# *NATIONAL FORENSIC DNA STUDY REPORT*

**FINAL REPORT**

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# *NATIONAL FORENSIC DNA STUDY REPORT*

## EXECUTIVE SUMMARY

This report was prepared by Smith Alling Lane in partnership with Washington State University through the support of a grant awarded by the National Institute of Justice, Office of Justice Programs, U.S. Department of Justice (Grant 2002-LT-BX-K 003). Points of view or opinions in this document are those of the authors and do not necessarily represent the official position or policies of the United States Department of Justice.

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In recent years forensic DNA evidence has been used by agencies and actors in the criminal justice system more and more frequently to **both** convict the guilty and exonerate the innocent. Cases that previously may have been unsolvable have been transformed into solvable cases where viable suspects can be identified and arrested or removed from suspect lists. While this new technology enhances the opportunity for the criminal justice system to "do justice" in more cases of suspected wrongdoing, it also creates an added need for law enforcement agencies to review old cases for potential biological evidence that should be sent to a crime laboratory for testing. Many policy makers are interested in discussing solutions to this problem of an added burden on law enforcement and crime laboratories, but they need to have a more complete understanding of the major dimensions of the problem – How big is the case backlog? How did it grow so large? What is the capacity of the evidence collection, storage, analysis and retrieval system to reduce that backlog and provide timely information for the criminal justice system?

This Report relied largely on a nation-wide mail assessment of local and state forensics laboratories and local law enforcement agencies, as well as extensive interviews of prosecutors, investigators and laboratory administrators to arrive at answers to the questions posed above. While it is generally acknowledged that there is likely a significant backlog of criminal cases that might benefit from DNA analysis, no effort had been made to quantify this number. This study arrives at estimates for the numbers of unsolved criminal cases in the U.S. which might benefit from DNA analysis, assesses both law enforcement and laboratory capacities for dealing with cases involving DNA, and identifies significant issues relating to the expansion of the use of DNA forensic analysis in criminal cases.

## *SUMMARY OF REPORT FINDINGS*

### *BACKLOGS AND CAPACITY*

#### *The backlog of unsolved rapes and homicides in the U.S. is massive.*

Through the data collected from a large, representative sampling of local law enforcement agencies in the United States, the study arrives at the following pertinent estimates:

- The number of rape and homicide cases with possible biological evidence which local law enforcement agencies have not submitted to a laboratory for analysis is over 221,000.

    - Homicide cases – 52,000 (approximate)
    - Rape cases – 169,000 (approximate)

- The number of property crime cases with possible biological evidence which local law enforcement agencies have not submitted to a laboratory for analysis is over 264,000.

- The number of unanalyzed DNA cases reported by State and local crime laboratories is more than 57,000.

    - State laboratories – 34,700 cases (approximate)
    - Local laboratories – 22,600 cases (approximate)

- Total crime cases with possible biological evidence either still in the possession of local law enforcement, or backlogged at forensic laboratories is over one half million (542,700).

***A significant proportion of law enforcement agencies continue to misunderstand the potential benefits of DNA testing.***

While these figures address the first question as to the approximate size of the case backlog, the second question remains regarding how the backlog came to grow so large. The answer to this question is quite complicated, and the phenomenon of a substantial growth in criminal case backlogs involves a variety of factors – some of which are vexing and difficult to manage. However, a series of questions posed to local law enforcement agencies and forensic laboratories reveal several interesting patterns of response which, when considered collectively, begin to provide an accurate picture of how the backlogs tend to develop and why they continue to exist. The following provides some of these responses:

<u>Reasons why cases with DNA evidence have not been submitted to the laboratory:</u>

- 50.8 percent of responding local law enforcement agencies indicated that forensic DNA was not considered a tool for crime investigations.

    - 31.4 percent responded that no suspect had been identified
    - 9.2 percent indicated that the prosecution had not requested testing
    - 10.2 percent responded that a suspect had been identified, but not yet charged

- 23.6 percent of responding agencies suggested that DNA evidence from unsolved cases was not submitted for reasons relating to poor funding.

- 9.4 percent indicate a lack of funding for DNA analysis
- 10.4 percent indicate inability of laboratories to produce timely results
- 3.8 percent indicate crime laboratory is not processing requests for DNA testing

***Both state and local crime laboratories are overworked, understaffed, and insufficiently funded.***

Processing times at crime laboratories pose significant delays in many jurisdictions. State laboratories take an average of 23.9 weeks to process an unnamed suspect rape kit, and local laboratories average 30.0 weeks for such tests. The cost for testing these rape kits was estimated at $1,100 per case, and does not account for many overhead costs. Both state and local laboratories indicated that personnel needs were among the most significant concerns for their DNA programs. Specifically, most crime laboratories expressed the need for supplemental funding for additional DNA staff; several laboratories indicated that their priority concern was for additional funding to augment current salaries to avoid the loss of skilled personnel to other prospective employers. A strong need was also reported for reagents (chemicals used in DNA analysis) and for technical equipment used for DNA analysis.

