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A STUDY OF THE EFFICIENCY OF THE COMBINED DNA INDEX SYSTEM FOR THE OREGON STATE POLICE

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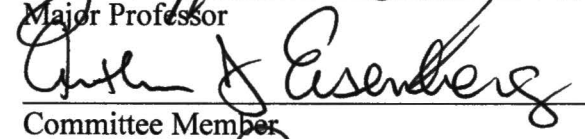
APPROVED:

Major Professor



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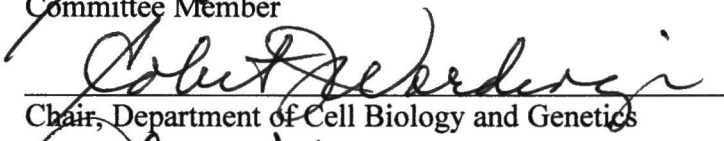

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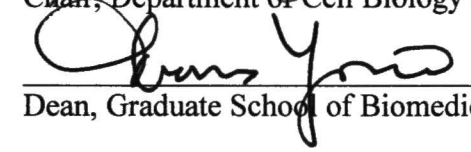

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CHAPTER I

INTRODUCTION TO CODIS

The goal of this project was to follow up on DNA matches that were made using the Combined DNA Index System. CODIS, which stands for the Combined DNA Index system, began as a pilot project in 1990. In 1994 the DNA Identification Act enabled the FBI to establish NDIS, which stands for the National DNA Index System. The purpose of CODIS is to link crime scenes together and its efficiency is measured in how many investigations it aids in. The three levels of CODIS are the local level (LDIS), the state level (SDIS) and the national level (NDIS). Not all states have an LDIS lab. For example, the state of Oregon has one SDIS lab, which communicates with the NDIS lab in Virginia. The categories present within CODIS are the convicted offender samples, forensic samples, unidentified human remains and finally the relatives of missing person's samples. When a person commits a crime, their DNA is obtained so that a profile may be uploaded into the convicted offender portion of CODIS. If that same individual is arrested for another crime, the DNA profile present in CODIS may be compared to the DNA left at the most recent crime, enabling the investigators to link crimes to suspects. In order to call the DNA a match, all twenty-six alleles must be present in the crime scene profile and the suspect's profile. A perfect match may also be referred to as a cold hit, while non matching may eliminate the suspect and almost

matching may provide clues as to the possibility of a family member committing the crime.[1] Since humans inherit half of their DNA from their mother and half from their father, there should be one allele from each parent present at the thirteen locations on the DNA. An allele is a variant of a gene and is entered into CODIS as a number. The forensic samples are composed of DNA obtained from crime scenes, which are useful in situations where there has been no identified suspect. Having the forensic sample index aids in linking crime scenes together and eventually facilitates in solving multiple crimes. When the remains cannot be identified, the DNA from the remains may also be uploaded into CODIS, in hopes that at some point the individual might be identified. The relatives of missing person's records may help with the identification of unidentified remains.

The components of what is included in a CODIS DNA record are the following; the DNA profile which is a series of numbers representing the alleles an individual inherited from mom and dad, the NDIS agency identifier which is for the submitting agency and may also be known as the laboratory number, the NDIS specimen identification number and the name of the DNA analyst that was assigned to performing DNA analysis on the evidentiary material.[2] This means that in the United States, there is no personal identifying information such as home addresses. Once a match is identified and confirmed, a public forensic laboratory must contact the other laboratory in order to obtain the name of the individual. Over all, CODIS is very important in linking crime scenes together, identifying suspects and identifying missing individuals. Since CODIS contains such secure information, there are certain guidelines that forensic scientists must follow in order to maintain the ability to use CODIS, which are set fourth in the Federal

DNA Identification Act. In the Act "there is limited disclosure and use of the DNA samples and records: to criminal justice agencies for law enforcement identification purposes, in judicial proceedings, if otherwise admissible pursuant to applicable statues or rules, for criminal defense purposes, to a defendant, who shall have access to samples and analyses performed in connection with the case in which such defendant is charged, or if personally identifiable information is removed, for a population statistics database, for identification research and protocol development purposes, or for quality control purposes."[2] If this information is obtained without authorization then there are severe consequences such as a criminal fine or imprisonment or both. In addition, if a violation does occur the laboratory is subject to cancellation as an NDIS participating laboratory.[2] In order for labs to participate in NDIS they are required to generate their DNA records in accordance with the FBI Director's Quality Assurance Standards for Forensic DNA Testing Laboratories and Quality Assurance Standards for Convicted Offender DNA Datbasing Laboratories.[2] The standards require the laboratories to undergo audits, which are conducted by an outside agency one every two years.

The problem and its purpose

Since the establishment of CODIS, unsolved cases are now being closed. For example, if DNA is uploaded into the forensic index present within CODIS, and there is no suspect identified, that offender might repeat an offense leading to his arrest for the recent and past crimes committed. This particular type of case is called a non-suspect case and demonstrates one of CODIS's strengths. The local, state and national government monitor the CODIS hits through their systems known as LDIS, SDIS and

NDIS. Each state determines what is loaded into the database, which is monitored by a CODIS administrator. In Oregon on September 29, 1991 a law was passed which included felony sex crimes, selected misdemeanor sex crimes, murder, and aggravated murder. In 1999, Burglary I and Assault 1 were added to the database. By January 1, 2002 all felons were added, and some misdemeanor crimes were taken out of the database.[3] Meaning, all cases that were studied in this research project were cases that were either felonies or certain misdemeanors such as sex offenses. There are several outcomes in using CODIS and those are " the match may link two or more unsolved cases, which allows investigators to coordinate their activities, the match may link a solved case with an unsolved case and the match may link two or more solved cases, which would be useful information to prosecutors in the adjudication of each case."[4]

Once biological evidence is left at a crime scene it is possible to use this DNA database to search against past crimes. This is especially important because of the fact that most offenders are repeat offenders or offenses that might be considered mild usually escalate to more serious crimes.[5] If a possible match occurs then an investigative lead is made. Law enforcement officers are then notified of these investigative leads. CODIS has produced over 48,500 hits and has assisted in more than 49,400 investigations.[6] A recent article in USATODAY reveals a serious problem with CODIS "A DNA match-a crime "solved" by the FBI's database- does not mean that an arrest was made, that a criminal was prosecuted or even that detectives considered a case closed. Just how many DNA matches lead to an arrest isn't known; no government agency keeps track."[7] There are several possible explanations as to why individuals do not know how many DNA

matches lead to an arrest. Some of those possible explanations are as follows; police overlooking the reports that the forensic scientists send to them, the DNA match was made to someone that could have not been the suspect or the victim did not want to prosecute and proceed further with the case. No matter what the explanation is, it is important to investigate the reason that many of these DNA matches are not proceeding further. Investigating why the DNA matches are not advancing requires additional time and resources. Therefore since neither time nor resources are available, the primary focus has been analyzing the DNA backlog. Putting DNA analysts in charge of following up with the CODIS hits and determining case resolutions would eventually put labs further behind and some labs out of business. One contribution to the overload is that states have expanded the scope of what is included in CODIS. Now that all individuals who have committed a felony must have their DNA taken, the backlog has increased dramatically in some states. A result of encompassing all felonies and some misdemeanors is an increase in the number of hits obtained in CODIS. An alternative idea that might explain an increasing number of hits is that some labs prioritize how the evidence is processed. The Oregon crime lab has seventeen hundred CODIS hits. The supervisor of this project, Brian Ostrom, believes that this high hit number results from how the state lab prioritizes its cases. The cases classified as people crimes are analyzed first by the DNA analysts and any over time is spent analyzing burglary and non-person crimes. Typically the hits that are obtained in the Oregon lab are hits to low priority cases. As an example, for about every ten burglary cases uploaded into Oregon's database, five will hit to CODIS. Prioritizing case work might improve many of the

other states databases and also increase the total number of hits obtained within CODIS. According to an article from 2004 in the Intelligencer, a man named John Capriotti who is the director of the Pennsylvania State Police's Bureau of Forensic Sciences, said " DNA work related to active investigations takes precedent over keeping up with the database."[8] A resolution to keeping track of the rising CODIS hits would be to hire more personnel that are specifically in charge of following up with the hits obtained. After all, CODIS is a valuable tool that not only has aided in solving crimes but also exonerating innocent individuals that were once convicted using older DNA methodologies. If this tool is not going to be used to it's full potential then the following is true "Justice delayed is justice denied."[8] As mentioned previously, it would be a good idea to have individuals present within the lab that would specifically focus on loading profiles into CODIS and following up on the hits made within CODIS. See below for some common terms used in this paper.

Definition of Terms

CODIS: Stands for the Combined DNA Index System and is a database used to aid in identifying suspects and unidentified remains. There are three levels, those of which are NDIS, SDIS and LDIS.

NDIS: National DNA Index System

SDIS: State DNA Index System

LDIS: Local DNA Index System

DNA: Stands for Deoxyribonucleic Acid and is found in the center of the cell. There are differences and similarities present within the DNA, which ultimately makes all humans similar and different.

Familial Searching: A technique used within CODIS to identify suspects when there is no perfect DNA match. The Federal government left it up to each state to decide how familial searching is conducted. Typically familial searching is performed by searching for rare alleles.

Allele: A variant of a gene.

Gene: Unit of heredity.

Cold hit: Perfect DNA match that is made to a known offender.

Case to Case hit: DNA matching different crime scenes.

Case to Offender hit: DNA that matched a offender and forensic evidence.

FSS: Stands for the Forensic Science Service, which is the government agency in the United Kingdom.

Convicted Offender Index: One of the four indices present within CODIS. It contains the DNA profile from a known offender.

Forensic Index: Contains the DNA from a crime scene. This index is useful for suspect-less cases.

Unidentified Human Remains Index: Contains the DNA from any remains that have not yet been identified.

Relatives of Missing Persons Index: Contains the DNA samples that have been obtained voluntarily, in hopes of identifying missing persons.

PPB: Portland Police Bureau

CRASH: Community Resources Against Street Hoodlums

STR: Stands for short tandem repeat. Forensic DNA Analysts look at a series of consecutively repeated units in the DNA, which are called short tandem repeats.

Method of Procedure

This project, which was conducted at the Oregon State Police Crime Laboratory, entailed following up with CODIS hits. It involved examining cases that have been worked by the forensic scientists and finding explanations as to how the cases are proceeding after DNA matches are made. Failures to follow up on a CODIS hit have become a national problem in forensic laboratories all over the country. The Oregon State Police find this a very important issue that must be resolved. Currently the Oregon State Police are getting a hit, an arrest and a conviction. The only problem with all of this is that it is hard to measure the efficiency of CODIS hits with just convictions. There are several ways the cases could have been resolved such as the victim did not want to pursue the case any further, the suspect was already incarcerated for another crime, the witnesses were hard to locate or the case was dropped because of a plea to other crimes. As part of my research I investigated each of the cases that have been worked to see if they were pursued any further after a hit to an individual. After researching these cases, it was my responsibility to put my findings into a format that made it easier for the state police to know how the cases were resolved. The information was collected using a variety of software programs. The reason that more then one computer program needed to be used in this project, is due to the fact that more often then not some of the information that

should have been provided in a program was absent in one and present in another program. The California Department of Justice currently has a system that is available which allows its users to input data. In order to design such a system it was my responsibility to obtain the case information. Once this had been obtained it made it easier to combine the data into a table format so that the state police could see how each case was proceeding. Below is a table of exactly what information was obtained. Due to the confidentiality of the information, false names and false information will be used in all tables seen. Once the information for one thousand hits had been gathered it was placed into Microsoft Access so that a database could be created.

Table 1: Example of format used to gather the data

Hit Number	Name	Date of Birth	SID Number	Case Number	Offense Date	Match Date	Offense	Case Resolution	Agency
1	John Doe	1/13/80	1256778	F-005-01	3/14/01	9/15/04	Burglary	Convicted	PPB
2	Jane Doe	2/18/54	1897659	F-009-03	5/16/02	10/12/05	Homicide	Dismissed	Clack

Throughout the time that CODIS has been in place, crimes where DNA matches have been made but not pursued have shed light upon a common problem occurring everywhere in forensic laboratories. Dozens of cases have found matches between a suspect and a crime but there has been no pressure to pursue the case any further. In fact one unfortunate result has been multiple DNA matches of a suspect, with the suspect continuously making repeated offenses. Most of the offenses are not pursued until the investigators realize there might be a link between the current crime and the past cases worked. Only then are the reports of the DNA matches reviewed and pursued further. In one Virginia case, this scenario occurred. A man by the name of William Orlando Smith

followed a girl and raped her in the woods.[7] Had the DNA match that the Virginia police made months earlier been pursued, the rape might have been prevented. This is not just one isolated event but a common occurrence seen in other states as well. Although this research for the Oregon State Police might not resolve a national issue, it will aid in preventing scenarios like the above from possibly occurring. By solving this problem and entering how cases are resolved into a database like Microsoft Access, it will make it easier for the investigators to process crimes. Even more important is the need for this information to be compared with other states. A study such as this will enable states to test the efficiency of CODIS.

