerID,StopLocation,StopCity)
select *
from Stop
    where stop.AgencyDescription='Appalachian State University Police Department'
or
    stop.AgencyDescription='East Carolina University Police Department' or
    stop.AgencyDescription='Elizabeth City State University Police Department' or
    stop.AgencyDescription='Fayetteville State University Police Department' or
```

```
stop.AgencyDescription='NC A&T University Police Department' or
stop.AgencyDescription='NC Central University Police Department' or
stop.AgencyDescription='NC State University Police Department' or
stop.AgencyDescription='UNC Asheville University Police Department' or
stop.AgencyDescription='UNC Chapel Hill University Police Department' or
stop.AgencyDescription='UNC Charlotte University Police Department' or
stop.AgencyDescription='UNC Greensboro University Police Department' or
stop.AgencyDescription='UNC Pembroke University Police Department' or
stop.AgencyDescription='UNC Wilmington Police Department' or
stop.AgencyDescription='UNC School of the Arts Police Department' or
stop.AgencyDescription='Western Carolina University Police Department' or
stop.AgencyDescription='Winston-Salem State University Police Department' or
stop.AgencyDescription='Wilmington Police Department' or
stop.AgencyDescription='Wrightsville Beach Police Department' or
stop.AgencyDescription='Kure Beach Police Department' or
stop.AgencyDescription='Carolina Beach Police Department' or
stop.AgencyDescription like'New Hanover County Sheriff%s Office'
order by stop.AgencyDescription asc
```

## 10.2 Custom Sql.Script#2- Select Records Script

The second custom script will join the 'stop1' and 'person' tables for the fields in both tables but will only select from the years 2015 to the present. This will continue to reduce the size of the data set to manageable terms. You are basically eliminating 15 years of irrelevant historical data. Once this script is completed, you will have a final data set ready for exporting. The script will run in 18 seconds and there will be approx. 215 thousand records contained in it.

### 10.2.1 Script#2

```
select Stop1.StopID, Stop1.AgencyDescription, Stop1.'StopDate',
Stop1.Purpose, Stop1.Action, Stop1.DriverArrest, Stop1.PassengerArrest,
Stop1.EncounterForce, Stop1.EngageForce, Stop1.OfficerInjury,
Stop1.DriverInjury, Stop1.PassengerInjury, Stop1.OfficerID, Stop1.StopLocation,
Stop1.StopCity, Person.PersonID, Person.Type, Person.Age, Person.Gender,
Person.Ethnicity, Person.Race
from Stop1
join Person on Stop1.StopID=Person.stopID
where person.stopid=stop1.StopID and stop1.'StopDate' >= '2015-01-01'
order by Stop1.'StopDate' asc
```

### 10.2.2 Delete Stop Table

- In Object Explorer, select the Stop table you want to delete.
- Right-click the Stop table and choose Delete from the shortcut menu.
- A message box prompts you to confirm the deletion. Click Yes

### 10.2.3 Copy Stop Table Structure from Stop Table to Stop1 Table

- Make sure you are connected to the database in which you want to create the table and that the database is selected in Object Explorer.
- In Object Explorer, right-click **Tables** and click **New Table**.
- In Object Explorer right-click the Stop Table and then click **Design**.