While the need for the expansion of mitochondrial DNA testing is substantial, the need for the more common nuclear DNA testing is even more pressing. Forensic laboratories reported nearly three thousand (2,999) cases over the last twelve-month period that could have benefited from mitochondrial testing.

***The role of the federal government in funding forensic DNA analysis has been, up to this point, important but rather minimal.***

Finally, most laboratories also reported that while federal funding has played an important role in assisting with backlogged DNA cases, the proportion of their overall DNA budgets funded through federal sources is minimal. Only 20.5 percent of state crime laboratories receive 50 percent or more of their funding from federal sources; that figure is only 4.5 percent for the local laboratories.

### *BENEFITS FROM DNA ANALYSIS*

Armed with a better understanding of the problem, policy makers subsequently ask for a definition of the expected benefits of devoting limited resources to the solution. Although this Report does not attempt a comprehensive, econometrically-derived cost-benefit analysis, the Report includes case studies on "preventable" crimes through strong DNA programs, along with an overview of DNA database successes.

***Forensic DNA databases are important tools in solving a variety of crimes, committed by a variety of criminals.***

The analysis of DNA database hits presented in the Report provides a breakdown of 4,092 DNA database hits in 38 states. The majority of database hits have linked repeat offenders to violent crimes. In fact, for several years the Virginia Division of Forensic Science has reported that more than 80% of the hits on the state's DNA database would have been missed if the database had been limited to only violent offenders. Most states, however, have only recently begun to require DNA testing for non-violent offenders for placement on their DNA database. Similarly, several laboratories will not process DNA evidence from property crimes if it is sent to the laboratory for analysis.

***There are numerous crimes that are potentially preventable through better, more efficient use of forensic DNA analysis.***

A review of specific cases in nineteen states reveals over 100 serious crimes that could have been prevented through either the inclusion of all convicted felons in the database or shorter DNA analysis processing times. The early identification of repeat offenders is possible with comprehensive DNA databases, and just how that identification would be made is highlighted in each actual case.

***The cost and the offsetting benefits associated with DNA testing present several questions relating to return on investment which merit further study.***

Finally, there are many additional benefits, and indeed costs, that are derived from expanded utilization of forensic DNA analysis. Although this Report discusses some of those benefits resulting from DNA database hits and preventable crimes, there are several additional areas for further study which may give policy makers a more vivid picture of how forensic DNA issues impact their communities.

## ACKNOWLEDGEMENTS

This Report could not have been completed without the participation and support of a great number of criminal justice professionals spread throughout the country. We wish to thank the nation's public forensic DNA laboratories whose response rate of 100 percent has guaranteed confidence in many of the results documented in this Report. The willingness of the heavily burdened state and local forensic laboratories to devote their limited resources to the detailed assessment tool sent for their completion is a testament not only to their professional dedication, but also to their recognition of the great need for national policy attention in this arena from all levels of government – local, state and federal.

We are also particularly grateful to those professionals in the law enforcement and forensic communities who participated in the pre-administration review of the draft assessment tool developed for this study. Given the considerable diversity in law enforcement agencies throughout the country, and the substantial variation in level of understanding and rate of utilization of forensic DNA, a thorough review of issues relating to the interpretation of and possible responses to the assessment tool was a primary concern of the researchers. Our top-notch review team was extremely instrumental in examining the draft assessment tools for weaknesses and omissions, and in providing a high level of confidence in the responses the assessment instrument ultimately generated.

In addition to the criminal justice professionals specified above, we also wish to express our gratitude to each local level law enforcement official who took the considerable time required to fill out the detailed assessment form. This group of public servants includes Police Chiefs and Sheriffs across the nation, as well as many tribal law enforcement executives. Similar thanks are owed to those many local prosecutors and crime investigators who assisted with the case studies and other research on DNA forensics.

And lastly, a very special thank you is owed as well to the officials at the *National Institute of Justice* who recognized at an early stage the importance of forensic DNA to the protection of public safety. This study is a reflection of their commitment to seeking to quantify the problems related to DNA analysis backlogs and to provide law enforcement and crime laboratories with workable solutions to those problems.

## AUTHORS' NOTE

In order to ensure accurate and honest responses, law enforcement agencies and crime laboratories were assured anonymity in the final published document. For this reason, some data are intentionally broad or not attributed to a specific source. In those instances where a law enforcement agency or crime laboratory is named, permission was obtained to both identify the agency and utilize specific data.

# I. INTRODUCTION

This Report summarizes the findings of an in-depth Forensic DNA Assessment project undertaken by Smith Alling Lane in partnership with the Division of Governmental Studies and Services at Washington State University. The study employed multiple data collection approaches, including a nation-wide mail assessment of local and state forensics laboratories and law enforcement agencies, as well as extensive interviews of prosecutors, investigators and laboratory administrators. The findings detailed herein are based upon data obtained through this process from significant numbers of law enforcement agencies, local forensics laboratories, state forensics laboratories, and dedicated individuals in every U.S. state.