CHAPTER II

THE SIGNIFICANCE OF FOLLOWING UP WITH CODIS HITS

Setting up the Combined DNA Index System was an expensive cost incurred by taxpayers all over the country. It was under the impression of those taxpayers and the government that this computer system would enable crime solving to be more efficient. Because of the fact that repeat offenses are made, after DNA matches, and still there is no resolution to the case, this may lead to a decrease in funding. One possible solution is to make law enforcement communities follow through with DNA matches made through CODIS by having a mandated law that requires crime laboratories or the law enforcement to follow through with the DNA matches made through CODIS. Even if no such law is enforced, then this issue still needs to be addressed by either the law enforcement or the forensic lab. Rather than making one group entirely responsible for following up with the CODIS hits, a far more superior idea would be for agencies to hire a group of individuals solely responsible for this job. Thereby forensic laboratories would still be able to process the backlog and investigators could continue pursuing current cases. Repeat offenses not only cost lives, in some situations, but also cost money to analyze the biological samples. Setting up a system that would follow up with the CODIS hits could eventually lead to a reduction in these repeat offenses.

CODIS has great strengths and weaknesses. Of course one of the hugest weaknesses is how its efficiency is measured. Previously mentioned was the idea of hiring more technical support that could continuously upload samples into CODIS and monitor the hits made. In order to monitor the hits, the DNA profiles from the convicted offenders must first be placed into the database. In one article from 2004, there was a report that the DNA might not be getting collected and therefore, the profiles are not ending up in CODIS.[9] One unfortunate result of samples not being collected is that later offenders may commit another crime, as most repeat offenders do, and there is no link found between cases. Therefore the number of suspects that CODIS helps to identify might be poorly underrepresented. According to an article from The Chronicle Telegram in 2004, they found that the DNA database had aided in identifying suspects in more then eleven thousand cases.[9] Right now the Oregon State Police have had a total of one thousand seven hundred and nineteen hits. It was my responsibility to gather information on one thousand of the hits that have been made, thus bringing the data up to the year 2005. As observed in Table 2 and Figure 1 the hits and the types of crimes leading to the collection of a profile are being monitored. What is missing from this information is how each case where a hit was observed lead to a conviction, a dismissal, whether or not there was a plea to other crimes, no charges were filed, the victim might have been unwilling to testify, a breakdown in reporting, the evidence was not admitted or maybe there was a jury acquittal. Understanding the type of offense that lead to the collection of a profile, will aid in linking multiple crimes to one another. Even then, some reports such as the

one mentioned previously are finding that some offenders are slipping through the cracks, and their profiles are not being entered into CODIS.

Oregon CODIS Hits Report

Year	Total Hits	Cases Aided	Forensic Hits	Offender Hits	National Offender Hits (1)	National Offender Hits (2)	National Forensic Hits	National Cases Aided
1994	1	1	0	1	0	0	0	
1995	1	1	0	1	0	0	0	
1996	2	2	0	2	0	0	0	
1997	4	9	3	1	0	0	0	
1998	3	4	1	2	0	0	0	
1999	3	4	1	2	0	0	0	
2000	13	17	3	10	0	0	0	
2001	29	34	9	18	0	2	0	2
2002	136	140	21	103	3	7	2	9
2003	85	86	9	59	4	13	0	13
2004	347	401	94	201	41	8	3	11
2005	358	360	64	252	30	7	5	10
2006	479	512	93	332	40	8	6	11
2007	258	269	43	177	29	7	4	11
Totals:	1719	1840	341	1161	147	52	20	67

Convicted offender profiles entered in CODIS: 78097

Total Hits in CODIS: 1719

Convicted offender hits (state and national): 1216

There is 1 offender hit for every 64 offender profiles entered.

Report created: 5/18/2007 11:41:57 AM

Table 2: Oregon CODIS Hits Report provided by Brian Ostrom

Oregon CODIS Hits Report

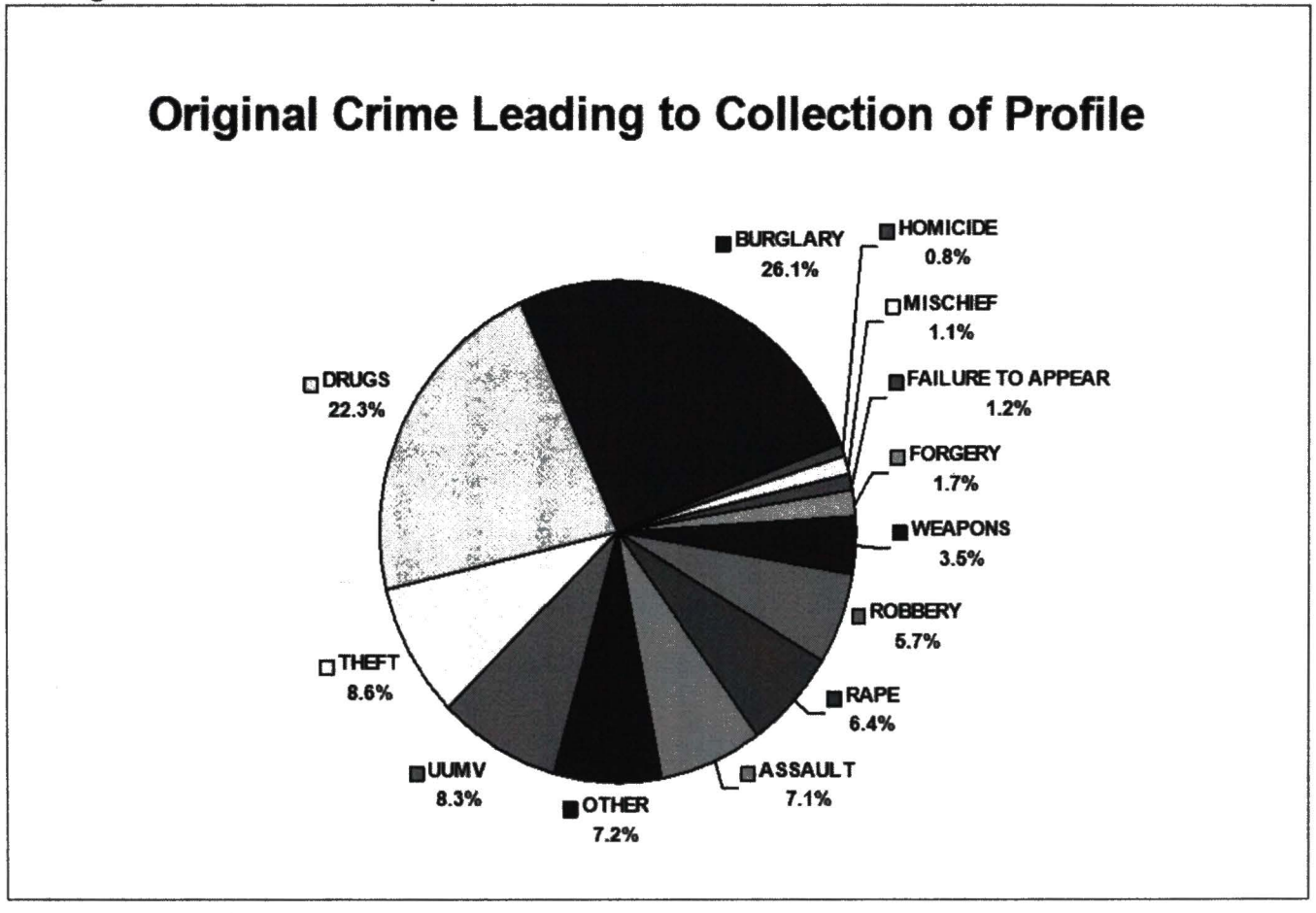

Figure 1: Showing original crime leading to collection of profile

According to the statistics for the Oregon State Police crime laboratory, approximately 26.1 % of the cases that lead to the collection of a profile are burglary cases. This means that a majority of offenders that end up in the offender index of CODIS are individuals that commit the burglary cases. Burglary may be considered a gateway crime to more serious crimes later on in the future. It is more often then not that the hits obtained are to the low priority cases such as burglary. Even though a majority of the hits are to property crime cases, the individuals committing the burglaries should have the DNA samples loaded into the database. A result of not collecting these samples, which has been documented to occur in other states, would be an inability to link crimes to each other or crimes to suspects. As mentioned earlier, individuals that commit burglaries might have a tendency to commit more serious crimes, which makes it very important to load the samples into the database. According to an article from The Oregonian, an audit of the Portland Police Bureau, found that a majority of the sex crimes were not being pursued. Once a CODIS hit is reported to the investigators, it is in the responsibility of the police, to pursue the individual that the hit was made to. One possible explanation to a low conviction rate or an unknown case resolution may be explained by an article which states "And when cases falter, it's often because victims wait a week or more—and in some cases much longer—for detectives to interview them. One teenager who reported being sexually assaulted had to wait four months for a detective to contact her, even though she had the suspect's first name and cell phone number and she knew where he worked. By then she'd changed her mind about pursuing charges."[10] Having been made aware of this, puts more negativity onto the police rather

than CODIS. In fact CODIS may be very efficient at providing investigative leads for officers, but the lead may not be being pursued, which results in no conviction or an unknown case resolution. In reality it might not be possible to measure the efficiency of CODIS until data from other states is made available. Sex offenses, which are considered high priority cases, are analyzed first by the DNA analysts at the Oregon State Police DNA lab. Since these are given high priority, it makes no sense why Portland is second to last among twenty one midsize cities in arresting suspects or solving crimes where a sex offense occurred.[10] Having a vast amount of time span out between the incident and contact to the victim, more often then not, leads to victims who are unwilling to pursue the case any further. Reporting a sex offense alone typically is traumatic enough for victims. This also increases the chances of the statute of limitations being applied to cases that are not resolved in a proper amount of time. It was found from the audit performed on the Portland police that a there are several explanations as to why the sex offenses are not being pursued by the investigators. One explanation pointed out that "sexual assault detective is one of the least-coveted positions in the bureau, and that's led to high turnover and low enthusiasm. Five detectives and three trainees are assigned to the unit. Many detectives in the unit are waiting for a better assignment to open in another division, the report states."[10] In order for the DNA matches made within CODIS to be properly pursued, there have to be investigators willing to pursue the matches. A second explanation was that the investigators might have actually pursued the match, but that "If the victims did not return the calls or refused to come downtown, cases were typically set aside."[10] This is of huge concern for the public, whom should feel safe

knowing that offenders are being convicted of heinous crimes. Since this project entailed following up with the CODIS hits, it was discovered that a majority of cases were either dismissed or there was an unknown case resolution. In fact, from performing this study, as hit numbers went into later years, there was an increase in the number of unknown case resolutions. This makes no sense, considering that technologies have improved over time, which gives DNA analysts, the ability to analyze samples with high throughput. The older technologies such as RFLP and polyacrylimide gel electrophoresis have been replaced by the more superior techniques of STR and capillary electrophoresis. What should be expected is that cases will be analyzed with greater efficiency allowing for investigators to obtain convictions sooner rather than later. More importantly is the fact that the Oregon State Police laboratory appear to be relatively efficient at sending out the reports of the DNA matches and analyzing the new cases that come in daily. Their way of prioritizing cases has led to an increase in the total number of hits obtained within CODIS. What is unfortunate is that according to an article, Drummond Kahn, who is the city auditor director who oversaw the audit report found that the rates of arresting suspects and solving the crimes were actually getting worse.[10] This could possibly lead individuals to conclude that the police, who are hired to protect the citizens, are not actively doing their job. A result of the inability to investigate the DNA matches, will ultimately lead to the inability to measure CODIS effectiveness. Bieber pointed out "Furthermore, hundreds of DNA database matches (hits) languish, without any follow-up by law enforcement or prosecutors."[11] Although this article does not specifically focus on Oregon, this type of situation might be occurring in several states, leading to a

possible explanation on why states are also reporting low conviction rates. Many states are not actively pursuing explanations to their low conviction rates, and because of this it is hard to compare the efficiency of CODIS hits between different states. By comparing the results obtained from the CODIS hits between different states, this provides the justice system with an upper hand in knowing ways in which CODIS may be improved. "The overall success of such programs simply has not been carefully evaluated in a systematic way by the justice system. This is lamentable as, without such monitoring, it is impossible to identify new ways to improve effectiveness of these data banks. Ultimately such evaluation must occur, as these collections constitute a costly government program and, with limited resources, law enforcement agencies must balance competing demands on budgets and personel."[11]

CHAPTER III

THE BACKGROUND OF CODIS AND ITS EFFICEINCY

In 1990, when CODIS was conceived, it was thought of as a powerful tool in curtailing crime. In that aspect CODIS has succeeded, it has aided in solving several violent crimes.