- Select all columns (left upper corner) in the Stop table and, from the **Edit** menu, click **Copy**.
- Switch back to the new table and select the first row.
- From the **Edit** menu, click **Paste**.
- From the **File** menu, click **Save**.
- In the **Choose Name** dialog box, type 'stop1' and click **OK**.

### 10.2.4 Delete all Records from Stop1 Table Script

```
delete from Stop1
```

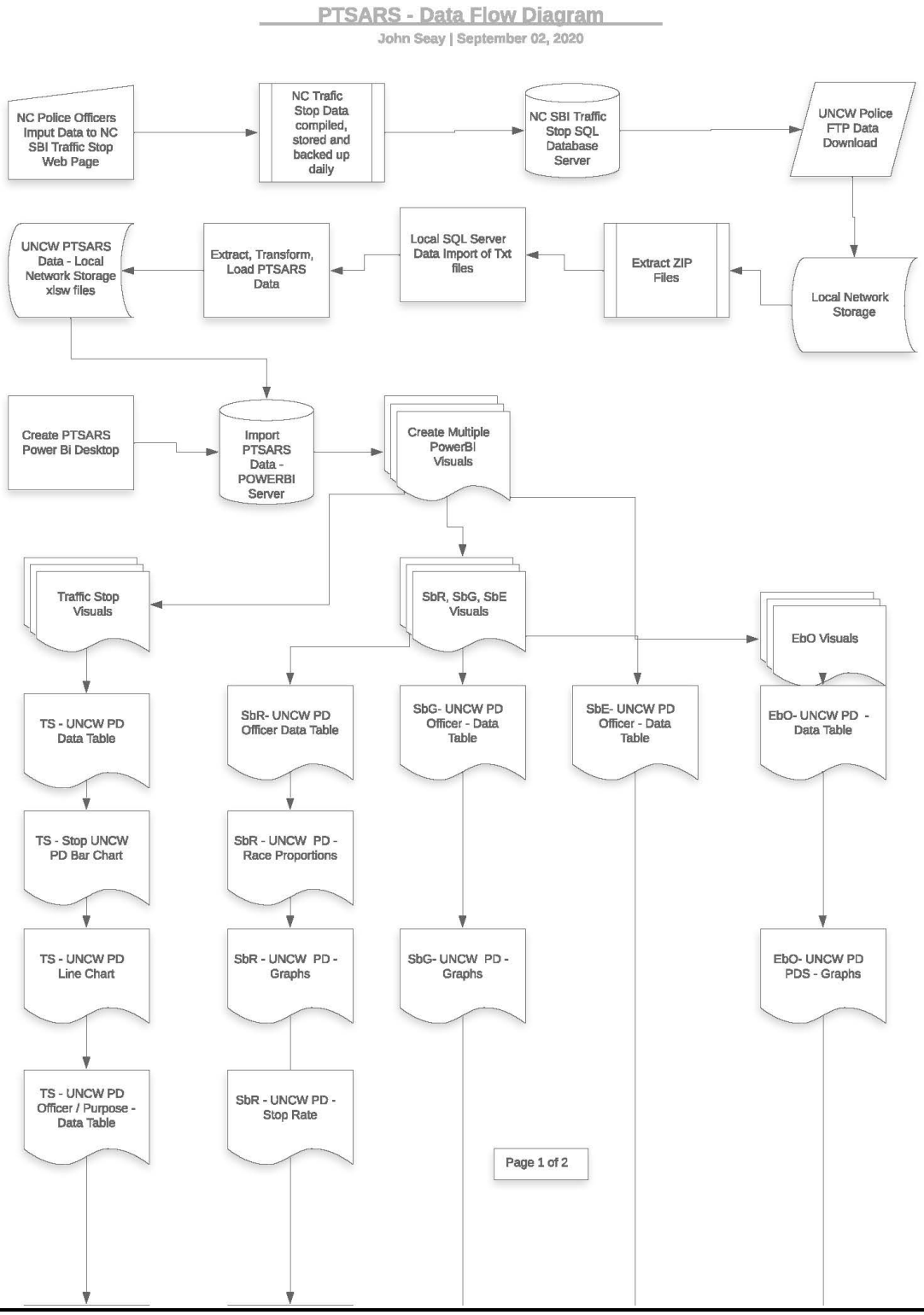
### 10.2.5 Export the Data

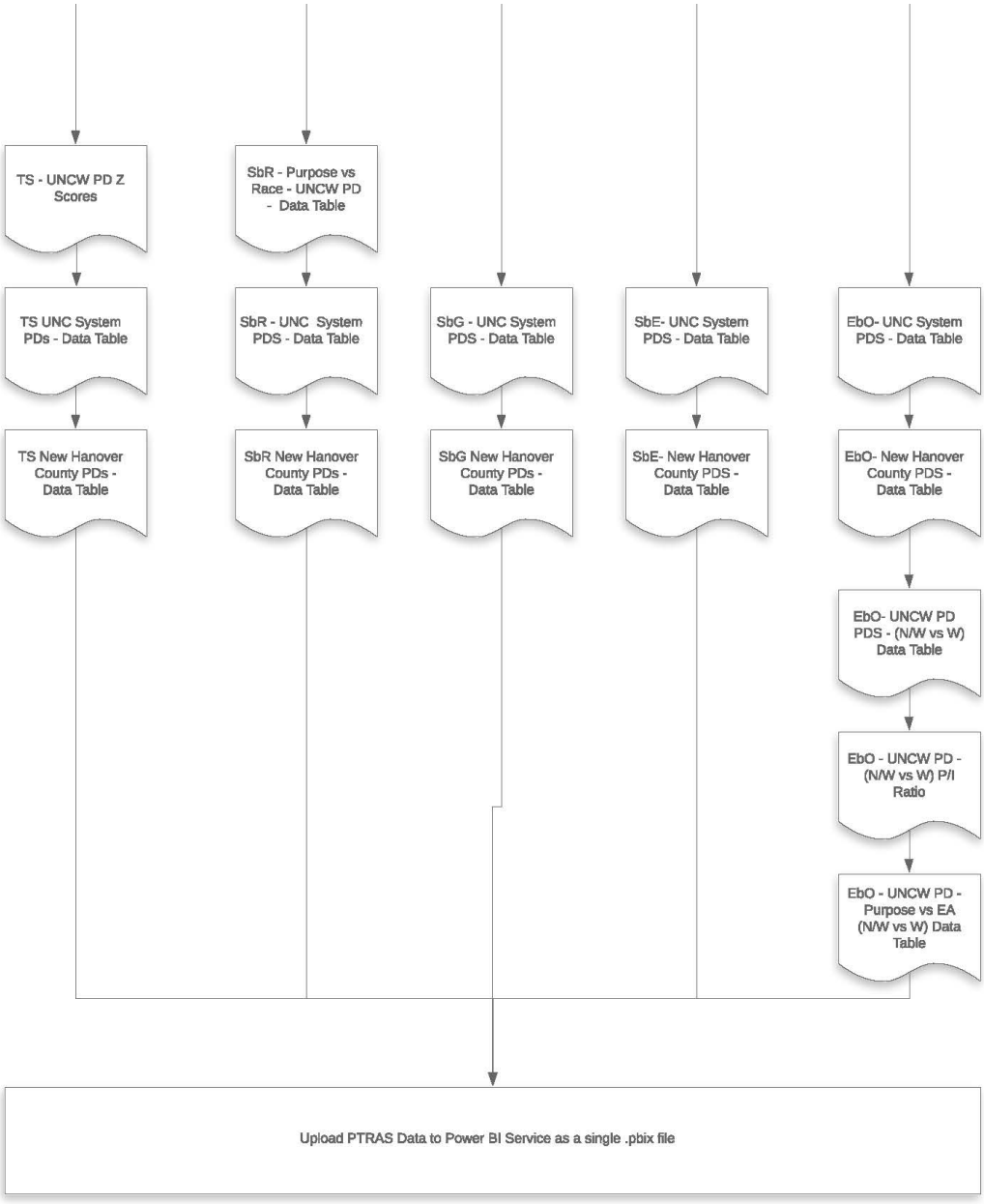
- Right select left corner of the result window. A wizard will display 'Save results as'. An export window pops up.
- The save as type is populated as 'csv'. This is acceptable or change it to 'tab delimitated', both are acceptable.
- Change the save as folder to the local location.
- Name the file as 'Stop1.csv' and click save.
- You may see an existing file by this name. It is OK to overwrite it. This was last month's export file. You will update it. SQL server for the month is done.

The stop1.csv file is only about 26,743 KB of data and contains the vast majority of the necessary data for this project. This file can now be opened in MS Excel for manipulation. Upon opening it, it is noticed that the headers are missing. They can be reinserted manually. Add a blank row #1. Manually enter headers from the Traffic Stops Data Table Reference key sheet. Once these are entered, save the file as an 'xlsw' formatted file. All columns are formatted to 'General'; this is acceptable for all columns except the 'StopDate' column. Change the formatting for this column to 'Date' format. Save the file again. Close the file.

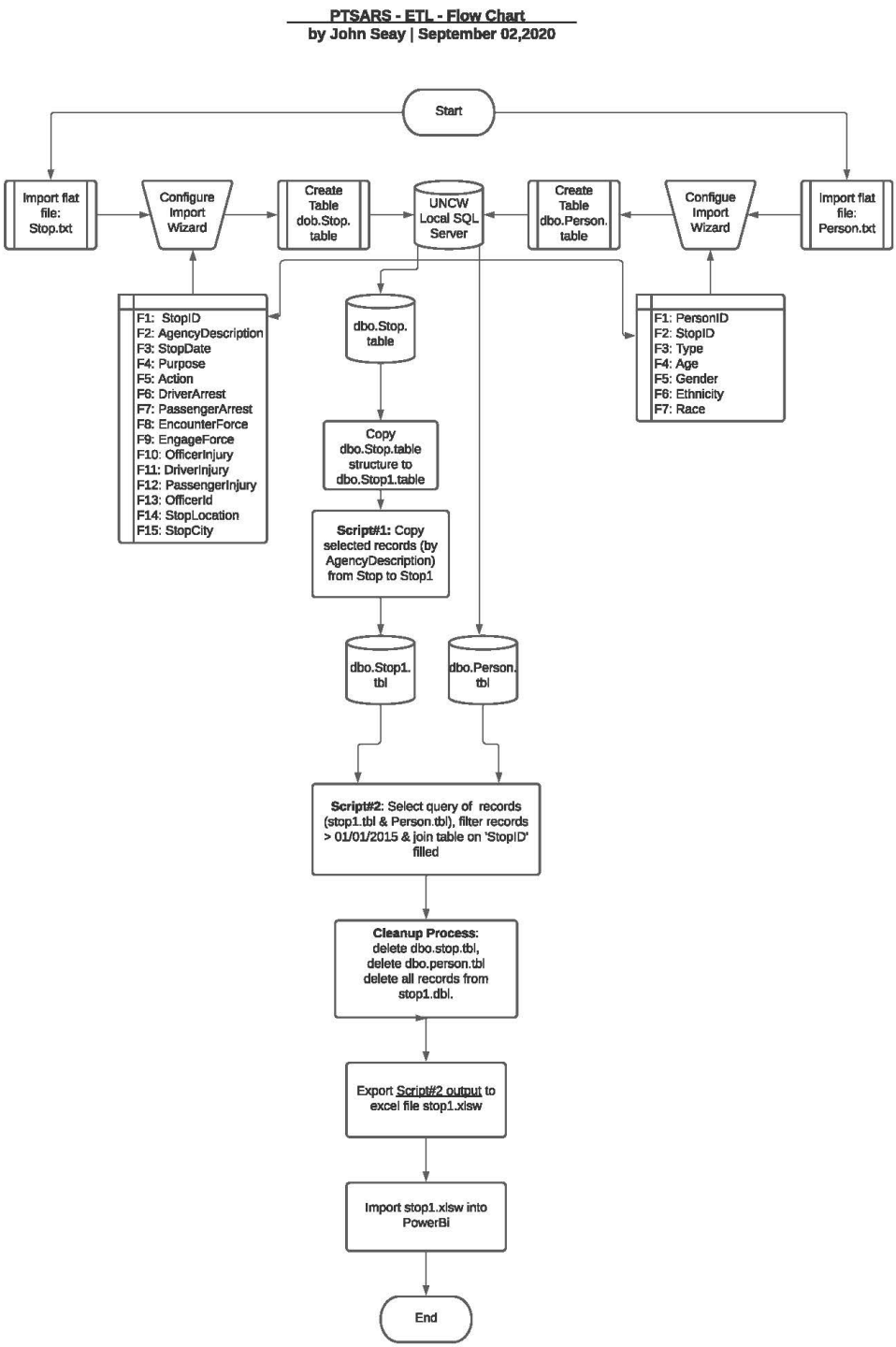
# 11 Diagrams

## 11.1 Data Flow Diagram -PTSARS

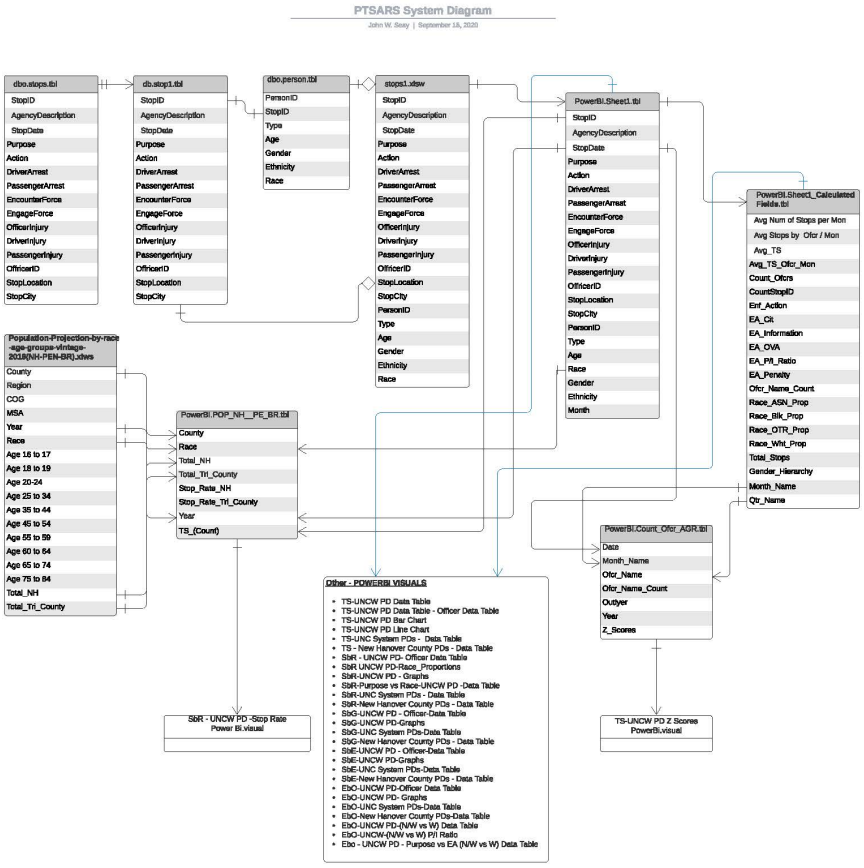



TS - UNCW PD Z Scores
SbR - Purpose vs Race - UNCW PD - Data Table
TS UNC System PDs - Data Table
SbR - UNC System PDS - Data Table
SbG - UNC System PDS - Data Table
SbE- UNC System PDS - Data Table
EbO- UNC System PDS - Data Table
TS New Hanover County PDs - Data Table
SbR New Hanover County PDs - Data Table
SbG New Hanover County PDs - Data Table
SbE- New Hanover County PDS - Data Table
EbO- New Hanover County PDS - Data Table
EbO- UNCW PD PDS - (N/W vs W) Data Table
EbO - UNCW PD - (N/W vs W) P/I Ratio
EbO - UNCW PD - Purpose vs EA (N/W vs W) Data Table
Upload PTRAS Data to Power BI Service as a single .pbix file

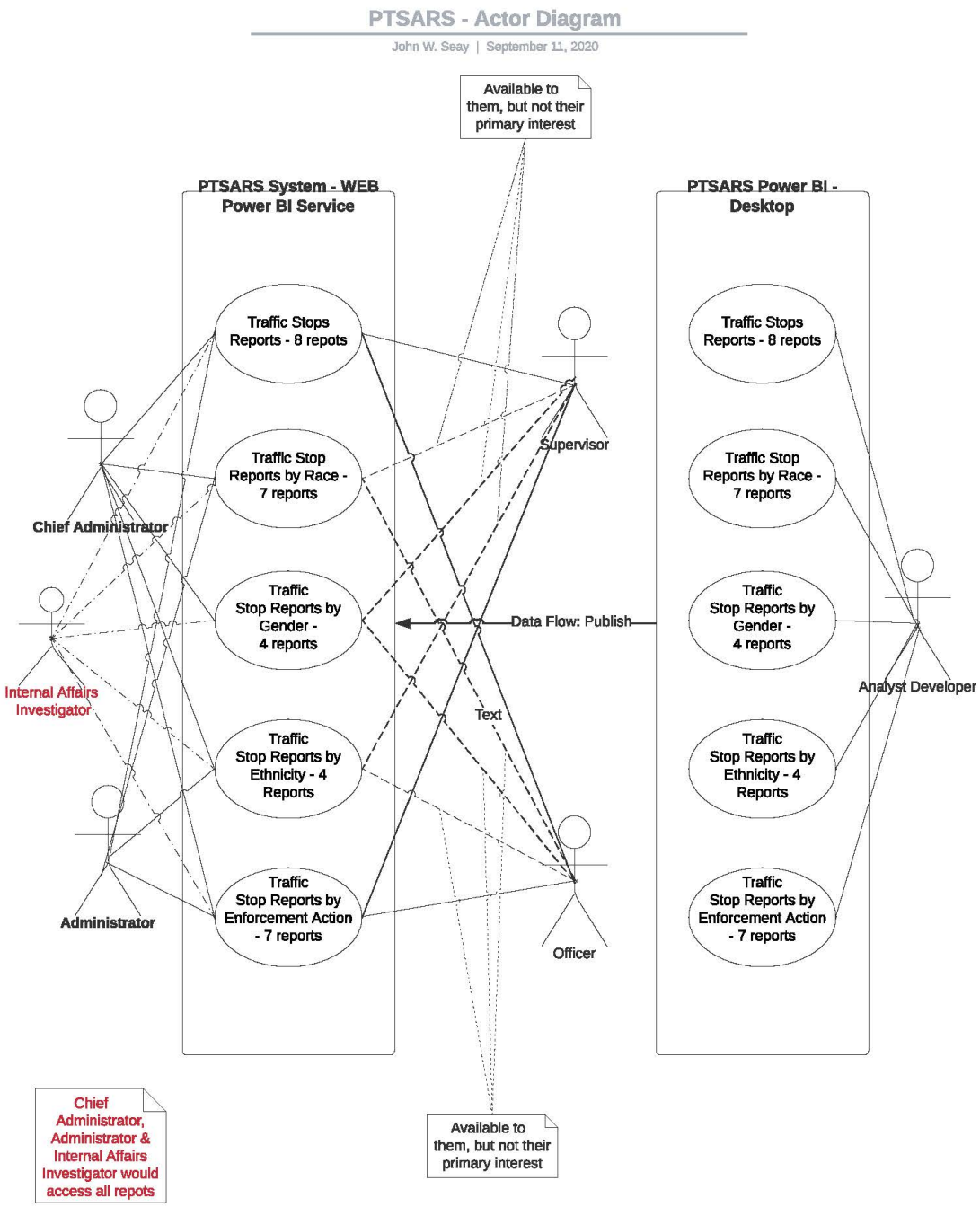
## 11.2 Data Flow Diagram -ETL



## 11.3 System Diagram



## 11.4 Actor Diagram



## 12 DATA Dictionary

NOTE: dbo.Stop1.sql & dbo.Person.sql exports to Stop1.xlw

| **dbo.Stop.sql & dbo.Stop1.sql** | **Stop1.xlsw – Sheet1** |
|---|---|
| StopID (nvarchar(50), null) | StopID: General |
| AgencyDesecription (nvarchar(100), null) | AgencyDescription: General |
| StopDate (datetime2) | StopDate: Data |
| Purpose (nvarchar(50), null) | Purpose: General |
| Action (nvarchar(50), null) | Action: General |
| DriverArrest (nvarchar(50), null) | DriverArrest: General |
| PassengerArrest (nvarchar(50), null) | PassengerArrest: General |
| EncounterForce (nvarchar(50), null) | EncounterForce: General |
| EngageForce (nvarchar(50), null) | EngageForce: General |
| OfficerInjury (nvarchar(50), null) | OfficerInjury: General |