This study brings to bear scientific quantitative methodology and rigorous qualitative analysis on a question that has increasingly occupied public debate in both law enforcement and public policy circles. Recent newsworthy developments have fueled this broad interest – ranging from the activities of the *Innocence Project* in applying DNA analysis in pursuit of the release of those wrongfully convicted, to cases in which DNA has been used to solve long-unresolved cases and obtain convictions in extended serial cases. Heretofore *not* well addressed, however, have been the related questions of **capacity** and **backlog** at local law enforcement agencies and the corresponding impact, or potential for impact, at crime laboratories. While popular wisdom has acknowledged the existence of a backlog of cases that might benefit from the application of forensic DNA analysis, no clear insight into the extent of any such backlog has previously been available. Using the data compiled from this study, it is possible to make scientifically supportable estimates of the numbers of unsolved criminal cases in the U.S. which might benefit from DNA analysis, to assess both law enforcement and laboratory capacities for dealing with cases involving DNA, and to identify significant issues relating to the expansion of the use of DNA forensic analysis in criminal cases.

Given this general background, this Report addresses a number of key issues for the continued development of comprehensive statistical data on the effectiveness of forensic DNA in both solving and preventing crime. In doing so, Section II describes the methods used in administering the assessment tool to law enforcement agencies, local crime laboratories and state crime laboratories. Section III presents the analyses results that estimate the backlog of unsolved homicide and rape cases in the U.S. Section IV then provides an overview of a number of issues associated with the capacity of these various agencies to collect and process forensic DNA evidence. The issue of unsolved case "hits" (based on CODIS data) is then addressed in Section V; Section VI considers the issue of DNA testing and crime prevention; and a discussion of cost-benefit analysis issues is in Section VII. The Report concludes in Section VIII with a review of the major findings derived from the study and the resulting implications for public policy development.

## II. METHODOLOGY

As noted above, this study applies several distinct data collection methods. Section VI, for example, relies entirely on information collected using telephone interviews of local crime investigators and prosecutors. Sections III, IV, and V, on the other hand, report analysis of data collected through a series of self-administered assessment tools. The methodology developed for this portion of the study involves an application of Don Dillman's *Total Design Method* to a self-administered mail survey of law enforcement agencies and forensics laboratories. The ultimate goal of the study was to arrive at defensible estimates of the numbers of **unsolved cases** (homicides, rapes, and property crimes) extant in the U.S., of the **backlog** pressure that might be anticipated if DNA testing were applied to those cases, and of the impact which such testing might have upon agency (e.g., law enforcement and crime laboratory) **capacity.** To accomplish this goal a sampling protocol was constructed to allow for the assessment of a representative sample of law enforcement agencies, as well as nearly all state and local crime laboratories.

All state and local forensic DNA laboratories were thus assessed. (For the purposes of this study, the term "local" laboratory(ies) is defined to include those laboratories serving city, county or regional jurisdictions.) Responses were obtained from 50 state laboratories and 70 local laboratories across the country. This level of response provides an overwhelming confidence in the analysis conducted using the data provided by these laboratories. Because of the large number of local law enforcement agencies in this country (between 15,000, and 18,000 – depending upon the inclusion or exclusion of "special police" agencies such as the U.S. Border Patrol, airport police, etc.), the study design called for the development of a law enforcement agency sampling protocol. This protocol allowed for the selection of agencies from within twelve basic selection strata. Working from up-to-date national mailing lists, both Sheriff offices and municipal police departments were divided into strata on the basis of the number of commissioned officers employed by a law enforcement agency. All police agencies with over 100 commissioned officers (both Sheriff and municipal police agencies) were included. Random samples ranging from 500 to 1000 were taken from the remaining sampling frames thus identified (Unspecified size, Under 25 Officers, 25-50 Officers, 50-100 Officers) to which all tribal law enforcement agencies were added to arrive at a final mail sample list of approximately 3,400 law enforcement agencies.

As discussed below, a significant number of agencies, particularly the larger organizations, completed the forensic DNA assessment questionnaire. Again, this relatively high level of response provides significant confidence in the results reported here. Local law enforcement agencies from every state, and representing approximately 154,467,000 citizens of the United States, responded to this assessment. Based upon the broadly representative nature of the many responding agencies, and based upon the overall response rate, the authors have a high level of confidence that the conclusions drawn from the analysis of the responses to the mail assessments are methodologically supportable and representative of law enforcement in the nation as a whole.

Working from the list of law enforcement agencies developed through the sampling protocol, and similar current lists for state and local forensic laboratories, a three-wave mailing process was administered, with each non-responding agency ultimately receiving three separate mailings of the assessment tool and a letter encouraging completion of the form. Once the mail process was concluded, select non-responding laboratories and agencies were contacted by telephone in order to check for any bias related to non-response error in the survey process. The

number of final responses (1,692 law enforcement agencies, 70 local laboratories, 50 state laboratories) provides significant confidence for the observations and conclusions contained in this Report. Response rates for each size and type of entity are set forth in the table below. These rates of response compare favorably to the anticipated 40 percent minimum response rate set at the outset for this study, with higher response rates from the laboratories and larger law enforcement organizations increasing confidence in findings relating to those entities.

| | State Forensics Laboratories | Local/ Forensics Laboratories | Large LE Agencies | LE Agencies 50-100 | LE Agencies 25-50 | LE Agencies < 25 | LE Agencies Unspecified |
|---|---|---|---|---|---|---|---|
| Responses | 50[i] | 70 | 586 | 287 | 476 | 170 | 98 |
| Percent | 100% | 100% | 59% | 52% | 47.6% | 34% | 19.8% |

194 Tribal law enforcement agencies were mailed assessment forms. However, with a response rate of approximately 27.8 percent (54 responses) the data did not generate statistically reliable information.