A CODIS match is made in the following manner; DNA profiles are generated and then the profiles are compared to the indices present within CODIS. If the profile that was generated for an individual matches a profile already stored in the database then a match is made and a report is written regarding the match. These reports are written and sent to the investigating agency, which then should continue to investigate the lead. For some reason the matches are being made, but not properly acted upon. Presumably, if more DNA matches were followed up on the number of individuals CODIS helped to convict might actually increase. The Oregon State Police are getting hits to individuals but they have no idea on how the cases are being resolved. Forensic labs, whose primary function is to analyze evidence, have neither the time nor the capabilities to investigate CODIS leads. Proponents of CODIS state that it is possible to test its effectiveness by measuring how many hits and investigations it has aided in. Therefore it is imperative to investigate how CODIS had aided in solving crimes, ways to improve CODIS and lastly the reasons that most of these DNA matches are not being pursued any further.

CODIS has aided in solving several crimes by giving DNA analysts the ability to search DNA samples present in the database as well as the ability to do familial searching.[12] There have also been several cases in which it has aided in exonerating several individuals.[13] Once DNA analysts have generated genetic profiles, PopStats, a software program, calculates the frequencies of genetic profiles and gives analysts the ability to search the indices present within CODIS.[14] There are two primary indices in CODIS, they are the convicted offender index and the forensic index. If the profile generated by the analyst matches a profile from the convicted offender index then it aids in providing an identity of a suspect for investigators, consequently if the profile from a crime scene matches a profile in the forensic index then this aids in linking crime scenes together. By being able to search within the database and between the databases, forensic DNA analysts may link crimes to known offenders or suspects to multiple crimes. "DNA profiles from convicted offenders and evidential material are contributed to NDIS by participating State CODIS laboratories. The profiles from all forensic cases are searched at this level against the Offender Index and against all case profiles in the Forensic (Casework) Index."[14] The state legislature determines what is input into the database. Some states have decided to put all felonies into the database whereas others, such as Oregon, have decided to put some misdemeanors and felonies into the database. By increasing the size of what is input into the database this ultimately increases the number of hits obtained within CODIS. Currently many states are beginning to include all felonies in the database, whereas a few years ago it only included cases involving murder or sexual assault. Once an individual commits a crime and they are arrested, a DNA

swab is taken and a profile is generated for that individual. That DNA profile is then uploaded into the convicted offender index. Thereby, if that individual commits a crime again, they may be linked to that crime. If DNA is left at a crime scene and there is no suspect, then the profile is stored in the forensic index in hopes that an identity may be soon be obtained.

One case to illustrate the effectiveness of CODIS was the sexual assault of Debbie Smith. Fortunately Mrs. Smith survived to tell the police what happened. A suspect was arrested but later released when conventional serology excluded him. After a series of rapes that were similar to Mrs. Smith's case, her case was reopened and a DNA profile was generated. The profile that was generated was eventually searched against the databank, leading to Norman Jimmerman who was already incarcerated for other crimes.[15] This is not the only success story. When the database was designed it was used mainly for violent crimes, but now it is being used to solve property crimes. Some argue against using the database to solve crimes like property crime because its possible infringement on civil liberties. In an article by Tania Simoncelli, she suggests that all people have the right of being innocent until proven guilty, even those that have been convicted of a crime.[16] According to Simoncelli the database is a violation of one key portion of democracy. Despite these objections using CODIS to solve these types of crimes is useful and important. Crimes against property are considered gateway crimes to more serious offenses. USATODAY pointed out that among some states, Oregon was one that "the total number of DNA matches in property crime cases has exceeded the

number of matches in violent crimes."[5] These examples illustrate the success of CODIS despite the lack of mechanisms for tracking CODIS matches.

Familial searching is used in circumstances when there is not a perfect DNA match. In 2006 an article was published in "Human Genetics" about the idea of finding criminals using DNA from relatives. This has been a center of controversy among some, but others see it as yet another way to improve the database. Proponents of familial searching feel like this is necessary for situations dealing with mass disasters or missing persons. According to an article by Bieber et al., it was reported that 46% of jail inmates indicated they had at least one close relative that was incarcerated.[12] Information like this may be used to search against close relatives of the suspect. This exact type of scenario occurred in a case in 1988. "The brutal 1988 murder of 16-year-old Lynette White, in Cardiff ,Wales, was finally solved in 2003. A search of the U.K. National Database for individuals with a specific single rare allele found in the crime scene evidence that identified a 14-year-old boy with a similar overall DNA profile. This led police to his paternal uncle, Jeffrey Gafoor."[12] This is not the only case that has been solved in this manner. Familial searching has also led to the exoneration of the innocent. For instance individuals have been freed after investigators discovered that it was the brother of the individual that actually carried out a crime. Yet again further emphasizing how familial searching can be used in a positive way. Daryl Hunt, a man who had served eighteen years in prison, was exonerated after familial searching was performed. A man named Anthony Brown matched at sixteen of the twenty-six alleles left at a crime scene. After familial searching was done, it was discovered that the crime scene sample matched

Willard Brown.[17] Even with all these success stories about how CODIS has aided in solving crimes, there exists a cloud that looms over the database. According to one article as of 2003, the DNA tests had exonerated one hundred and thirty people who had been falsely convicted or imprisoned.[13] Even though familial searching has lead to several exonerations of the innocent, it should be made clear that the searching techniques within the United Kingdom database and the United States database, are quite different. The United Kingdom's database for offender identification is known as NDNAD, which stands for The National DNA Database. The daily operation of the database is performed by the Forensic Science Service, which is a government agency.[11] There are several other states that also maintain DNA databases such as Germany, the Netherlands, Belgium, Denmark, France, Norway, Spain, Sweden, Switzerland and Canada.[11] The reason that the United Kingdom DNA database is important when it comes to discussing familial searching, is that the United Kingdom has been very successful in using familial searching to solve crimes. Many are aware that the United Kingdom is far more advanced then the United States when it comes to technology. The United Kingdom not only reports individuals that closely match, but they also report geographic information and physical description to the investigators when they conduct familial searching.[17] In the United States, there are specific rules on searching and each state has the ability to define how the searching is conducted. "Investigators in the USA and the United Kingdom have begun to solve not just crimes committed by convicts whose DNA profiles are in government databases, but also those committed by relatives such as Willard Brown, whose profiles were not on file. Siblings, parents, and even

uncles and cousins increasingly are being investigated for crimes because their genetic fingerprints closely resemble the DNA of the known criminal."[17] At the Oregon State Police, in order to report a familial match, there must be one allele that matches at each of the thirteen locations on the DNA.[18] Technically, in a single source sample, there should be a maximum of two alleles at each location on the DNA. This is because an individual receives one allele from their mother and one from their father. If some states, such as Oregon, require a minimum of one allele to match at each location, there is a high likelihood of missing brothers or sisters. This type of searching capability is really only good for parent offspring searches, because you have the chance of missing brother or sisters.

One logical disagreement that presents itself regarding familial searching, is whether or not this is a violation of the fourth amendment, which protects against unreasonable search and seizures. Including the DNA from offenders is considered reasonable because it is used in the special needs exception of the fourth amendment.[16] In that, offenders are considered to have lost the right to the fourth amendment as a consequence of being convicted. The question then becomes a moral issue as to whether or not individuals, who are related to someone that was convicted, should have their privacy invaded because they have a family member that commits crimes. Even more interesting is the fact that DNA does share similarities between individuals, and it is highly probable that there can be two unrelated individuals that can partially match.

Since the database contains samples from forensic casework and also convicted felons, adding any additional samples might make it over inclusive. Expanding the

database to include everyone, especially those applying for a visa, is an idea that has been brought to attention. Even if the database did include everyone, the problem of following up on the CODIS hits still might not be resolved. Increasing the size of the database could lead to more chaos, especially due to the fact that DNA analysts would be overloaded with analyzing more samples, further adding to the backlog. Now that California has decided to include all felons in its database, the backlog has quadrupled, which leads to cases that do not get processed for months.[16] Mandating DNA samples from every individual can not be considered an invasion of privacy, at least in regards to predisposition to genetic diseases. Forensic DNA analysts do not look at coding regions in the DNA; therefore the samples that would be supplied would only be used in providing leads to investigations. Amitai Etzioni compares a mandated collection of DNA to the Japanese internment camps saying that their approach during World War II was both over-inclusive and under-inclusive.[13] This comparison is analogous because if the database included everyone that was a U.S. citizen, it would leave out all those that have immigrated to the United States illegally. Even if questions arise about including everyone in the DNA database, it would only aid in attaining accurate convictions of individuals. Before DNA became the main standard in identifying people, eyewitness testimony was used largely in the court system. The downfall of eyewitness testimony is that few individuals were classified as possible suspects. Thus placing these individuals in a category. Today eyewitness testimony is not as crucial and more importantly the DNA database can make matches, which eliminates more then one person from being put into the category of being called a suspect. Still the question remains as to whether this is

similar to big brother is watching you, from the book 1984 where the citizens of a totalitarian state were under constant surveillance. This time the citizens would be under constant genetic surveillance, and the fourth amendment, which protects our privacy, would be imaginary. The idea of people being innocent until proven guilty would be nonexistent for a complete inclusion of the innocent individuals. Stating that our motto of innocent till proven guilty does not apply now because we are currently using the database to search for offenders. The government may soon reason collecting DNA from innocent citizens in that it applies to the "special needs" exception for the Fourth Amendment.[16] In fact Tania Simoncelli states that the mere fact that the governments needs would be outweighing our innocent citizens privacy seems "beyond the pale, as a matter of Constitutional principle."[16] Even more worrisome is the fact that there have already been instances of abuse with Michigan's Law Enforcement Information, in which police officers were going into the network to obtain home addresses or background information. If breach of information has already occurred, it is hard to say what would happen if everyone's DNA samples were loaded into the database. In an article by David Lazer and Viktor Mayer-Schonberger, they deem that if the DNA information is needed, court orders must be obtained for access to the samples.[19] Some of the samples have already been used in other areas like medical research. Of course the ability to use the samples for other things varies between the different states. One disadvantage to including everyone is that it might lead to evidence being planted at a crime scene. It is thought that criminals will make use of a new over-inclusive database, which may lead to false incrimination.[16] When taking a step back it becomes apparent that if familial

searching is going to be used or the database is going to eventually include everyone, then policies must be established which limit access to the data.

Storage of the samples for retesting purposes should be evaluated. Many labs across the nation keep DNA samples for a number of years before disposing them. David Lazer and Victor Mayer-Schonberger perceive there are two key principles which are "the context and purpose principles, which assert that personal data that have been collected for one purpose and in one particular context should only be re-used for other purposes in cases where there is a strong overriding public interest."[19] Storage of DNA samples may eventually lead to its use in new technologies, such as single-nucleotide polymorphisms and proteomics that are erupting. Using these technologies would eventually enable people to look at gene profiles for all individuals. Although there is this downfall, the samples do need to be stored for instances in which a DNA match is made. Even if technology does change and there is a switch from using the common STR markers to the SNPs or Y-STR systems, a benefit to storing samples is that it will not be necessary to obtain them a second time. In an article by M. Dawn Herkenham, it is stated that "maintaining the offender sample for reanalysis is similar to the need to retain a portion of the evidentiary sample."[2] Keeping portions of evidentiary items or reference samples enable the analysts to go back and retest. The necessity to store samples for retesting purposes applied to a recent discussion at the Oregon State Police in which the defense did not want a technical reviewer to testify to a case worked by an analyst that no longer works at the Oregon State Police laboratory. This became an issue because not only did they not want the peer reviewer to testify to it, but they also did not

want to pay for the person that previously worked at the Oregon State Police to come up and testify to the case. When an analyst leaves an agency, such as in this scenario, it is under the responsibility of the defense to pay for that individual to testify, if they are not willing to have the technical reviewer testify to the case. The defense has this right, under a court of law, that they may challenge that the technical reviewer did not touch the evidence. So for scenarios like the one above, it makes sense to store the swabs for further testing. But ultimately, everyone eventually retires or changes jobs. Then there is the issue of how to handle cases like this without consuming the evidentiary material. Even with cases such as mixtures, it is possible that when the evidentiary material is retested, a new combination of alleles may present itself a locus. This may easily be explained, but the issue of storage of swabs does seem necessary for forensic DNA analysts who must go back and retest the sample. This is all part of the quality assurance program, which guarantees that a sample switch does not occur. As mentioned previously there should be stipulations, which prevent samples from being retested. The types of requirements that should be instilled are as follows; if the sample is from a convicted offender, if the case evidence is from unknown subjects, if its from missing persons and lastly if the samples are voluntary. This is actually all part of what the FBI prepared in 1991 called the "Legislastive Guidelines for DNA databases."[20] In this, particular requirements are set fourth to protect the citizens from abuse of stored samples. However, what is key is what defines abuse. If abuse is letting the DNA population statistics be used for medical research, then the database has already been abused by Alabama.[19] On the other hand abuse could mean using the database to obtain background

information or to test the DNA for individualizing traits for the party of interest. Either way, if the privileges are abused then there are consequences such as a fine up to $250,000 and imprisonment up to one year.[2] In addition, established standards require laboratories to undergo audits, ensuring that all laboratories are following proper protocol. These audits are later submitted to the FBI's CODIS unit and reviewed by a panel. Michael E. Smith perceives that having the database include innocent individuals is not of value, but storing the samples after obtaining a DNA profile at the thirteen locations is important. Smith makes an adamant point about why storing samples can lead us down a dangerous path. Since DNA analysts look at the thirteen locations on the DNA, which are non-coding regions, including everyone in the database shouldn't really be an issue. Samples that are stored may be tested for genetic disorders or allow for investigation into who birthparents are. It is under Smith's belief that ultimately other people would have the ability to know things about us that we do not even know.