| DriverInjury (nvarchar(50), null) | DriverInjury: General |
| PassengerInjury (nvarchar(50), null) | PassengerInjury: General |
| OfficerID (nvarchar(50), null) | OfficerID: General |
| StopLocation (nvarchar(50), null) | StopLocation: General |
| StopCity (nvarchar(50), null) | StopCity: General |
| | |
| **dbo.Person.sql** | |
| PersonID (nvarchar(50), null) | PersonID: General |
| StopID (nvarchar(50), null) | |
| Type (nvarchar(50), null) | Type: General |
| Age (nvarchar(50), null) | Age:General |
| Gender (nvarchar(50), null) | Gender: General |
| Ehtnicity (nvarchar(50), null) | Ethnicity: General |
| Race (nvarchar(50), null) | Race: General |
| | |
| | |
| **Sheet1.PowerBi.tbl** | **NOTE: dbo.Stop1.xlw – Sheet1 exports to Sheet1.PowerBi.tbl** |
| | |
| Action : Whole Number | |
| Age : Whole Number | |
| AgencyDescription : Text | |
| DriverArrest: Whole Number | |
| DriverInjury : Whole Number | |
| EncounterForce : Whole Number | |
| Enf_Action : Text | |
| EngageForce: Whole Number | |

| | |
|---|---|
| Ethnicity : Text | |
| Gender : Text | |
| Month : Whole Number | |
| Month_Name : Text | |
| OfficerID : Text | |
| OfficerInjury : Whole Number | |
| PassengerArrest : Whole Number | |
| PassengerInjury : Whole Number | |
| PersonId : Text | |
| Purpose : Whole Number | |
| Purpose_Name : Text | |
| Qtr_Name : Text | |
| Race : Text | |
| Stop_Month : Whole Number | |
| Stop_Quarters : Whole | |
| Stop_Year : Whole Number | |
| StopCity : Text | |
| StopDate : Date | |
| StopID : Whole Number | |
| StopLocation : Text | |
| Type : Text | |
| | |
| **Count_Ofcr_2016-2021.xlsw - Count_Ofcr_AGR** | **NOTE: Count_Ofcr_2016-20210.xlw-Count_Ofcr_Agr exports to Count_Ofcr_Agr.PowerBi.tbl** |
| Year: General | |
| Month: General | |
| Ofcr_Name: General | |
| Ofcr_Name_Count: General | |
| | |
| | |
| | |
| **Count_Ofcr_AGR.PowerBi.tbl** | |
| Date | |
| Month: Text | |
| Ofcr_Name: Text | |
| Ofcr_Name_Count: Whole number | |
| Outlyer: Text | |
| Year: Text | |
| Z_Scores: Fixed decimal number | |
| | |
| | |

| | |
|---|---|
| **DATA Dictionary: Continued** | **NOTE: population-projections-by-race-age-groups-vintage-2019(NH-PEN-BR).xlsw - Sheet exports to POP_NH_PE_BR** |
| | |
| **POP_NH_PE_BR.PowerBi.tbl** | **population-projections-by-race-age-groups-vintage-2019(NH-PEN-BR).xlsw - Sheet** |
| County: Text | County: General |
| Region: Text | Region: General |
| COG: Text | COG: General |
| MSA: Text | MSA: General |
| Year: Whole Number | Year: General |
| Race: General | Race: General |
| TS: Whole Number | TS: General |
| Age 16 to 17: Whole Number | Age 16 to 17: General |
| Age 18 to 19: Whole Number | Age 18 to 19: General |
| Age 20 to 24: Whole Number | Age 20 to 24: General |
| Age 25 to 34: Whole Number | Age 25 to 34: General |
| Age 35 to 44: Whole Number | Age 35 to 44: General |
| Age 45 to 54: Whole Number | Age 45 to 54: General |
| Age 55 to 59: Whole Number | Age 55 to 59: General |
| Age 60 to 64: Whole Number | Age 60 to 64: General |
| Age 65 to 74: Whole Number | Age 65 to 74: General |
| Age 75 to 84: Whole Number | Age 75 to 84: General |
| Total_NH: Whole Number | Total_NH: General |
| Total_Tri_County: Whole Number | Total_Tri_County: General |
| Stop_Rate_NH: Decimal Number | |