Analysis of the responses obtained from this mail-out assessment collection process indicates that the final assessment dataset derived from the data collection effort is broadly representative of the local law enforcement agency community nationally. The law enforcement agency responses are (in a geographic sense) proportionately spread across the agency size strata identified above, and they represent local police agencies from each of the fifty states. In this analysis, only tribal agencies and those of unspecified size are under-represented among participating agencies. In many instances the tribal agencies did not have access to the data sought by the assessment since the federal government (Bureau of Indian Affairs) typically handles these types of cases on reservations. One issue does arise from the consideration of the level of response achieved in the study. The smaller agencies did not respond at as high a rate as did the large agencies, and those agencies of unspecified size responded at a rather low rate. This unfortunate fact influenced both our analyses and some of the conclusions drawn; in light of this limitation, particularly conservative approaches to the analysis of central tendencies and in the estimation of backlogs were employed. Researchers compensated for this reduced confidence regarding the smaller agencies when dealing with total numbers or issues specific to these classes of law enforcement agencies. In follow-up questioning with those non-responding agencies, a lack of resources was the primary reason given for failure to complete the assessment. In many jurisdictions, case management systems are either non-existant or so antiquated as to not be of much utility in developing the numbers requested in the assessment. Moreover, local jurisdictions did not have the manpower to devote scarce personnel resources to manually reviewing old case files for open cases that may contain DNA evidence.

While due care was taken to develop conservative estimates, it should be noted that the analysis confirms the anticipated utility of the assessment process and the data obtained from the effort. For instance, relatively few agencies report difficulty in responding to the questionnaires (e.g., only 10.9 percent of large agencies report being unable to formulate an educated guess in response to a question about rape cases with potential DNA evidence). In short, sufficient data of good quality have been received as a consequence of the mail assessment collection process to allow estimation of national totals with considerable confidence, especially given the cautionary note above and the conservative estimation approach applied as a result.

## III. CASEWORK BACKLOGS

One of the single most troublesome obstacles to generating accurate figures from the local law enforcement assessment is that a significant portion of respondents (particularly from the larger jurisdictions) indicate that an educated guess on issues of unsolved rapes and homicides is not possible without a time-consuming comprehensive review of case records. Many jurisdictions are not able, or possibly were not willing, to venture a guess as to how many cases are still open—much less speculate as to whether or not there may be biological evidence associated with such criminal offenses. In order to generate the most accurate estimates possible, project researchers worked directly with these jurisdictions over the telephone and through e-mail communications to encourage supportable "educated guesses" for these few agencies. The researchers did not suggest to the agencies methodologies for developing numbers, but rather spoke with various departments within agencies (such as homicide units, sexual assault units and property rooms) to encourage coordination and completion of the assessment. With a combination of assessment instrument-based evidence and these "refined guesses" for a small number of law enforcement agencies, it was possible to generate figures for consideration which provide some needed perspective on the likely scale of the current forensic DNA analysis backlog issue in this country.

It is possible to apply multiple methods to the estimation of backlogs of cases involving forensic DNA evidence. Federal Bureau of Investigation (FBI) crime statistics serve as one source of estimation, the mail assessment process serves as a second source, and conventional statistical estimation techniques serve as yet a third. Of some limited assistance in this regard are national Uniform Crime Report (UCR) figures, reported annually by the FBI. These crime figures, unfortunately, are summary at best, and hence of rather limited utility. With these caveats in mind, a rough calculation of a 10-year figure for backlogged cases (murders and rapes) can be made using an average generated from the most recent three years reported by the FBI. This estimation approach leads to the conclusion that there are at least 49,000 unsolved murder cases in the U.S. (as of January 1, 2002). Because this method of backlog estimation does not assess truly old cases (older than 10 years), and because it does not include the immediately previous calendar years' figures, this figure is in all probability a low estimate. Applying the same cautious approach to the estimation of unsolved rapes leads to a figure of at least 470,000 unsolved cases. One significant shortcoming of UCR data as they relate to the purposes of this Report is that the FBI crime data summaries do not identify cases with biological evidence which could yield DNA findings.