More importantly the database is over represented by the African-American community in many states, which could be corrected by including all arrests. "Without very unlikely changes in Americans' behavior or in our criminal justice system, nearly thirty percent of black males, but less than five percent of white males will be imprisoned on a felony conviction at some point in their lives."[21] Since most state legislatures mandate that all individuals who have committed a felony have their DNA samples taken, this leads to a database over represented by blacks. "Initially, statutory legislation allowed collection of DNA only from those convicted of murder or sexual crimes, but inclusion criteria have steadily expanded to include all felonies, including non-violent

property crimes, in the majority of U.S. states."[11] This does not mean that African Americans tend to commit more felonies; it simply means that they are more likely to be arrested. CRASH, which stands for Community Resources Against Street Hoodlums, represents how CODIS could be abused. The Rampart division of the Los Angeles Police Department in 1999 planted drugs and guns on defendants who were mainly African Americans and Latinos. After planting the drugs and guns on the defendants, they later testified in court to finding the items on the individuals.[22] The reason that this is so important is because of the use of DNA dragnets. This is a technique that is used by police in which likely suspects in a geographic area around the crime scene are asked to provide a DNA sample. In one instance a DNA dragnet was used, and when someone asked a friend to donate a sample, that individual ended up becoming the prime suspect for a case.[22] Although these have found to be somewhat useful, the United States has only conducted a handful of them. In fact many of the DNA dragnets that have been conducted in the United States have been found to be targeted at certain racial groups.

In regards to how the database should be improved, there must be a follow up on the DNA matches that are reported to investigators. Secondly, familial searching may aid in solving more crimes, which may be a way to improve the effectiveness of the database. Since the searching techniques are vastly different between the United Kingdom and the United States, it would be advisable to use familial searching that would provide geographic location and physical description, similar to what the United Kingdom does. Lastly, instead of focusing on the negatives of increasing the size of the database, we should focus more on the retention of samples by the laboratories. After all, Smith points

out "I have no privacy right, nor should I, to be an unidentifiable presence in your midst. True, if the state possesses my thirteen-STR profile, I should take care not to commit a crime."[21] Besides the point that retained samples could be used for newer technologies, the database includes only felonies in some states. Unfortunately about thirty percent of African Americans are charged with felonies, while it is less then five percent for Caucasian males.[21] If the database is to be increased to include all arrests, then it would be less racially discriminating. It seems like one way to resolve most of these issues is to increase the size of the database to include all arrestees, and destroy any reference samples after a certain period of time. Thereby the database would be more representative of the entire population and would lead to reduced concern surrounding the possibility of the samples being used for newer technologies. Even if these ideas are implemented, one issue largely remains, and that is who is going to be responsible for following up the database hits.

Previously an idea was purposed on increasing the size of the database to include all individuals by taking DNA samples of babies at birth. The downfall is that not only would it cost approximately $670 million per year, but there would also be an increase in the number of cold hits, where the person that matched was not a suspect in the crime.[9] Based upon Locard's exchange principle, "with contact between two items, there will be an exchange," the argument is that in individual will leave DNA behind wherever he/she may go.[23] Even if some dispute that it would increase the number of hits that would be obtained, the only way that the databases' effectiveness can truly be measured is by looking at how many cases it has helped solve, not how many hits it has received. In fact

according to an article " a recent analysis of Virginia's crime lab found that of the 2,744 cases in which DNA from a crime scene was matched to an offender in Virginia's database, only 597 resulted in covictions."[16] This further shows that increasing the size to include more people would result in an increase in cold hits or spurious hits. If there is an existing problem with following up on the CODIS hits, it is hard to predict how advanced the problem may be if it becomes mandatory to submit DNA samples into the database.

Since the effectiveness of CODIS is measured in hits and investigations aided, there is no way to know how many cases CODIS has helped solve. In fact, according to Bieber, "no peer-reviewed, hypothesis-driven research has been published to measure the outcomes-only output has been measured."[11] Hits are defined as either case-to case hits or case to offender hits. Meaning that if the DNA evidence analyzed matches DNA present within one of the indices in the database, then a hit is made. If the hit has actually aided in the investigation then the hit is included in the investigations aided tally. Knowing investigations aided does not provide useful information because the outcomes and the type of aid are unknown. Ultimately, it is important to know if the victim did not want to go to trial, was the match made to someone who is already in prison, or is the report for the CODIS hit sitting on an investigators desk. An investigative aid can simply be referred to as the DNA comparison itself, even if there is no DNA match. If the term investigation aided is going to be used, then it needs to be clearly defined. On a grand scale, we do not know how effective CODIS is because nothing has been established to know how the cases are resolved. At the Oregon State Police, there has been an increase

in the number of CODIS hits and cases it has aided in. It is important to look into each case where a CODIS hit was obtained and see how the case was resolved. In some previous research at the Oregon State Police it was found that there was one offender hit for every sixty-four profiles that were entered. Knowing that one offender hit was made only states that the DNA from a crime scene matched that of the DNA that was already in the database. Investigators need to know the following; when the hit was made, if the case went to trial, if the person is already in jail serving a sentence for another crime, or if the victim decided that he/she did not want to pursue the case any longer. From a previous interns work with the Oregon State Police, it was found that no such scenario existed in which DNA reports were not received. In fact it was also discovered that when the CODIS match did occur, the conviction followed in about a months time. This is surprising since according to an article by Bieber, he states "the few U.S. states (New York and Virginia) that have followed up on a small number of hits have reported a low rate of convictions following their DNA database hits."[11] Since many states are not following up with their hits, it is hard to say if a low rate of convictions is normal across the board.

Following up on CODIS hits will aid in solving more crimes and reducing future crimes. As discussed earlier some states like New York and Virginia are reporting low conviction rates. There might be a logical explanation such as the database hit wasn't considered a key piece of evidence or the law enforcement are taking time in responding to the reports that are sent to them. Problems arise when the hit is from an older crime and is reported to the investigators. Many of the investigators are bogged down with

pursuing current cases, and it is hard to locate witnesses after several years. In some instances, the suspect may have been murdered by the time the hit was made, which was found to occur according to past research with the Oregon State Police. Knowing the status of every case and how it was resolved will convey the effectiveness of CODIS. If the conviction rate increases, it is highly probable that this will lead to prison crowding or the individuals may receive a light sentence. The reason being is because of the fact that most prisons are already overcrowded. Knowing case resolution is just one part of the equation. The second part of the equation is that DNA analysts are too overwhelmed analyzing samples to be forced into following up on CODIS hits. Backlogs have to be processed in addition to current cases, which creates strain on the DNA labs. In one case a man by the name of Robert N. Patton Jr. was arrested in Ohio two years before his DNA was loaded into the database. Upon entry of his profile into the database, he was found to be responsible for dozens of rapes.[24] This example shows not only how the convicted offender index and the forensic index can aid in linking crimes, but also how crucial it is to input DNA profiles into the databases in a timely manner.

CHAPTER IV

MATERIALS AND METHODS

In performing this research a combination of computer systems and phone contacts were used to follow up with the CODIS hits that have been made. The information that was obtained from these software programs was only for one thousand of the seventeen hundred CODIS hits. The systems that were used were OJIN, which gives access to the Oregon cases on the Internet, LIMS, which stands for Laboratory Information Management System, Proflog and CODIS hits.

OJIN

OJIN stands for the Oregon Judicial Information Network, and lists the case information for each individual. In using OJIN it was possible to see how each case is proceeding, or in other words whether or not there was a conviction, a dismissal, a case still open or the individual was wanted. OJIN may be accessed online, but there are passwords that are required in order to gain full access. After logging on to OJIN, it is possible to search for the court case information from all thirty-six counties in the state. The information allows an individual to search "the civil, small claims, tax, domestic, and criminal (including misdemeanor and felony) cases."[25] Upon entering the name into OJIN, a search is done for that name and a list is generated. Possession of the date

of birth allowed for a quicker search among people that had a similar name in OJIN. Missing case information was observed several times when conducting this project, if the case information was present within OJIN, then it was loaded into Excel. For information regarding OJIN please go to (http://www.ojd.state.or.us/ojin/index.htm).[25]

LIMS

LIMS, which stands for Laboratory Information Management System, was used to gather the agency information and the date of births. LIMS provided more information about the case such as agency information, birth dates and type of case. Having this information was necessary because it aided in a more efficient search, whereas any missing information did not allow for proficient searches to be conducted. The software program was called JusticeTrax LIMS-plus® and may be found by going to (http://www.justicetrax.com/products/lims-plus.htm).[26] The LIMS program was designed by forensic scientists and "is one of the most comprehensive case management tools ever created."[26] It allows forensic scientists to manage the cases by providing an overall view of the case and allows the forensic scientists to track the evidence. Given that it contained secure information, this program was password accessible. In order to access this information, an individual at the Oregon State Crime Laboratory was required to sign on using their particular screen name and password. The searching was conducted by simply entering the lab case number or CDL number into a pop up box. LIMS became very useful when the CODIS hits database did not provide a lot of information. The agency information allows the forensic lab to know who investigated each case, which became useful at the very end of the project, when agencies were contacted in regards to

unknown case resolutions. The only agency that was contacted in this study was the Portland Police Bureau.

Proflog

Proflog contains all personal identification data from the offenders, which was used to gather more information on the cases if the other systems did not provide as much information. Proflog is a database, that was made using Microsoft Access and was used as the last resource in providing the date of birth. It was not uncommon to see missing date of births present within LIMS. The reason that date of birth is crucial for searching cases is due to the fact that many people have the same name. Certain individuals are not aware of their own date of birth and because of that, an individual may be listed with different date of births. When using Proflog, the name of the individual was entered into a pop up box, and if any information were present regarding that case, the data would appear in a new window.

CODIS Hits

CODIS hits is a database that provides the names of the individuals for all the hits obtained. By evaluating this computer system it was possible to determine if there was a CODIS hit. There are two types of hits that were studied, which were either forensic hits or offender hits. The forensic hits, which were also called case to case hits, occurred when two or more of the samples linked to one of the three levels in CODIS. The offender hits, which are also known as case to offender hits, occurred when one or more forensic samples was linked to an offender. By entering the hit number into CODIS hits, a pop up box would appear with all the necessary information, including the hit number,

name, offense date, hit date, state identification number (SID), and the laboratory number (CDL). It was not uncommon to see time lapse between the offense date and the hit date. For example, an offense could have occurred in the year 2002 and a CODIS hit was not obtained until the year 2004.

Microsoft Excel

After verifying if a hit was made, it was my responsibility to see what happened after the hit, or if the hit was followed up on, which involved evaluating each case and its resolution. Some of the ways that cases may have been resolved would be; the report was not followed up on, an overloaded district attorney, memory lapse, victims or witnesses were hard to get a hold of or were dead/missing, the victim wanted to put it past them, the evidence was not admitted, the suspect is dead or is already incarcerated, the person was convicted, there is an unknown case resolution and lastly the case was dropped because of a plea to other crimes. Once all of the information that was provided by the software programs was entered into Microsoft Excel, it was my responsibility to organize it into a spreadsheet format. This format made it easier to manipulate and made it effortless for the last phase of the project.