| Stop_Rate_Tri_County: Decimal Number | |
| | |
| | |

# 13 Exhibit #1: DAX Calculated Fields

```
EA_Information =
    var EA_NA = CALCULATE(COUNTX(Sheet1,[Enf_Action]),FILTER(Sheet1,[Enf_Action]="NA"))
    var EA_VW = CALCULATE(COUNTX(Sheet1,[Enf_Action]),FILTER(Sheet1,[Enf_Action]="VW"))
    var EA_WW = CALCULATE(COUNTX(Sheet1,[Enf_Action]),FILTER(Sheet1,[Enf_Action]="WW"))
    var Information = EA_NA + EA_VW + EA_WW
    return Information
EA_Penalty =
    var EA_Cit = CALCULATE(COUNTX(Sheet1,[Enf_Action]),FILTER(Sheet1,[Enf_Action]="Cit"))
    var EA_OVA = CALCULATE(COUNTX(Sheet1,[Enf_Action]),FILTER(Sheet1,[Enf_Action]="OVA"))
    var Penalty = EA_Cit + EA_OVA
    return Penalty
EA_P/I_Ratio = (Sheet1[EA_Penalty]/Sheet1[EA_Information])
Month=MONTH('Sheet1'[StopDate])
Month_Name=SWITCH([Month],1,"Jan",2,"Feb",3,"Mar",4,"Apr",5,"May",6,"Jun",7,"Jul",8,"Aug",9,"Sep",10,"Oct",11,"
    Nov",12,"Dec")
Ofcr_Name=SWITCH([OfficerID],"1000624","DonaldsonD","2001059","PadgetC","2027264","RainerB","2033244","Ki
    ngW","2035738","TorroellaV","3010001","LevitzD","301001","LevitzD","512001","LevitzD","5120001","LevitzD","4
    049022","BolingJ","5019102","HasteW","5001696","CurryT","5028156","PaluckA","2031017","LindseyC","503101
    7","LindseyC","121017","LindseyC","12017","LindseyC","503017","LindseyC","503107","LindseyC","5041440","D
    eaconS","5091440","DeaconS","5058887","WatkinsJ","5058227","WatkinsJ","8058227","WatkinsJ","506975","Go
    oteeJ","5062648","GooteeJ","5092938","GaitherD","5072983","GaitherD","5072938","GaitherD","5072958","Gaith
    erD","508","OzbeckJ","5077911","OzbeckJ","5087911","OzbeckJ","5082383","HodgeN","5182383","HodgeN","16
    2383","HodgeN","5096608","PaluckJ","5106841","SeayJ","5105841","SeayJ","51068411","SeayJ","5108699","Le
    wisC","5105699","LewisC","5112613","McLambM","512618","McLambM","5112615","McLambM","5112186","Mc
    LambM","5112618","McLambM","5130361","BrayE","5136702","CottenJ","5138839","HayesB","5138893","Hayes
    B","5128839","HayesB","5136202","CottenJ","5149120","KurtykaS","514910","KurtykaS","5155169","MozingoA","
    5199159","EarpJ","5169155","EarpJ","5169159","EarpJ","5169139","EarpJ","9159516","EarpJ","5161939","EarpJ
    ","5161955","EarpJ","516159","EarpJ","5199159","EarpJ","5174133","MariottiK","5186975","ReynoldsE","518692
    5","ReynoldsE","5196978","ReynoldsE","5186978","ReynoldsE","5196975","ReynoldsE","519","FlynnS","519660
    4","FlynnS","5156604","FlynnS","121","FlynnS","5208851","CookD","5217317","CookB","5212317","CookB","523
    7317","CookB","521","SavageR","5235920","FleurietJ","5233920","FleurietJ","5232935","FleurietJ","5215920","Fl
    eurietJ","28","HillJ","5240535","HillJ","5240355","HIIIJ","52403555","HillJ","52402355","HIIIJ","5258851","HaysB",
    "2528851","HaysB","5261935","PickeringJ","5261955","PickeringJ","5261938","PickeringJ","5276084","MueckS",
    "5","PaluckA","25","LevitzD","504","DeaconS","509","PaluckJ","515","MozingoA","523","FleurietJ","1236","McLam
    bM","2144","HillJ","16283","HodgeN","50918","PaluckJ","100624","DonaldsonD","192618","McLambM","266841",
    "SeayJ","313040","BrayE","375283","HasteS","400361","BrayE","478522","ForbesR","506264","GooteeJ","50679
    5","ReynoldsE","506875","ReynoldsE","506925","ReynoldsE","513040","BrayE","519604","FlynnS","51936604","