Using the data obtained through the mail assessment data collection process, it is possible (as was done for the Preliminary Report on this study) to extrapolate total numbers of backlogged cases as well. For purposes of validation, this was done by calculating an average figure for each type of case for each of the six strata of law enforcement agencies. That mean number was then multiplied by the total number of agencies of that size in the United States to obtain a national backlog subtotal for each stratum. Adding up these figures provides an estimated national total for each type of crime. This approach provides an estimated backlog of unsolved murder cases of more than 170,000 cases, more than 60,000 of which involve DNA evidence. The same estimation approach yields figures of more than 593,000 total unsolved rapes and more than 430,000 unsolved rape cases featuring forensic DNA evidence. The full range of calculations associated with this approach and the UCR estimations are set forth in the appendices to this Report.

However useful these figures might be for a rough estimation, both of these approaches are somewhat problematic. The UCR data are too summary in character, and they do not include DNA information. The raw data from the mail assessment study are skewed upwards by the presence of the very large agencies, and/or agencies with very strong evidence retention policies, and rely uncomfortably on data obtained from the "unspecified size" agency category – a category with low response rate and a high degree of variation in response. In order to compensate for these shortcomings in the data, other more complex statistical techniques must be employed which provide a higher level of confidence.

Given the caution related to response rates discussed above, and the extremely skewed distributions of each of the measures being assessed in this section (unsolved rapes and homicides, and unsolved property crimes), which was driven by the large estimates from the larger law enforcement agencies, the following estimates were calculated in multiple ways to ensure that they are not the artifacts of a single method of statistical estimation. In particular, the following summary estimate figures were generated by a semi-parametric method that involved a *weighted decile* approach (excluding the cases at the $10^{th}$ and $90^{th}$ percentiles in the calculation of the mean and confidence interval estimates, and adding the excluded cases back into the end totals). This conventional statistical estimation approach was taken so that the estimates from the large law enforcement agencies would be reflected fully in the totals calculated, but would not disproportionately influence the calculation of the mean estimates.

These results were then checked according to several standard statistical diagnostic procedures. These commonly used procedures in the management of estimation problems included performing log transformations on each variable of interest in order to correct for skewness (separate analyses for both log base 10 and "e" were conducted), and calculating separate estimates within each strata of agency size (under the assumption that pattern of skewness may vary according to the size of the agency, which it certainly did) with and without log transformations. In the end, none of the results from these several diagnostic statistical procedures produced backlog estimates that differed significantly (at $p<.05$) from those reported in this Report. The researchers, therefore, quite confident that the estimates arrived at here are not contingent upon any particular analytic strategy.[ii]

## A. Unsolved Rapes and Homicides

Table 3.1 contains the estimated total number of unsolved homicides and unsolved rapes extant in the U.S. at the time of the mail assessment data collection effort, along with estimates of the number of cases which likely feature possible forensic DNA evidence. Agencies were asked to count unsolved cases dating back to 1982 (twenty years). With regard to unsolved rape and unsolved homicide cases, there are currently an estimated 96,141 unsolved homicide cases and an estimated 304,178 unsolved rape cases reported by local law enforcement agencies in the U.S. in 2002-2003. Upon combining these two estimates, researchers arrive at an extrapolated total of 400,319 unsolved homicide and rape cases nationally. If the upper limits of the confidence intervals are used as an estimate (what will be referred to as "adjusted totals"), there may actually be as many as 432,179 unsolved homicides and rape cases nationally.

**Table 3.1.** Estimated national totals for unsolved homicides, rapes, and property offenses and estimates of cases with possible DNA evidence.[iii]

| Offense Type | Total | 95% Confidence Interval |
|---|---|---|
| Unsolved Homicides | 96,141 | 91,281 to 101,001 |
| Unsolved Homicides with DNA | 48,324 | 44,904 to **51,774** |
| Unsolved Rapes | 304,178 | 277,178 to 331,178 |
| Unsolved Rapes with DNA | 154,649 | 140,069 to **169,229** |
| Total Property Crimes with DNA | 253,931 | 243,491 to **264,371** |

**Note: A similar table reports crime laboratory backlog estimates as well later in the text**

Local law enforcement agencies were also asked how many murder and rape cases contained possible biological evidence that had not been sent to a laboratory for testing. These findings, also displayed in Table 3.1, show that a substantial portion of the adjusted totals for rape (169,229) and homicide (51,774) cases have not been sent to a forensic laboratory for testing—indeed, using the adjusted totals, **an extrapolated total of 221,003 cases may contain biological evidence that has not been sent to a forensic laboratory for DNA testing.**

## B. Unsolved Property Offenses

The majority of law enforcement agencies report that forensic DNA evidence is *not* routinely collected from property crime scenes, and similarly a preponderant majority of local and state crime laboratories report that law enforcement does not perform "routine" collection of DNA from property crimes. The common assumption (made by nearly half of the law enforcement agencies) is that their local or state crime laboratory does ***not*** accept DNA evidence from property crimes for unnamed suspects. However, 75 percent of reporting local laboratories and 88 percent of state laboratories report that they ***do*** accept and process unnamed suspect property crime evidence. These mail assessment findings point to a shortcoming in the understanding by law enforcement of the policies of forensic laboratories that serve them. These findings also signal an inconsistency between local law enforcement's understanding of what forensic analysis is being done versus what the actual services of their crime laboratories are in practice. They could also signal an inconsistency between the reported versus actual practices of those forensic laboratories.