Microsoft Access

Once this information was obtained, it was possible to create a database using Microsoft Access. Creating this database involved taking all the data for the one thousand hits studied and entering it into Microsoft Access. A database such as this will allow the forensic laboratory to have an idea of how the cases are being processed or how they were resolved.

CHAPTER V

RESULTS

Following up on CODIS hits is a national issue, not just a concern surrounding the Oregon State Police. The major drawback in pursuing this project is that this will probably only be resolved when it becomes mandated that all laboratories change their policies on how CODIS hits are followed up on. Laboratories not only need to change how the CODIS hits are followed up on but also need to look at ways of improving the efficiency of DNA analysis. It should be in the responsibility of every laboratory to look into each case and see how the cases were resolved. Whether the investigation entails hiring a completely different section that will be accountable for this, or putting current staff in charge of it, is up to the individual laboratories. Upon figuring this out, databases should be created that enable each laboratory to know how cases are proceeding. In addition to this it would be a good idea to shift to a system similar to what the Forensic Science Service is using right now, in which DNA analysis was performed on site. So far the Oregon State Police are moving in a positive direction in trying to resolve this issue.

The information gathered from this project shed light on a common theme seen in other states as well, in regards to CODIS hits. It was surprising to not find a higher conviction number, but this does appear to be the norm in other states that are following up on their CODIS hits. The Oregon State Police's method of prioritizing cases has led to an increase in the total number of hits obtained within CODIS. Even though this is an

inadequate way to measure the efficiency of CODIS, it may be an excellent way for labs to improve the total number of hits obtained in their CODIS databases. It is unlikely that there will ever be a mandated law that would require labs to follow up on the CODIS hits. Because of this, one possible way to improve the efficiency of CODIS and the laboratory overall is to begin to prioritize cases, similar to what is performed at the Oregon State Police DNA lab. People crimes should be analyzed first and investigated immediately, instead of within months. Any over time should be spent analyzing non person crimes such as burglary. In addition, a group should be hired within each lab, that is solely responsible for following up on the hits made within CODIS. If the findings indicate that it is the investigators who are not acting on the DNA matches, then it should be in the responsibility of the police agencies to hire more man power that can respond to this.

In order to thoroughly investigate the efficiency of the CODIS database, one thousand of the CODIS hits were studied. In that, the computer software programs provided valuable information such as the type of case, the date the offense occurred and the match date made within CODIS, and most importantly the type of case resolution. The agency information also provided the state police with the ability to know who was handling more of the cases that were obtaining CODIS hits. The information that was investigated was later broken down into type of resolution based on the 1000 hits viewed (Table 3), the type of offense based on the 1000 hits (Table 4), the case resolution for rape (Table 5), burglary (Table 6), unauthorized use of a motor vehicle or UUMV (Table 7), theft (Table 8), robbery (Table 9), homicide (Table 10), assault (Table 11), arson (Table 12), criminal mischief (Table 13), the PPB case distribution for the cases with

unknown resolution (Table 14), total number of hits for each agency (Table 15), case resolution for the Portland Police Bureau or PPB (Table 16), case resolution for Clackamas (Table 17), case resolution for Multnomah (Table 18), case resolution for Gresham Police Department (Table 19), case resolution for Albany Police Department (Table 20), case resolution for Washington Sheriff's Office (Table 21), case resolution for Beaverton Police Department (Table 22), case resolution for Eugene Police Department (Table 23), case resolution for Linn County (Table 24), case resolution for Marion County (Table 25) and lastly the total number of hits per year (Table 26). It should be noted that since the information that was investigated only went up to hit one thousand, the year 2006 is misrepresented. The information from Tables 3 through 26, in addition to notes taken through this study, provided useful information into whom was handling a majority of the cases that had CODIS hits, how the cases were being resolved, what agencies were more efficient in obtaining convictions, and when a majority of the hits were made within CODIS. Upon evaluating all the data, the information that was gathered was put into Microsoft Access, in hopes that that information will be available on the web. Hopefully in the near future, it will be possible to compare this study, which was conducted at the Oregon State Police laboratory, to other studies at other state labs across the country.

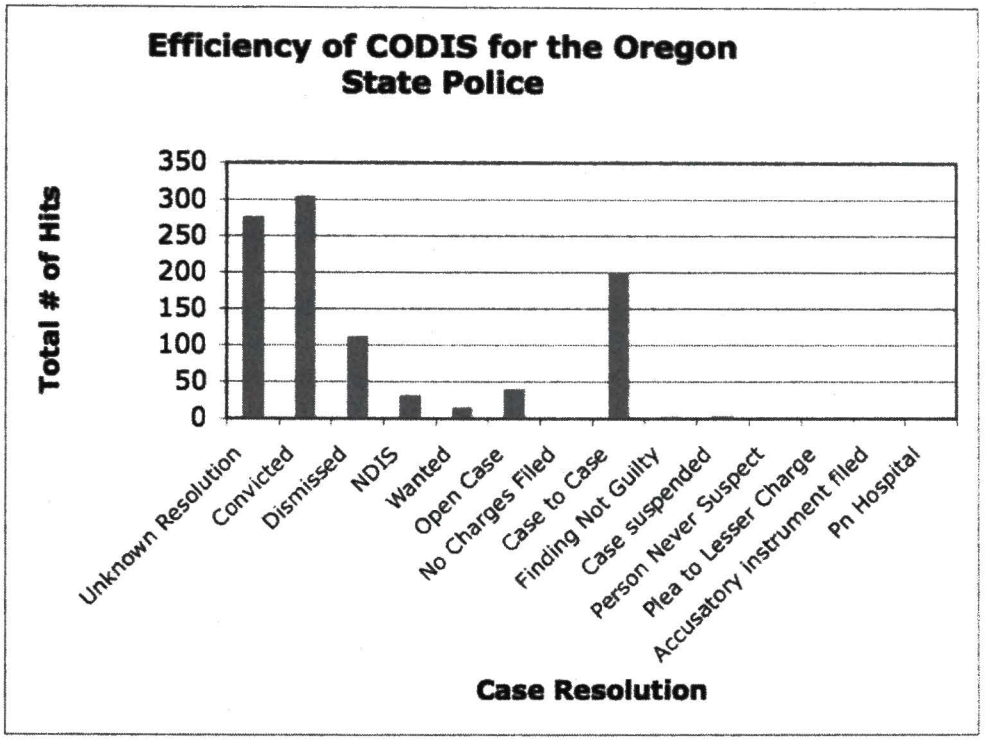

Table 3: The Efficiency of CODIS for Oregon State Police

As mentioned previously the goal of the project was to see how cases were being resolved. Upon entering the data into Microsoft Excel using the variety of software programs, it was discovered that 27.7% of the cases had an unknown resolution, 30.7% of the cases had convictions, 11.3% of the cases were dismissed, 3.1% were NDIS hits, 1.7% were wanted, 4.1 % were open cases, 0.2% had no charges filed, 20.1% were case to case hits, 0.3% had a finding of not guilty, 0.4% were cases that were suspended, 0.1% the person was never the suspect, 0.1% there was a plea to lesser charge, 0.1% an accusatory instrument filed and 0.1% were the patient was in the hospital. Roughly one third of the hits obtained a conviction, but in evaluating the information there was a large percentage of unknown resolution. An unknown resolution means that none of the

software programs that were used provided information as to how cases were resolved. Since almost half of the cases that were investigated were handled by the Portland Police Bureau (PPB), the unknown cases for the PPB were sent to the District Attorney's office for further evaluation. The CODIS administrator for the Oregon State Police contacted the District Attorney's office, whom informed the DNA lab that an intern would be responsible for determining what happened to the cases with unknown resolutions.

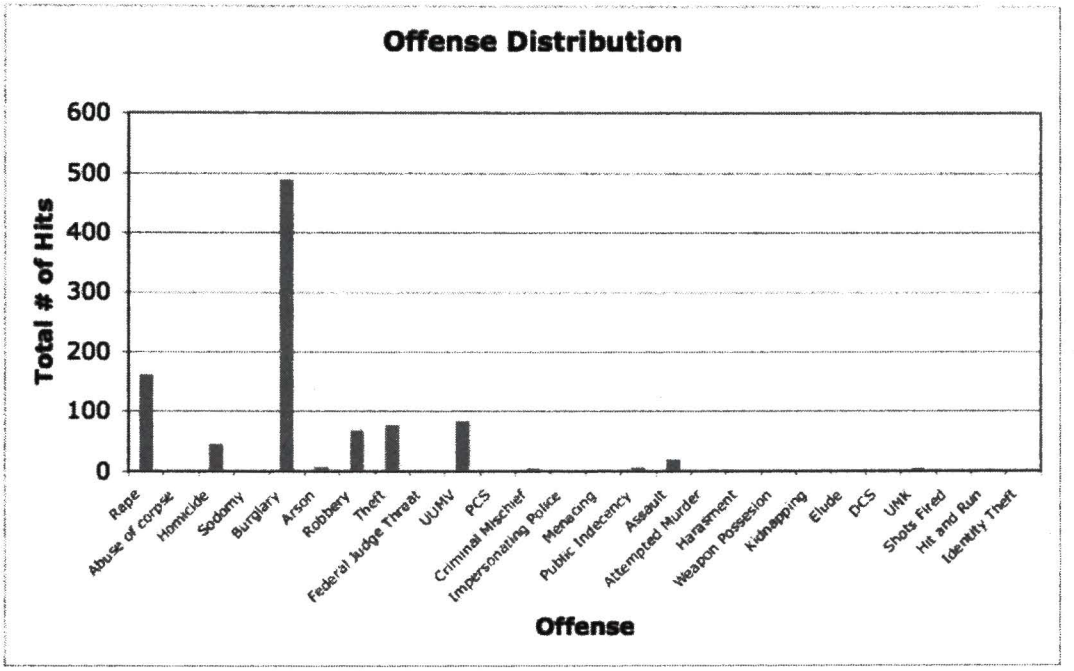

Table 4: Offense Distribution

After determining the how the cases were resolved for the one thousand hits made within CODIS, each case was broken down into the type of offense. Since the Oregon State Police prioritize the cases, handling person crimes first and then non-person crimes, this has aided in improving the total number of CODIS hits obtained. In addition, the Oregon State Police handle more low priority cases such as burglary, which have a high hit ratio as compared to person crimes. Based on the findings; burglary accounts for

48.90% of the hits, rape accounts for 16.20%, homicide accounts for 4.60%, arson accounts for 0.80%, robbery accounts for 6.90%, theft accounts for 7.80%, unauthorized use of a motor vehicle (UUMV) accounts for 8.50%, criminal mischief accounts for 0.60%, public indecency accounts for 0.70%, assault accounts for 2.00%, harassment accounts for 0.20%, weapon possession accounts for 0.40%, kidnapping accounts for 0.20%, eluding accounts for 0.20%, delivery of a controlled substance (DCS) accounts for 0.20%, unknown (UNK) accounts for 0.60%, hit and run accounts for 0.30%, abuse of a corpse accounts for 0.10%, sodomy accounts for 0.10%, federal judge threat accounts for 0.10%, possession of a controlled substance (PCS) accounts for 0.10%, impersonating police accounts for 0.10%, menacing accounts for 0.10%, attempted murder accounts for 0.10%, shots fired accounts for 0.10% and identity theft accounts for 0.10%. This means that over half of the hits are non-person crimes. Having knowledge of the type of offenses that obtain the most hits only allows investigators to know what cases are handled more often. Since the goal was to find out how cases were resolved it was important to break down the information further into case resolution based on the type of offense.

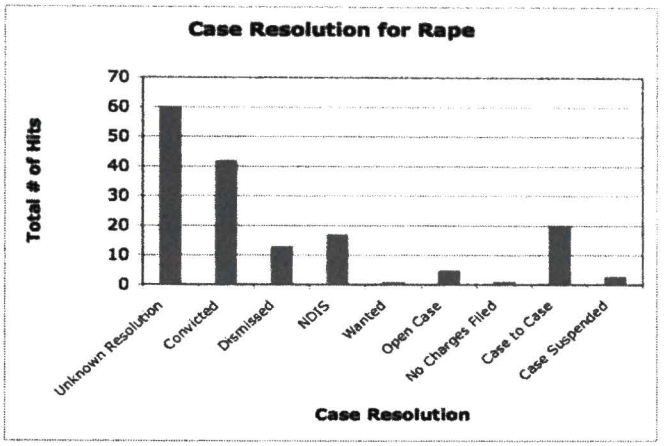

Table 5: Case Resolution for Rape

Out of the on 162 cases classified as rape, 37.04% had an unknown resolution, 25.93% had a conviction, 8.02% were dismissed, 9.88% were NDIS hits, 0.62% were wanted, 3.09% were open cases, 0.62% had no charges filed, 12.96% were case to case hits and 1.85% had cases that were suspended.