    FlynnS","522266","PainF","546604","FlynnS","400361","BrayE","4000361","BrayE","5011696","CurryT","5072930
    ","GaitherD","5125283","HasteS","5143746","DanielsL","5143764","DanielsL","5145746","DanielsL","5148522","
    DanielsL","5156169","MozingoA","5174137","MariottiK","5174183","MariottiK","5189021","BussardJ","518902","B
    ussardJ","5021518","BussardJ","9021518","BussardJ","9021578","BussardJ","5189675","ReynoldsE","5092949",
    "RobertsD","5199021","RobertsD","5192947","RobertsD","51929449","RobertsD","5192945","RobertsD","519244
    9","RobertsD","5192949","RobertsD","5199604","FlynnS","5202251","CookD","5218986","GalanT","5214416","S
    avageR","5222566","PainF","522256","PainF","522566","PainF","375285","HasteS","5224177","KingstonS")
```

```
Purpose_Name=SWITCH([Purpose],1,"SPD",2,"STPLT",3,"DWI",4,"SAFE",5,"VEHQP",6,"VEHRG",7,"STBLT",8,"INV
    ",9,"OT",10,"CP")
Qtr_Name=SWITCH([Stop_Quarters],1,"Q1",2,"Q2",3,"Q3",4,"Q4")
Race_Asn = countx(Filter(Sheet1,[Race]="A"),Sheet1[Race])
Race_Blk1 = countx(Filter(Sheet1,[Race]="B"),Sheet1[Race])
Race_NA = countx(Filter(Sheet1,[Race]="I"),Sheet1[Race])
Race_OTR = countx(Filter(Sheet1,[Race]="U"),Sheet1[Race])
Race_Wht = countx(Filter(Sheet1,[Race]="W"),Sheet1[Race])
Race_Count_T = countx(Sheet1,[Race])
Race_ASN_Prop = divide([Race_Asn],[Race_Count_T])
Race_Blk_Prop = divide([Race_Blk1],[Race_Count_T])
Race_NA_Prop = divide([Race_NA],[Race_Count_T])
Race_OTR_Prop = divide([Race_OTR],[Race_Count_T])
Race_Wht_Prop = divide([Race_Wht],[Race_Count_T])
Stop_Month = MONTH(Sheet1[StopDate])
Stop_Quarters = QUARTER('Sheet1'[StopDate])
Stop_Year=YEAR(Sheet1[StopDate])
```

# 14 Exhibit #2: SBI 'RefStopsCodeNumber.txt' Table

| | | | |
|---|---|---|---|
| StopPurpose | 1 | SPD | Speed Limit Violation |
| StopPurpose | 2 | STPLT | Stop Light/Sign Violation |
| StopPurpose | 3 | DWI | Driving While Impaired |
| StopPurpose | 4 | SAFE | Safe Movement Violation |
| StopPurpose | 5 | VEHQP | Vehicle Equipment Violation |
| StopPurpose | 6 | VEHRG | Vehicle Regulatory Violation |
| StopPurpose | 7 | STBLT | Seat Belt Violation |
| StopPurpose | 8 | INV | Investigation |
| StopPurpose | 9 | OT | Other Motor Vehicle Violation |
| StopPurpose | 10 | CP | Checkpoint |

# 15 Exhibit #3: Traffic Stop Report

# TRAFFIC STOP REPORT

**Agency Name** | **Date (Month/Day/Year)** | **Time**

**County of Stop** | **Officer ID Number**

**City of Stop**

**Part I**

**Initial Purpose of Traffic Stop** *(check only one)*

- ☐ Checkpoint
- ☐ Driving While Impaired
- ☐ Investigation
- ☐ Other Motor Vehicle Violation
- ☐ Safe Movement Violation
- ☐ Seat Belt Violation
- ☐ Speed Limit Violation
- ☐ Stop Light / Sign Violation
- ☐ Vehicle Equipment Violation
- ☐ Vehicle Regulatory Violation

**Vehicle Driver Information**

**Driver's Age** _____ **Driver's Race** ☐ White ☐ Black ☐ Native American ☐ Asian ☐ Other

**Driver's Sex** ☐ Male ☐ Female

**Driver's Ethnicity** ☐ Non-Hispanic ☐ Hispanic *(Person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish Culture)*

**Enforcement Action Taken as a Result of the Traffic Stop** *(check only one)*

- ☐ Citation Issued
- ☐ No Action Taken
- ☐ On-View Arrest → If arrest made, who was arrested?