Despite this apparent "information gap" between local law enforcement agencies' perceptions and crime laboratory policies, the information collected in the law enforcement assessment process still allows an estimated total number of property crimes that may contain biological evidence across the nation. Accordingly, using the adjusted totals in Table 3.1, **there**

**is an extrapolated total of as many as 264,371 property offenses with possible biological evidence in the U.S.**

Thus, upon adding the adjusted numbers of homicides, rapes, property crimes and "other" cases with possible DNA evidence from law enforcement agencies and state and local crime laboratories, there are currently as many as **542,723 unsolved homicide, rape, and property offense cases for possible DNA analysis known to law enforcement agencies and crime laboratories in the U.S.**

## C. Other Offenses

Other types of offenses for which DNA evidence could exist are not reflected in Table 3.1 because the assessment tool did not seek this information from local law enforcement agencies. Such offenses could include crimes such as assault, battery and kidnapping.

In designing the assessment tool, the researchers placed a considerable amount of emphasis on developing questions that would generate accurate responses without being overly burdensome on the responding agency. The initial emphasis of this question set was on counting the potential number of unsolved homicides and rapes with possible DNA evidence – those crimes typically considered the most heinous by society, and therefore the most important to solve. The researchers feel the general public come to expect DNA analysis for these types of cases.

The question regarding the number of unsolved property crimes was intended to provide a picture of where the United States could be headed in terms of future DNA analysis demands. While also asking for the number of "other" types of crimes with potential DNA evidence might have provided a broader picture of the number of backlogged DNA cases in the country, the researchers were concerned that requesting additional figures would only result in higher numbers of local agencies determining that they did not have the staff resources or automated systems required to complete the assessment.

Therefore, in reading the figures in the preceding sections A and B, it is important to bear in mind that these figures potentially exclude a large number of other types of crimes for which DNA evidence may be instrumental in solving. Because many crime laboratories do routinely track the types of cases for which DNA analysis is needed, a category for "other" case backlog was included in their assessment instrument. For comparison purposes, consider that of the over 57,300 backlogged DNA cases reported by state and local crime laboratories, at least 5,200 of these cases were classified as "other" – accounting for nearly 10 percent of all backlogged cases. (See Chapter IV, *Crime Laboratory Backlogs* for a further discussion of DNA backlogs at crime laboratories).

# IV. AGENCY CAPACITY

This section addresses a number of issues concerning the capacity of the various agencies to collect and process forensic DNA evidence (see the appendix for the distributions of values for all variables in the law enforcement, local laboratory, and state laboratory assessments). In particular, this section is separated into the capacity issues facing law enforcement agencies versus local and state crime laboratories. The selected law enforcement issues to be considered include: (1) where law enforcement agencies typically send cases for DNA analysis; (2) biological evidence storage issues; (3) the reasons why DNA evidence for either unsolved homicides or rapes is not sent to a crime laboratory for testing; and, (4) cold case squad reviews.

With regard to the local and state crime laboratories, the selected capacity issues highlighted in this section include: (1) those associated with the evidence typically compiled in backlogged cases; (2) the cases that are currently within the statute of limitations; (3) the expected backlog of cases estimated by the crime laboratories; (4) the average time for analysis and the output capacity of the laboratories; (5) the major barriers associated with processing DNA evidence, with particular attention to property offenses; (6) the potential need for mitochondrial DNA testing; and, (7) cost/funding issues.

## A. Law Enforcement

### *Case Processing*

With regard to general case processing, the findings set forth in Table 4.1 suggest that 80.1 percent of law enforcement agencies report that the primary location for sending DNA evidence for processing is state crime laboratories. Conversely, only 11.7 percent of law enforcement agencies reported that local and regional crime laboratories are the primary places to which they send forensic DNA evidence for testing. Another 4.2 percent reported that their evidence is sent elsewhere ("other"). However, in reviewing the description that these agencies included with their description of "other", it appears that this category in fact meets the definition of a "local" laboratory as used in this study; thus bringing the number of agencies using local laboratories up to 15.9 percent

**Table 4.1.** Primary locations where law enforcement agencies send DNA evidence for testing.

| Location to which DNA Evidence is Sent | Law Enforcement Agencies Responding (%) |
|---|---|
| State Agency Laboratory | 80.1 |
| FBI Laboratory | 1.1 |
| Private Laboratory/Commercial Laboratory | 2.9 |
| Local Agency Laboratory | 11.7 |
| Other (regional, medical examiner, county) | 4.2 |

At first glance it may appear that state crime laboratories are performing the majority of casework DNA analysis. Even so, many of the larger U.S. cities and counties, where the majority of reported homicides and rapes take place, are served by local crime laboratories. Thus, although a greater number of law enforcement agencies report that they send their cases to state laboratories for DNA analysis, a relatively significant proportion of the overall DNA casework in the U.S. is in fact conducted in local crime laboratories. In point of fact, an estimated minimum of 80 million U.S. residents are being served by such local crime laboratories. With an estimated U.S. population of slightly more than 280 million according to the 2000 U.S Census Bureau data, local laboratory DNA testing accounts for nearly 30 percent of all DNA testing being done in the country. Moreover, of the 25 U.S. cities with the highest crime rate per capita (as reported in the 2001 UCR data), more than half (14) are being served by local crime laboratories.