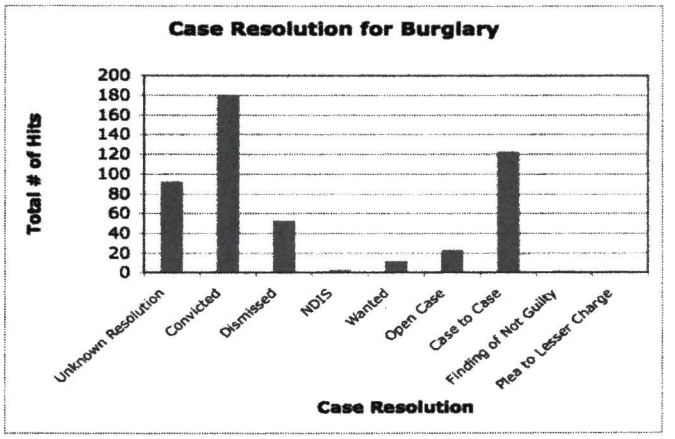

Table 6: Case Resolution for Burglary

Of the 489 cases classified as burglary cases, 18.81% had an unknown resolution, 36.81% were convicted, 10.84% were dismissed, 0.61% were NDIS hits, 2.45% were wanted, 4.70% were open cases, 25.15% were case to case hits, 0.41% had a finding of not guilty and 0.20% had a plea to a lesser charge.

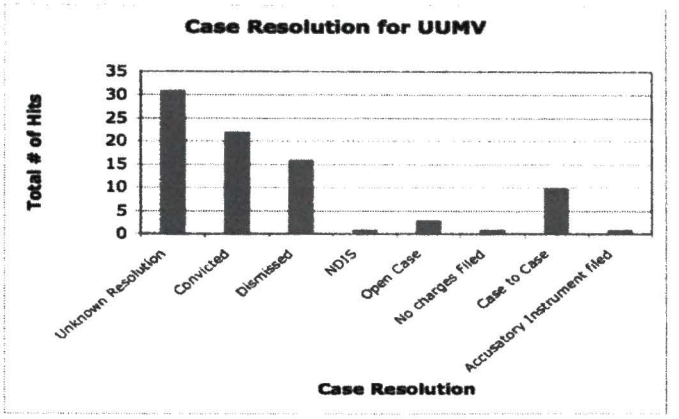

Table 7: Case Resolution for UUMV

Out of the 85 unauthorized use of a motor vehicle cases, 36.47% had an unknown resolution, 25.88% had convictions, 18.82% were dismissed, 1.18% were NDIS hits, 3.53% were open cases, 1.18% had no charges filed, 11.76% were case to case hits and 1.18% had an accusatory instrument filed.

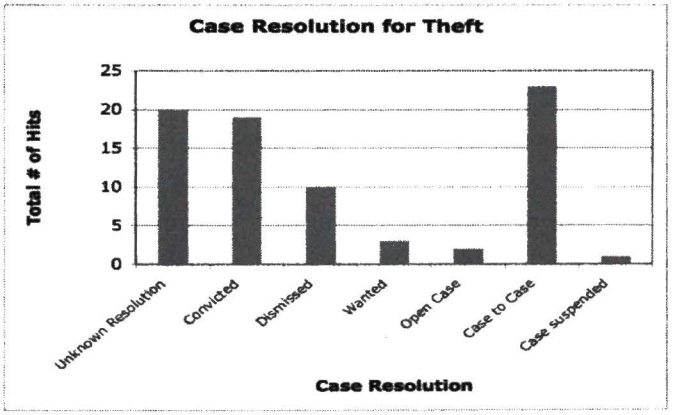

Table 8: Case Resolution for Theft

Out of the 78 cases classified as theft, 25.64% had an unknown resolution, 24.36% were convicted, 12.82% were dismissed, 3.85% were wanted, 2.56% were open cases, 29.49% were case to case hits and 1.28% were cases that were suspended.

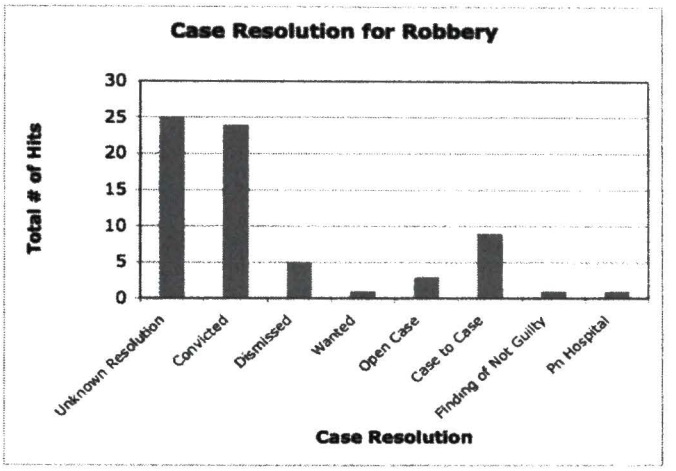

Table 9: Case Resolution for Robbery

Out of the 69 cases classified as robbery, 36.23% had an unknown resolution, 34.78% had convictions, 7.25% were dismissed, 1.45% were wanted, 4.35% had open cases, 3.04% were case to case hits, 1.45 % had a finding of not guilty and 1.45% had the patient in the hospital.

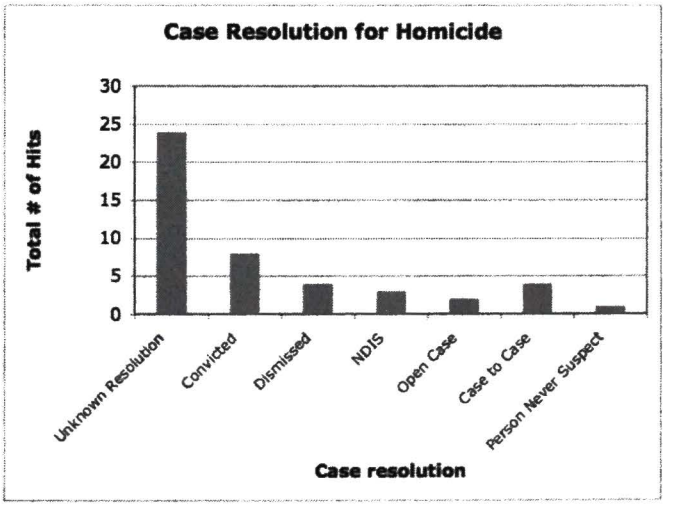

Table 10: Case Resolution for Homicide

Out of the 46 cases classified as homicide, 52.17% had an unknown resolution, 17.39% were convicted, 8.70% were dismissed, 6.52% were NDIS hits, 4.35% were open cases, 8.70% were case to case hits and 2.17% had the person as never a suspect.

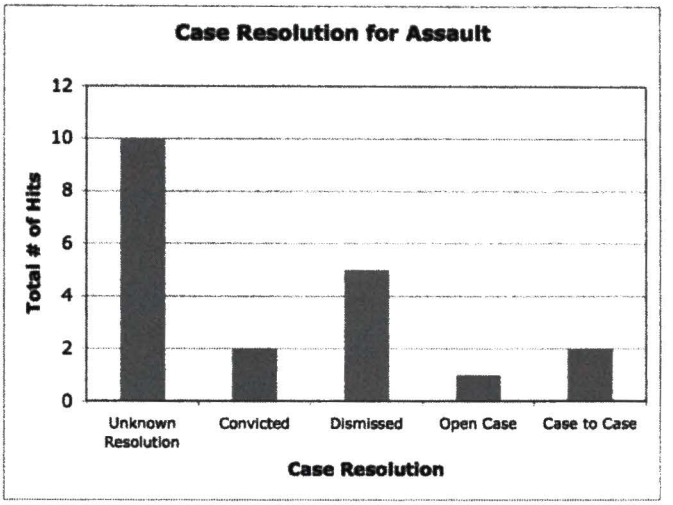

Table 11: Case Resolution for Assault

Out of the 20 cases that were classified as assault, 50.00% had an unknown resolution, 10.00% were convicted, 25.00% were dismissed, 5.00% were open cases and 10.00% were case to case hits.

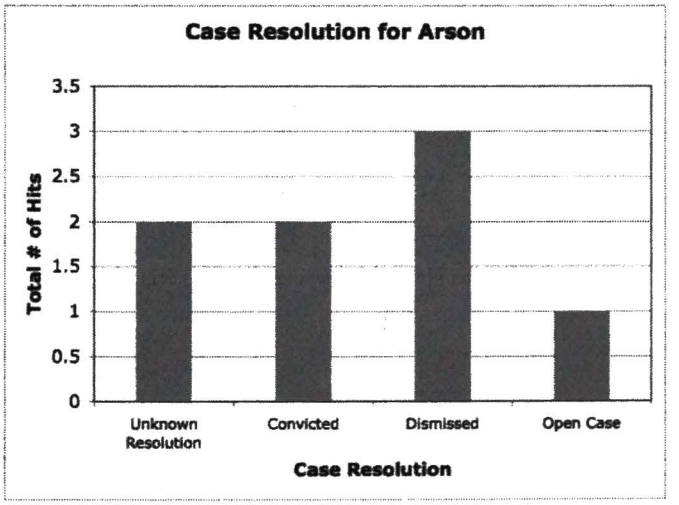

Table 12: Case Resolution for Arson

Out of the 8 cases that were classified as arson, 25.00% had and unknown resolution, 25.00% were convicted, 37.50% were dismissed and 12.50% were open cases.

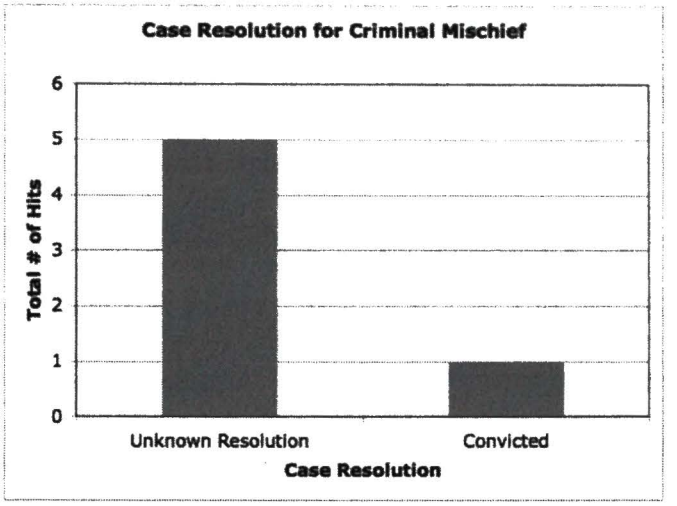

Table 13: Case Resolution for Criminal Mischief

Out of the 6 cases classified as criminal mischief, 83.33% had an unknown resolution and 16.67% had convictions.

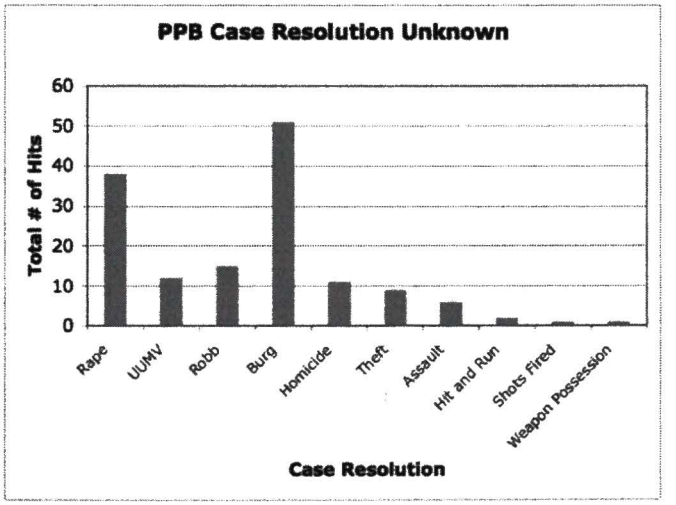

Table 14: PPB Case Resolution Unknown

Upon investigating the cases by agency, 528 of the cases were handled by the Portland Police Bureau (PPB). Of those cases, 153 corresponded to PPB cases with unknown resolutions. Only 146 of the 153 cases had an agency lab number. Since the other seven cases had no agency lab numbers only the 146 cases were sent over to the

District Attorney's office. Table 15 represents the 146 cases with unknown resolutions, which were sent over to the District Attorney's office. Out of the 146 cases with unknown resolutions, 26.03% were classified as rape cases, 8.22% were classified as unauthorized use of a motor vehicle (UUMV), 10.27% were robbery, 34.93% were burglary, 7.53% were homicide, 6.16% were theft, 4.11% were assault, 1.37% were hit and run, 0.68% were classified as shots fired and 0.68% were classified as weapon possession. This means that the low priority cases like burglary had a higher unknown resolution percentage as compared to person crime. Even though the burglary had a higher percentage of hits with unknown resolution, the burglary cases obtain more CODIS hits.