  - ☐ Driver
  - ☐ Passenger(s)
- ☐ Verbal Warning
- ☐ Written Warning

**Physical Resistance Encountered**

| | | |
|---|---|---|
| Did Officer(s) encounter any physical resistance from Driver and/or Passenger(s)? | ☐ Yes | ☐ No |
| Did Officer(s) engage in the use of force against the Driver and/or Passenger(s)? | ☐ Yes | ☐ No |
| Did injuries occur to the Officer(s) as a result of the stop? | ☐ Yes | ☐ No |
| Did injuries occur to the Driver as a result of the stop? | ☐ Yes | ☐ No |
| Did injuries occur to the Passenger(s) as a result of the stop? | ☐ Yes | ☐ No |

**Vehicle/Driver/Passenger(s) Search**

Was a search initiated subsequent to the traffic stop? ☐ Yes* ☐ No

***If search was initiated, complete Part II**

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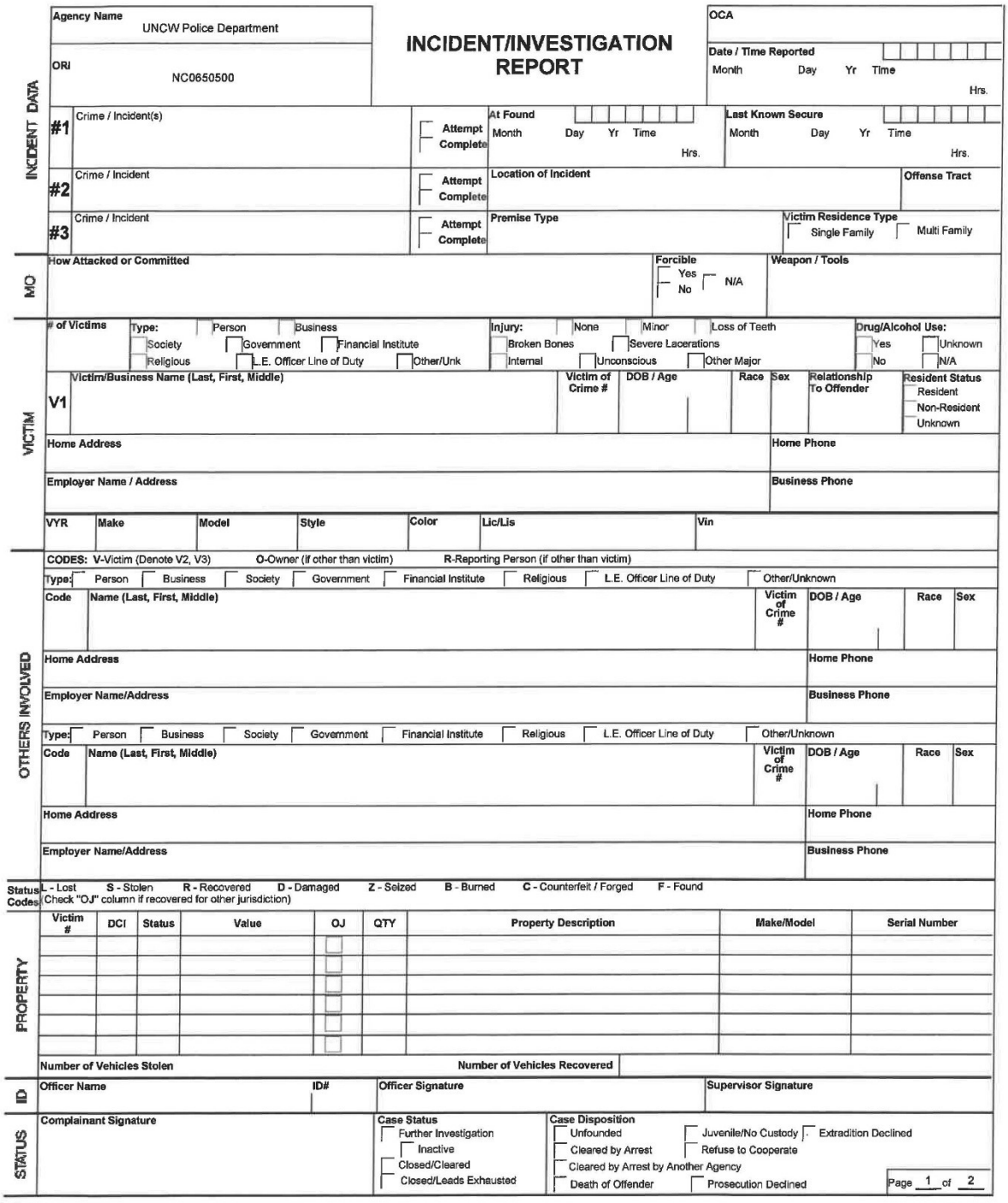
## 16 EXHIBIT #4: Enforcement Action Outcomes

| ENFORCEMENT ACTION OUTCOMES | |
|---|---|
| **No- Action** | - The TS ends with no further action. |
| **Verbal Warning** | - The officer ends the TS with a verbal admonishment for a minor infraction. |
| **Written Warning** | - The officer ends the TS with a written warning or admonishment.<br>- There is no penalty but a written record is kept on file of the warning. In practice there is not a lot of difference between the Verbal and the Written Warning. But the key point in either case, there is no penalty. |
| **Citation** | - Officers may end a TS with citation. There is a financial penalty for this. This is usually for a more significant civil infraction and or criminal act. Criminal citations require the motorist to appear before a court at a later date. The motorist is only physically detained and not arrested. |
| **On View Arrest**. | - The officer arrests the motorist for a criminal violation. This can be for assortment of crimes, DWI, drug possession, and or weapons possession etc. The motorist is physically restrained and transported to the County Jail and will appear before a magistrate for bail. |

# 17 EXHIBIT #5: Police Forms



**INCIDENT/INVESTIGATION REPORT**

Agency Name: UNCW Police Department
ORI: NC0650500
OCA:
Date / Time Reported: Month Day Yr Time Hrs.

**INCIDENT DATA**

#1 Crime / Incident(s) — Attempt / Complete — At Found: Month Day Yr Time Hrs. — Last Known Secure: Month Day Yr Time Hrs.