Additional analyses (see appendix) indicate that the larger jurisdictions also have greater needs for DNA testing. Specifically, in addition to having a larger caseload of rapes and homicides in general, the large law enforcement agencies reported a slightly higher estimate of the proportion of rape cases that are likely to contain DNA evidence, where 53 percent of large agencies estimated that between 75-100 percent of rape cases are likely to contain DNA evidence relative to 47 percent of all other law enforcement agencies. With regard to homicides, roughly 58 percent of both large and all other law enforcement agencies estimated that between 75-100 percent of all homicides are likely to contain DNA evidence. It should be noted that these estimates reflect the *expectations* of law enforcement, and are not necessarily indicative of the percentage of cases that test positive for DNA at the crime laboratory.

These types of "local considerations" must be taken into full consideration in reviewing the findings reported here. Therefore, although it is undoubtedly true that the majority of forensic DNA analysis is performed by state laboratories, it is also the case that the local laboratories primarily serve major metropolitan populations that have high crime rates, and as a consequence may generate a higher level of demand for DNA analysis. Many of these large local jurisdictions may also benefit from from better evidence collection training programs, developed with the assistance of the local crime laboratory.

Also of note, a relatively low number of law enforcement agencies utilize DNA analysis by either the FBI crime laboratory or private forensic laboratories. The FBI crime laboratory serves the agencies of the federal government, including the Bureau of Indian Affairs, and the District of Columbia almost exclusively. Though there is capacity at private laboratories for additional DNA analysis, many jurisdictions do not have the financial resources to pay the fees associated with such forensic testing.

### *Storage*

Of those cases where biological crime scene evidence is not sent to a crime laboratory for testing, or evidence is returned to the local agency if current technology cannot produce results, a central concern for many law enforcement agencies is the availability of appropriate storage space for unanalyzed evidence. Pressures on evidence storage space can result in degradable biological evidence being maintained under improper conditions—or worse yet, being discarded or not collected at all for a lack of space to store it safely. Lack of appropriate storage space can lead to valuable DNA evidence becoming degraded and requiring a more expensive and

potentially less exact DNA analysis process to be employed (see "Mitochondrial DNA Testing" section for further discussion).

In addition to the need to retain evidence from unsolved crimes in the event that new advances in forensic technology (such as DNA testing) may identify a suspect in the future, law enforcement agencies are also facing increasing statutory requirements to preserve evidence pertinent to cases considered "solved." Cases where post-conviction DNA testing has resulted in extraordinary exoneration have led a number of state legislatures to impose requirements for the indefinite storage of evidence used in serious crime convictions. While such systematic storage activity is important to the enhancement of the criminal justice system's capacity to "do justice" for its citizens, such requirements for evidence storage frequently take the form of an unfunded mandate passed down to local jurisdictions from their respective state governments.

It is also worth noting that over a fifth (22 percent) of law enforcement agencies reported that some of their unanalyzed evidence is stored at the crime laboratory rather than in agency evidence repositories. Among police agencies reporting that biological evidence is stored at the crime laboratory, nearly 40 percent were the largest jurisdictions. Again, considering that larger jurisdictions typically have higher crime rates and a high demand for forensic DNA analysis, this finding suggests that many crime laboratories may also be facing similar strains on evidence storage capacity. Moreover, many laboratories are also required to store evidence after analysis is completed, and therefore face many of the same unfunded mandates for evidence storage for "solved" cases as well as for "unsolved" cases. As a consequence many laboratories find they are responsible for not only storing their own cases – both unanalyzed backlog cases and analyzed evidence – but also those of the law enforcement jurisdictions they serve.

In the area of lost forensic evidence, there have been widely publicized reports of large metropolitan law enforcement agencies discarding potential DNA evidence (e.g., rape kits) in an effort to create additional storage space for new evidence. Regardless of whether these reported actions were the result of honest mistakes or the consequence of faulty agency decision-making processes, the fact remains that this critical evidence is forever lost to future crime investigations.

Table 4.2 summarizes these storage issues for local law enforcement agencies. As can be seen quite clearly in this table, most law enforcement agencies (79.0 percent) indicate that unanalyzed evidence is typically held in a centralized storage area. Six-in-ten (61.0 percent) of these agencies indicated that they currently have insufficient storage capacity for evidence retention needs relating to DNA evidence. It is also important to note that three-in-four (75.7 percent) of the large law enforcement agencies indicated that gaining additional space for the effective preservation of evidence was either of "critical"[iv] or "highly critical"[v] importance (with 70.3 percent of all responding agencies responding similarly).