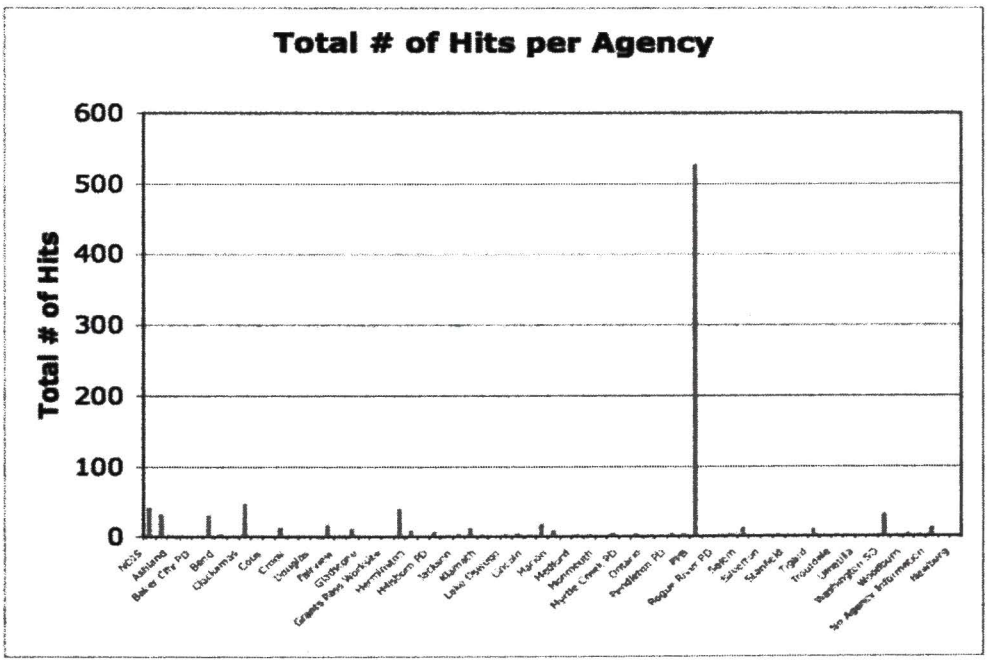

Table 15: Total Number of Cases per Agency

In order to first see what happened to cases with an unknown resolution, it was important to see what agency handled the largest percent of cases. In analyzing the data,

the Portland Police Bureau (PPB) handled 52.8% of the cases. Since they handled over half of the cases, that information was sent over to the District Attorney's office. This table shows a larger percent of NDIS hits as compared to Table 1, but that is because of the overlap that occurred between the case to case hits and the NDIS hits. Many of the case to case hits were handled by another state. The supervisor on this project was interested in knowing the case resolution for the agencies represented in Tables 17-26, therefore tables for those agencies are shown.

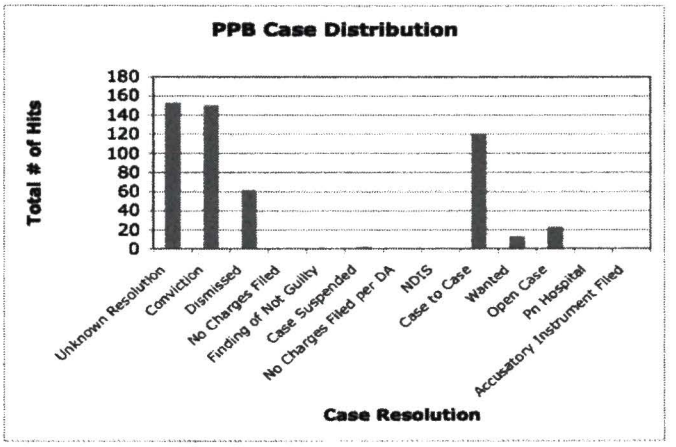

Table 16: PPB Case Distribution

Out of the 528 cases handled by the Portland Police Bureau (PPB), 28.98% had an unknown resolution, 28.41% had a conviction, 11.74% were dismissed, 0.19% had no charges filed, 0.19% had a finding of not guilty, 0.38% had a case that was suspended, 22.92% were case to case hits, none of the NDIS cases or cases were there were no charges filed per DA were handled by the PPB, 2.46% were wanted, 4.36% were open cases, 0.19% had the patient in the hospital and 0.19% had an accusatory instrument filed.

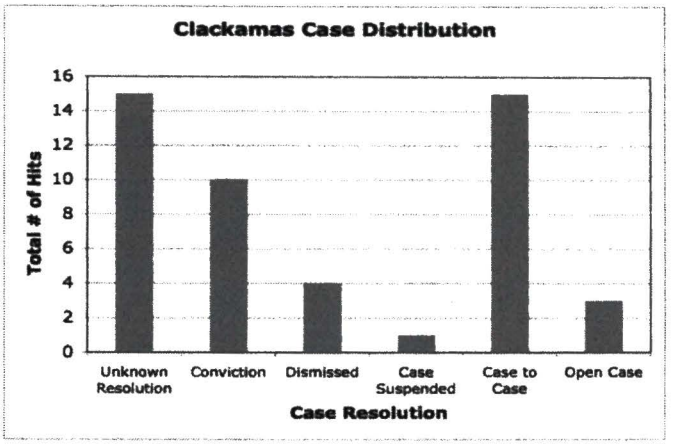

Table 17: Clackamas Case Distribution

Out of the 48 cases handled by Clackamas, 31.25% had an unknown resolution, 28.3% had a conviction, 8.33% were dismissed, 2.08% had the case suspended, 31.25% were case to case hits and 6.25% were open cases.

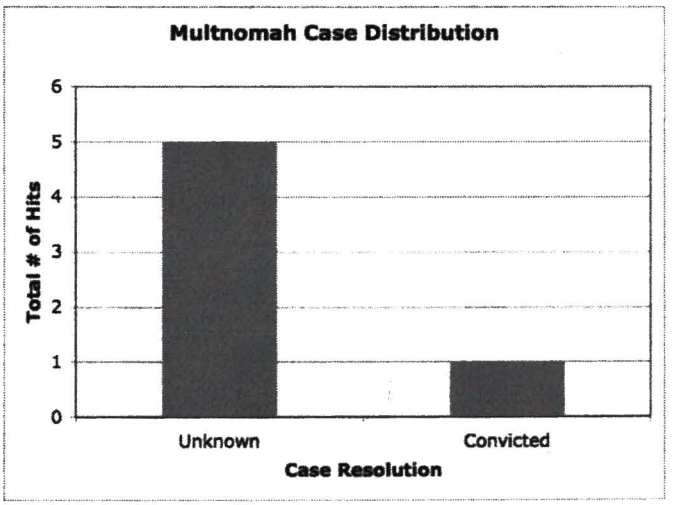

Table 18: Multnomah Case Distribution

Out of the 6 cases handled by Multnomah, 83.33% had an unknown resolution and 16.67% had convictions.

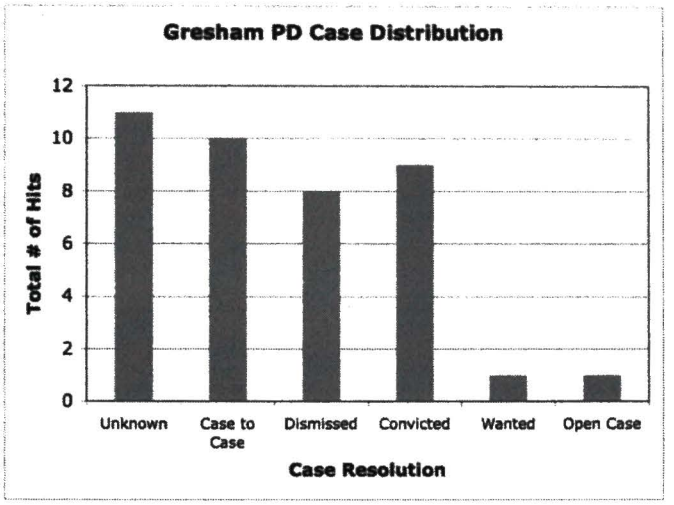

Table 19: Gresham PD Case Distribution

Out of the 40 cases total handled by the Gresham Police Department, 27.50% had an unknown resolution, 25.00% were case to case hits, 20.00% were dismissed, 22.50% were convicted, 2.50% were wanted and 2.50% were open cases.

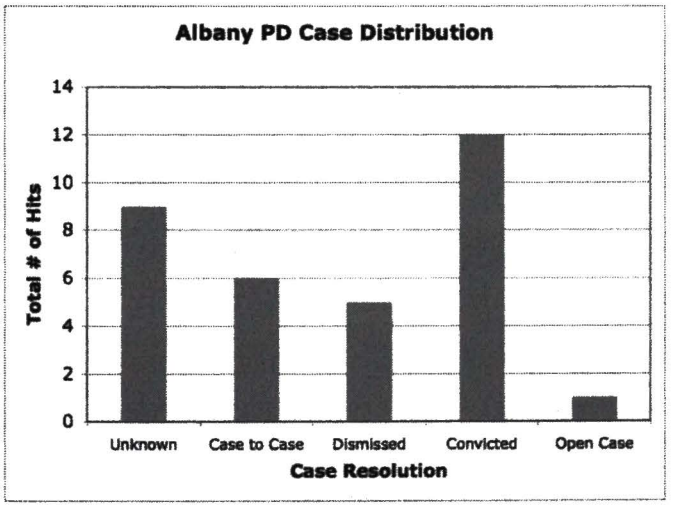

Table 20: Albany PD Case Distribution

Out of the 33 cases handled by the Albany Police Department, 27.27% had an unknown resolution, 18.18% were case to case hits, 15.15% were dismissed, 36.36% were convicted and 3.03% were open cases.

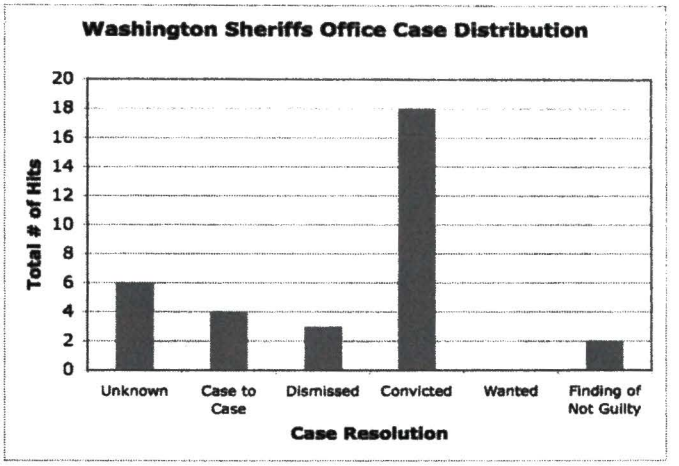

Table 21: Washington Sheriffs Office Case Distribution

Out of the 33 cases handled by the Washington Sheriffs Office, 18.18% had an unknown resolution, 12.12% were case to case hits, 9.09% were dismissed, 54.55% were convicted, none of the cases handled by the Washington Sheriffs Office were wanted and 6.06% had a finding of not guilty.

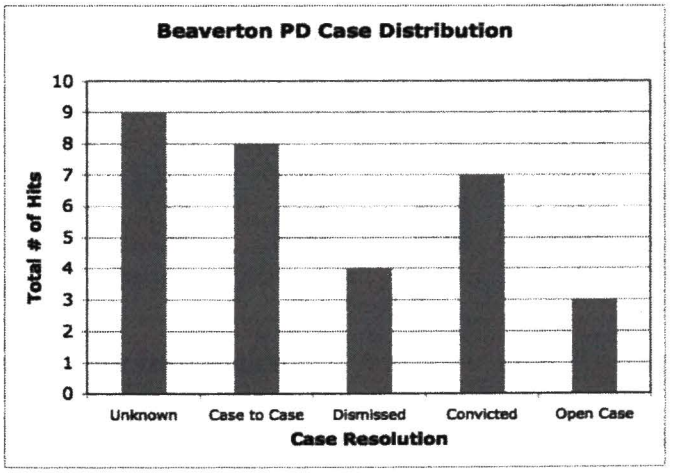

Table 22: Beaverton Police Department Case Distribution

Out of the 31 cases handled by Beaverton, 29.03% had an unknown resolution, 25.81% were case to case hits, 12.90% were dismissed, 22.58% were convicted and 9.68% were open cases.