#2 Crime / Incident — Attempt / Complete — Location of Incident — Offense Tract
#3 Crime / Incident — Attempt / Complete — Premise Type — Victim Residence Type: Single Family / Multi Family

**MO**

How Attacked or Committed — Forcible: Yes / No / N/A — Weapon / Tools

**VICTIM**

# of Victims — Type: Person / Business / Society / Government / Financial Institute / Religious / L.E. Officer Line of Duty / Other/Unk — Injury: None / Minor / Loss of Teeth / Broken Bones / Severe Lacerations / Internal / Unconscious / Other Major — Drug/Alcohol Use: Yes / No / Unknown / N/A

V1 Victim/Business Name (Last, First, Middle) — Victim of Crime # — DOB / Age — Race — Sex — Relationship To Offender — Resident Status: Resident / Non-Resident / Unknown
Home Address — Home Phone
Employer Name / Address — Business Phone

VYR — Make — Model — Style — Color — Lic/Lis — Vin

**OTHERS INVOLVED**

CODES: V-Victim (Denote V2, V3) O-Owner (if other than victim) R-Reporting Person (if other than victim)

Type: Person / Business / Society / Government / Financial Institute / Religious / L.E. Officer Line of Duty / Other/Unknown
Code — Name (Last, First, Middle) — Victim of Crime # — DOB / Age — Race — Sex
Home Address — Home Phone
Employer Name/Address — Business Phone

Type: Person / Business / Society / Government / Financial Institute / Religious / L.E. Officer Line of Duty / Other/Unknown
Code — Name (Last, First, Middle) — Victim of Crime # — DOB / Age — Race — Sex
Home Address — Home Phone
Employer Name/Address — Business Phone

**PROPERTY**

Status Codes: L - Lost S - Stolen R - Recovered D - Damaged Z - Seized B - Burned C - Counterfeit / Forged F - Found
(Check "OJ" column if recovered for other jurisdiction)

| Victim # | DCI | Status | Value | OJ | QTY | Property Description | Make/Model | Serial Number |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Number of Vehicles Stolen — Number of Vehicles Recovered

**ID**

Officer Name — ID# — Officer Signature — Supervisor Signature

**STATUS**

Complainant Signature
Case Status: Further Investigation / Inactive / Closed/Cleared / Closed/Leads Exhausted
Case Disposition: Unfounded / Juvenile/No Custody / Extradition Declined / Cleared by Arrest / Refuse to Cooperate / Cleared by Arrest by Another Agency / Death of Offender / Prosecution Declined
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## INCIDENT/INVESTIGATION REPORT

**Page 2**

OCA

**Status Codes** L - Lost S - Stolen R - Recovered D - Damaged Z - Seized B - Burned C - Counterfeit / Forged F - Found

**DRUGS**

| DCI | Status | Quantity | Type Measure | Suspected Type | Check up to 3 types of activity for each: Possess | Buy | Sale | Mfg. | Importing | Operating |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| | | | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| | | | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**OFFENDER**

**Offender Used**
Alcohol/Drugs ☐ Yes ☐ Unk ☐ No ☐ N/A
Computer ☐ Yes ☐ Unk ☐ No ☐ N/A

**Offender 1** Age: Race: Sex:
**Offender 2** Age: Race: Sex:
**Offender 3** Age: Race: Sex:
**Offender 4** Age: Race: Sex:
**Offender 5** Age: Race: Sex:
**Offender 6** Age: Race: Sex:

**Primary Offender Resident Status**
☐ Resident
☐ Non-Resident
☐ Unknown

**SUSPECT**

Name (Last, First, Middle) | Alias or Nickname | Home Address

Occupation | Business Address

| DOB / Age | Race | Sex | Height | Weight | Build | Hair Color | Hair Style | Hair Length | Eye Color | Glasses |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

Scars, Marks, Tattoos, or other distinguishing features (i.e. limp, foreign accent, voice characteristics)

| Hat | Jacket | Shirt/Blouse | Tie/Scarf | Coat/Suit | Pants/Dress/Skirt | Socks | Shoes |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

Was Suspect Armed? | Type of Weapon | Direction of Travel | Mode of Travel

| VYR | Make | Model | Style | Color | Lic/Lis | Vin |
|---|---|---|---|---|---|---|
| | | | | | | |

**WITNESS**

Name (last, first, middle) | DOB / Age | Race | Sex | OCA

Home Address | Home Phone | Employer | Phone

Suspect Hate / Bias Motivated: Yes ☐ No ☐

**NARRATIVE**

Narrative

Page 1 of 1

# ARREST REPORT

**AGENCY INFO**

| Agency Name | ORI | Date/Time of Arrest Mo Date Year Hrs: | OCA |
|---|---|---|---|
| UNCW Police Department | NC0650500 | | |

| Taken Prints ☐ Photos ☐ | Fingerprint Card Check Digit # (CKN) | Arrest Tract | Residence Tract | Arrest Number |
|---|---|---|---|---|
| | | | | |

**ARRESTEE INFORMATION**

| Name (Last, First, Middle) | D.O.B. Mo Date Year | Age | Race | Sex | Place of Birth | Country of Citizenship |
|---|---|---|---|---|---|---|
| | | | | | | |

| Current Address | Phone | Occupation | ☐ Resident ☐ Unknown ☐ Non-Resident |
|---|---|---|---|
| | | | |

| Employer's Name | Address | Phone |
|---|---|---|
| | | |

| Also Known As(Alias Names) | Hgt | Wgt | Hair | Eye | Skin Tone | Consumed Drug/Alcohol ☐ Yes ☐ No ☐ Unk |
|---|---|---|---|---|---|---|
| | | | | | | |

| Scars, Marks, Tattoos | Social Security # | OLN | State | Misc. # and Type |
|---|---|---|---|---|
| | | | | |

| Nearest Relative Name | Address | Phone |
|---|---|---|
| | | |

**ARREST INFO**

| If Armed, Type of Weapon | ☐ On-View ☐ Order for Arrest ☐ Criminal Summons ☐ Citation ☐ Warrant | Place of Arrest |
|---|---|---|
| | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Charge # 1 | ☐ Fel ☐ Misd | Counts | DCI Code | Offense Jurisdiction (If not arresting Agency) | Statute# | Warr Date Mo Date Year |
| Charge # 2 | ☐ Fel ☐ Misd | Counts | DCI Code | Offense Jurisdiction (If not arresting agency) | Statute# | Warr Date Mo Date Year |
| Charge # 3 | ☐ Fel ☐ Misd | Counts | DCI Code | Offense Jurisdiction (If not arresting agency) | Statute# | Warr Date Mo Date Year |

**VEH. INFO.**

| VYR | Make | Model | Style | Color | Lic/Lis | VIN |
|---|---|---|---|---|---|---|
| | | | | | | |

Vehicle: 1: ☐ Left at Scene ☐ Secured ☐ Unsecure Date/Time _____ Hrs _____
2 ☐ Released to other at owners request ☐ Name of Other _____
3 ☐ Impounded ☐ Place of storage _____ Inventory on File? ☐

**CONFINED BOND INFO**

| Date/Time Confined Hrs: | Place Confined | Committing Magistrate |
|---|---|---|
| | | |

| Type Bond ☐ Written Promise ☐ Unsecured ☐ Secured ☐ No Bond ☐ Other | Amt. Bond | Trial Date | Court of | City |
|---|---|---|---|---|
| | | | | |

| Assisting Officer Name/ID Number | Released By Name/Dept/ID | Date/Time Released Hrs: |
|---|---|---|
| | | |

**Status Codes** L-Lost S-Stolen R-Recovered D-Damaged Z-Seized B-Burned C-Counterfeit/Forged F-Found
(Check "OJ" column if recovered for other jurisdiction)

**DRUGS AT ARREST**

| DCI | Status | Quantity | Type Measure | Suspected Type | Check up to 3 types of activity for each: Possess | Buy | Sale | Mfg. | Importing | Operating |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| | | | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| | | | | | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**COMPLAINANT**

| Name: Complainant ☐ Victim ☐ | Address: | Phone: |
|---|---|---|
| | | |

**NARRATIVE**

**STATUS**

| Arresting Officer Signature/ID # | Date/Time Submitted Mo Date Year Hrs: | Supervisor Signature |
|---|---|---|
| | | |

| Case Status: ☐ Further Inv. ☐ Inactive ☐ Closed | Case Disposition: ☐ Cleared By Arrest/No Supplement Needed ☐ Arrest/No Investigation | Arrestee Signature |
|---|---|---|
| | | |

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UNCW Police Department

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## Field Interview

☐ FIELD INTERVIEW ☐ INTELLIGENCE REPORT _____ (CONCERNING)

CASE NUMBER _____ AREA _____ DATE _____ TIME _____

LOCATION OF CONTACT _____

**SUBJECT'S INFORMATION**

NAME _____ (LAST FIRST MIDDLE) MONIKER _____

ADDRESS _____ SOCIAL SECURITY NUMBER _____