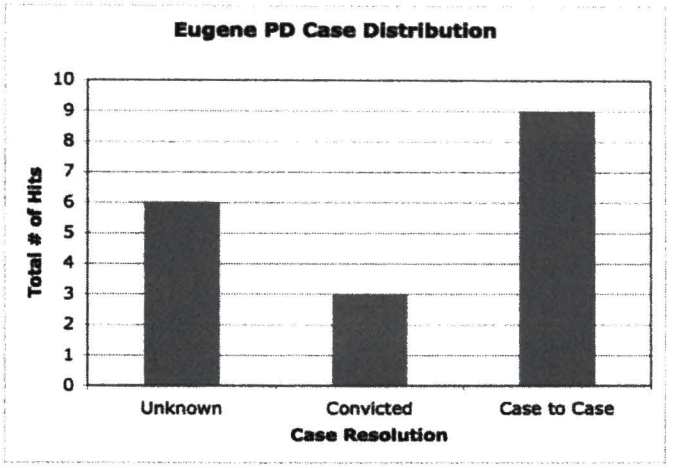

Table 23: Eugene Police Department Case Distribution

Out of the 18 cases handled by Eugene, 33.33% had an unknown resolution, 16.67% had a conviction and 50.00% were case to case hits.

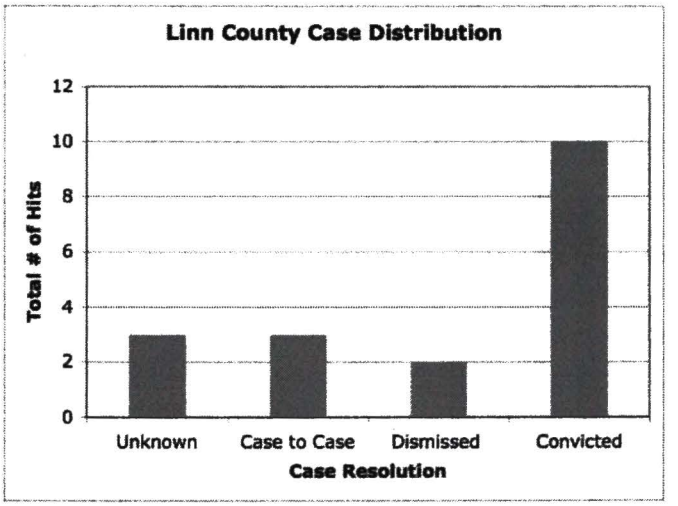

Table 24: Linn County Case Distribution

Out of the 18 cases handled by Linn, 16.67% had an unknown resolution, 16.67% were case to case hits, 11.11% were dismissed and 55.56% were convicted.

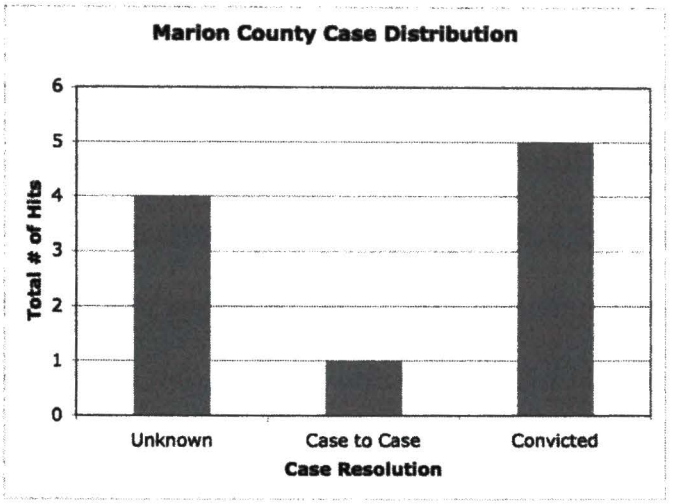

Table 25: Marion County Case Distribution

Out of the 10 cases handled by Marion, 40.00% had an unknown resolution, 10.00% were case to case hits and 50.00% were convicted.

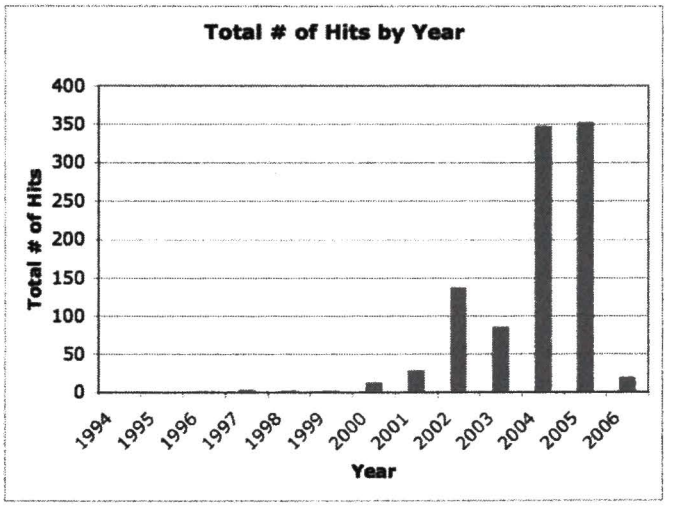

Table 26: Total Number of Hits by Year

Table 26 shows the total number of hits between 1994 and 2006. The year 2006 is misrepresented due to the fact that only 1000 out of the 1700 hits were investigated. Between the years of 2001 and 2002 a spike in the graph may be observed. This is because of the transition from restriction fragment length polymorphism (RFLP) to the

common short tandem repeat (STR). During 2002 all felons were added to CODIS while some misdemeanor crimes were removed. Because of the fact that all felons were added to the database, another spike may be observed for 2002. Out of 1000 CODIS hits investigated, 0.10% were from 1994, 0.10% were from 1995, 0.20% were from 1996, 0.04% were from 1997, 0.30% were from 1998, 0.30% were from 1999, 1.30% were from 2000, 2.90% were from 2001, 13.70% were from 2002, 8.60% were from 2003, 34.80% were from 2004, 35.30% were from 2005 and 2.00% were from 2006.

CHAPTER VI

DISCUSSION

From the results it was found that the Portland Police Bureau handled a little over half of the hits made within CODIS. Upon studying the data further, it was shown to be necessary to break down the information into total number of hits per capita. The supervisor on this project was interested in knowing total number of hits per capita for Clackamas, Multnomah and Washington Counties. Clackamas County included Clackamas, Oregon City, West Linn and Lake Oswego. Multnomah included the Portland Police Bureau, Gresham Police Department and Multnomah County. Washington County included Beaverton, Tigard, Washington Sheriffs Office and Hillsboro. Comparatively, Clackamas County had a total of 56 hits with a total population of around 421,684 individuals, Multnomah County had a total of 574 hits with a total population of around 1,279,812 individuals and Washington County had 82 hits with a total population of around 632,880 individuals.[27] In dividing up the information, this still revealed that Multnomah County, which included the PPB, still had a majority of the hits. Since the Portland Police Bureau had a majority of the hits, the cases with an unknown resolution were sent over to the District Attorney's office. Upon requesting the 146 of the 153 cases with unknown resolution, it was noted that an intern at the District Attorney's office would be responsible for investigating those cases further. It is more

important right now to find out how the unknown PPB cases were resolved, since they handled a majority of the cases that obtained a CODIS hit. There were several other agencies that handled cases that obtained CODIS hits, but upon discussing the data with the supervisor of this project, it was upon common agreement to focus on the agencies that handled the cases that obtained more hits. The data that is represented for the case resolution by agency are those that were either requested by the supervisor of this project, or the agency had handled a statistically significant number of cases that had CODIS hits, for them to be incorporated into this document. Minus the exception for Marion County, which only handled ten cases that obtained a CODIS hit, and Multnomah County, which only handled six cases that obtained a CODIS hit, any county that handled above eighteen cases with CODIS hits were reported in the tables. The information for Marion County and Multnomah County were directly requested by the supervisor on this project, and therefore they were reported here.

From reviewing the data, it appears that the Portland Police Bureau handles a majority of the cases that have obtained a CODIS hit. Multnomah had a high-unknown resolution percentage of 83.33%, but they only handled six cases that obtained CODIS hits. Comparatively speaking in regards to the larger counties, such as Portland, this number is grossly overrepresented. Upon evaluating the numbers based on per capita, there was still an indication that Multnomah County had obtained a majority of the hits made within CODIS. Understanding what agencies to focus on, gives the Oregon State Police a starting point, into the investigation on case resolution after CODIS hits. It is in the hopes of the Oregon State Police, to eventually obtain all the information necessary to

have it up and running on the World Wide Web. An even more interesting study, within this investigation, would be to compare these findings to other states. In fact, these findings might be the norm across the board. It is highly possible, but an assumption that several states have begun to evaluate the effectiveness of CODIS, but numerous states might not be reporting their findings. In reality, CODIS is very efficient at providing investigative leads. A new system needs to be designed that will provide investigators with a follow up on the CODIS hits. There are truly two parts of the equation, the first part being CODIS providing the investigative leads and the second part being what happens after the hits are made. Since CODIS was not designed to tell us what happens after a CODIS hit, a new system, such as the database that was designed in this project, should aid in providing that information. Many individuals have targeted CODIS as not being efficient, but in reality it has done its job. By putting more funding into the instigative agencies, it may make it possible to hire more personnel that are specifically focused on following up on the CODIS hits. One downfall to this would be that the funding would have to come from somewhere. The money would most likely be removed from the forensic laboratory and given into the investigative agencies, which could be problematic, as it could lead to an increased DNA backlog.

As mentioned before many laboratories all over the nation are having problems with following up with CODIS hits. It is thought that one way to actually verify that the evidence is handled and analyzed immediately is to follow the Forensic Science Service ideas of responding to the crime scenes themselves. Their method allows for the samples

to be analyzed almost immediately and for the criminals to be identified within hours instead of months.

The Oregon State Police currently have had around seventeen hundred CODIS hits. When each hit is obtained, the information for that hit is loaded into the CODIS hits database. This database provided the names for each individual, and it was not uncommon to see a name appear more then once when entering the data into Excel. When a name appeared more then once, it was most likely due to the fact that that individual was a repeat offender. Table 27 shows an example of how the same individual may have multiple hits within CODIS. This shows one of CODIS' strengths, being that since most offenders are repeat offenders, multiple crimes scenes may now be linked to one perpetrator. The CODIS hits database only provided the hit number, the name of the individual, the SID number or state identification number, case number, the offense date and the match date.

Table 27: Example of multiple hits made to one individual

Hit Number	Name	Date of Birth	SID Number	Case Number	Offense Date	Match Date	Offense	Case Resolution	Agency
1	John Doe	1/13/80	1256778	F-005-01	3/14/01	9/15/04	Burglary	Convicted	PPB
2	John Doe	1/13/80	1256778	F-009-03	5/16/02	10/12/05	Homicide	Dismissed	Clack

When collecting the information there were three major problems. Many of the offenders that are listed in CODIS have aliases or do not know their own date of birth, which makes it harder to gather information. When entering the information into Excel, the name and date of birth became very useful in verifying that the correct case reports were being searched. When an individual has an alias or does not know their own birth

date, this limits the searching to only viewing a few case reports, as opposed to several which had the information entered under one name. A second problem that was encountered was that a previous intern had entered some data incorrectly. The supervisor on this project informed me, to bring the data up to hit one thousand, which corresponded to the year 2006. When filling in the previous interns work, it was discovered that some of the information had been entered in incorrectly for the offense date, the offense and the date of birth. This information was corrected and entered into Excel properly. The third major problem with this project, was that a vast amount of cases had an unknown case resolution or were dismissed. One possible explanation to having an unknown case resolution, would be that the individual was listed under another name and therefore was listed in Excel as unknown. Another explanation for having an unknown case resolution is that a report fell through the cracks and no investigation was done. This seems like a relatively logical explanation since according to the article in The Oregonian "Police poorly documented their cases, and that could make it difficult for prosecutors to pursue charges. Of the 62 unsolved cases, none had lab results from the Oregon State Police in the files even though in several cases the lab was thought to have been used."[10] Once the information was gathered for the total number of unsolved cases, it was discovered that many police agencies had unknown case resolutions. Approximately one hundred and fifty three unknown case resolutions belonged to the Portland Police Bureau, and because of this, the Oregon State Police requested these case reports. In order to resolve this, a new database needs to be designed, similar to the one created during this project. If it is possible for all states to have a system such as this, then not only will CODIS hits be

obtained, they will also be followed up on. What is important is that we not challenge CODIS, it is that we create a system that may target this problem.

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