EMPLOYER _____ OCCUPATION _____

DL/ID # _____ PHONE (Home) _____ (Work) _____

Race _____ Sex _____ Ethnicity _____ Age _____ Age 2 _____ Eyes _____ Date Of Birth _____

Height _____ Weight _____ Hair _____ Place Of Birth _____

Clothing _____ Other Physical Description _____

Scars/Marks _____

SOURCE IDENTIFICATION: _____

Other _____

Name (Optional) _____

Address _____

Phone _____

SOURCE EVALUATION: _____

**VEHICLE INFORMATION**

☐ NONE
☐ OWNER
☐ DRIVER
☐ OCCUPANT

YEAR _____ MAKE _____ MODEL _____ COLOR _____

TAG NUMBER _____ STATE _____ YEAR _____

VIN _____ IDENTIFYING MARKS _____

**ASSOCIATES / IN COMPANY OF (FI ON EACH SUBJECT)**

NAME _____ (LAST FIRST MIDDLE) ADDRESS _____

NAME _____ (LAST FIRST MIDDLE) ADDRESS _____

NAME _____ (LAST FIRST MIDDLE) ADDRESS _____

**INFORMATION PROVIDED / SUSPICIOUS ACTIVITY OBSERVED**

**ADMINISTRATION SECTION**

INFORMATION DIRECTED TO: _____ (SECTION) INFORMATION EVALUATION: _____

_____ (REPORTING OFFICER) _____ (EMPLOYEE #) _____ (APPROVING OFFICER) _____ (REVIEW DATE) _____ (APPROVE DATE)

FORM 109:91

**University Police Department** — **Non-Criminal Incident**

*Press firmly for clear copies.*

| Agency | ORI# | Date/Time Reported (Mo / Day / Yr — 24 Hr Clock) | OCA File No. |
|---|---|---|---|
| UNCW Police | [redacted] | 09 / 11 / 2020 | 202000[redacted] |

| Owner | Permanent Address | Phone |
|---|---|---|
| UNKnown | UnKnown | UnKnown |
| **Local Address** | | **Phone** |
| UNKnown | UNKnown | UNKnown |

Location from which property was obtained: Sidewalk in front of Graham Hall Entrance — Collecting Officer: [redacted]

| Property Control Number | Description of Articles (Include model, serial no., identifying marks, condition, etc.) | Property Value |
|---|---|---|
| 001 | 3 - twenty dollar bills (US currency) | $60.00 |
| | (1) Serial # PE39927370A | |
| | (2) Serial # ME40557527I | |
| | (3) Serial # PE36650958A | |

Nathan Bell DRC follows

**Narrative**

On 9-11-2020, at 14:12 hours, I responded to Graham Hall Rm 112-A in reference to found propert. [redacted] reported finding (3) twenty dollar bills on the sidewalk in front of Graham Hall Entrance. Items were recaved from reporting party and placed in Evidence Locker #1.

Nothing Further

| Officer's Name | Date/Time Submitted | Supervisor's Name | Case Disposition | Page |
|---|---|---|---|---|
| [redacted] | Mo 9 Day 11 Yr 2020 | [redacted] | ☐ Unfounded | Page 1 of 1 |
| Officer's Signature: [redacted] | 1445 24 Hr | Case Status: ☐ Further Investigation ☐ Inactive ☐ Closed | ☐ Cleared by Arrest ☐ Exceptional Cleared – Adult ☐ Exceptional Cleared – Juv. | |

# 18 GLOSSARY

- **Chief Administrator**: This is typically a Police Chief, Director, Sheriff
- **Administrator**: This is typically an Assistant Police Chief, Deputy Chief, Colonel, Major, Deputy Director, Under Sheriff and or Captain.
- **Supervisor**: This is typically a Police Lieutenant, Sergeant, Corporal
- **Internal Affairs Investigator**: This can be anyone from, the Police Chief to a full time dedicated Internal Affairs Detective, assigned to investigate another police officer.
- **'Stopdate'** is the date of stop of the individual traffic stop.
- **R.G.E:** Race, Gender & Ethnicity
- **SbR:** Stops by Race
- **SbE:** Stops by Ethnicity
- **SbG:** Stops by Gender
- **TS:** Traffic Stops

## 19 Retrospective

This was the largest most challenging project that I have ever undertaken. In hindsight I don't think I was completely prepared to take it in. However, that pretty much the case whenever you push the envelope and try something new. This project was a synthesis of many different skills; database, spreadsheet and presentation. I wouldn't have been able to even attempt it without a working knowledge of the PowerBi platform. There even was a certain artistry to the whole project. The visuals had to be visually appealing. This project brought out my inner artist, as humble as it is.

I felt by having a clear scope of project, that I was able to organize the project. It helped that I chose a few of the most common fields in the dataset. I was able to adequately develop them into a more comprehensive testing system. In the future, I would like to explore the data-tables, (contraband, searches, etc), that I bypassed for now.

I also had to develop a market for this product. Cops are notorious about being resistant to anything new. I had to sell the project at my police workplace. I had to explain the value to the police department.

The original dataset was so large that I didn't have any suitable digital tools to mine the data from it. Ultimately, I had to borrow assets from the University, a SQL server. This involved other University departments. In the beginning, I don't think I had a clear understanding of what was needed just to analyze this huge dataset. In the end, I was able to borrow a sufficient amount of resources, but not all the resources desired. Using SQL server management studio, I was able to view and understand the entire State of NC dataset. This project was not feasible without the SQL server. I would advise

anyone who wants to undertake a similar project that they should be clear on all the digital tools needed before diving headfirst into the project.

Without a doubt, the biggest challenge that I faced with this project was the DAX programming language. I have had no formal training in DAX and was learning it on the fly. When I faced a problem, I would research it on the various online WEB sites. I learned quite a bit, but don't feel comfortable with it. I feel that I could accomplish so much more if I had some type of formal training in it. I am looking for some type of certification course in it. Once I started to have a limited understanding of DAX, I was able to extend the original data set to new and unique ways. This allowed me to think of new testing protocols. In the future, I want to explore integrating either Python and or R scripts to aid in the ETL process. I may not always have access to a SQL server.

There is additional analysis that can be performed in this data set. The time field could be analyzed under Veil of Darkness (VOD) theory. (Abate, 2020) Also the other tables in the original data set; such as search, searchBasis, and contraband tables, offer opportunities for further analysis. There are other data sets that could be added to the system, such as university affiliation and location of the stops. Who is being stopped, resident students, commuter students, staff or non-university members. Location of stop is especially relevant. My past experience has shown that location of stop may shew data on individual officers. In the future, I plan to expand and upgrade my analysis in this subject area..

# 20 About the Author

John W. Seay has been a police officer since October 1980. He worked for three different police departments in two different states. He has worked for both a city police department and two different university police departments. He has worked in various police assignments. He is a trained investigator. He held the rank of Detective, Sergeant, Lieutenant and Captain. He has successfully conducted several internal affairs investigations. He has successfully completed a bachelor's degree in Business Management from Florida International University. He has completed over a thousand hours of in service training in both Police Administration, Emergency Management, and Homeland Security. Currently, he is a master's Candidate in the Computer Science & Information Systems (MSCIS) Program at the University of North Carolina Wilmington (UNCW). He is currently employed as a Detective for the UNCW University Police Department. He is currently assigned to the Support Service Division as the Data Analyst.

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