**Table 4.2.** Storage locations for unanalyzed evidence and long-term storage needs.

| Storage Issue for Local Law Enforcement Agencies | Law Enforcement Agencies Responding (%) |
|---|---|
| ***Where unanalyzed evidence is stored*** | |
| Centralized storage area | 79.0 |
| Decentralized storage areas/various district locations | 3.1 |
| Prosecutor's facility | 2.0 |
| Crime laboratory facility | 22.2 |
| Other | 5.6 |
| ***Does agency have sufficient space for long-term evidence storage?*** | |
| Yes | 39.0 |
| No | 61.0 |
| ***Is the need for more storage space "critical" or "highly critical"?*** | 70.3 |

### *Failure to Send DNA for Testing in Rape and Homicide Cases*

Part of what may be driving these backlog numbers and storage capacity issues at local law enforcement agencies are the specific reasons behind why forensic DNA evidence from unsolved homicides and unsolved rapes have not been sent to a crime laboratory for testing. Table 4.3 contains the percentages for common explanations provided to law enforcement agencies to choose from in the mail assessment instrument.

For those agencies indicating that rape or homicide evidence has not been sent to a crime laboratory for testing, Table 4.3 indicates that the primary reason is that a suspect has not yet been identified (31.4 percent of all responding agencies). Clearly, these "no suspect" cases are exactly the types of crime scene evidence that need to be submitted in order for the DNA database to be effective.

This finding is a strong indication that forensic DNA testing is not considered an investigatory tool by a significant portion of law enforcement agencies which have chosen not to send biological evidence to a crime laboratory for testing. Two other categories of response to this question are of a similar nature, and they warrant consideration as part of this discussion. The responses "A suspect has been identified but not yet charged," and "Analysis not requested by prosecutors" again show the bias towards using DNA analysis as a tool for the prosecution but not necessarily as an aid to identifying a suspect. When all three categories are combined, an estimated 50.8 percent of respondents indicated that forensic DNA was not considered a tool for

law enforcement criminal investigations. Rather, DNA evidence is considered a tool for the prosecution – evidence to secure a conviction after traditional police investigations have already identified the suspected criminal.

This revelation is particularly important for the corresponding impact it has upon DNA databases – crime scenes in which there are no suspects are precisely the types of cases that need to be submitted in order for the DNA database to be effective. The purpose of the DNA database is to link known offenders to crimes with no known suspects, and to link unsolved crimes together, thereby providing detectives either with suspects or with new investigatory leads. The fact that law enforcement agencies are purposely not submitting these cases indicates that there is limited understanding as to the nature and purpose of DNA databases. In fact, the study found that in many instances law enforcement officials were unaware of the fact that a DNA database has been established. For illustration, consider the following comments:

One large law enforcement agency commented simply:

*"National DNA Database Needed."*

Three other law enforcement agencies recorded these comments:

*"A database similar to automated fingerprinting should be the goal. Perhaps regional database established by the DOJ for the nation."*

*"This department would be interested in seeing a DNA database started. It could be accomplished by making the giving of samples mandatory after conviction of a crime."*

*"Need national database with rules for collecting samples, like with fingerprints."*

It should be noted that these comments came from law enforcement agencies scattered throughout the U.S., and from agencies of varying sizes (NOT exclusively small agencies). This limited knowledge of the DNA database is troublesome, but it should not be construed as an accurate reflection of law enforcement's desire for such a tool. In fact, when asked if the law enforcement agency filling out the assessment would be interested in using forensic DNA databases more frequently if there was a reasonable expectation that an unnamed suspect could be quickly identified, an overwhelming 96.9 percent responded positively. Many of the agencies responding negatively indicated that they needed no access to the database since the state laboratory took care of database searches. However, a handful of agencies also explained that they believed DNA to be too expensive for their jurisdiction or they had too few crimes to justify DNA testing. Also reflective of law enforcement's interest in becoming more knowledgeable about forensic DNA evidence in crime fighting is the fact that two National Institute of Justice resources – *What Every Law Enforcement Officer Should Know About DNA Evidence – Beginning Level Module and Advanced Level Module* – are frequently requested by law enforcement professionals. In fact, numerous agencies responding to the assessment specifically requested additional information about DNA and expressed an interest in the availability of pertinent training on the use of DNA databases. (These agencies were all put in contact with the appropriate personnel at the National Institute of Justice for further assistance.)

Another theme in agency responses regarding failure to submit biological evidence for testing relates to cost and resource (fiscal considerations). Individually, few agencies reported

that evidence is not sent to crime laboratories because of a lack of funding for DNA analysis (9.4 percent), the inability of crime laboratories to produce timely results (10.4 percent), or because crime laboratories are not processing requests for DNA (3.8 percent). However, each of these reasons may be considered in the overall context of *fiscal limitations*. Timely results require the existence of adequate capacity on the part of crime laboratories to handle demand, and such capacity is limited by resources. Crime laboratories that may not be processing requests for DNA testing do so primarily as a fallback means of *caseload management*, which is limited by capacity, which is limited in turn by resources. So, taken together, an estimated 23.6 percent of agencies do not submit DNA cases for reasons relating to poor funding. This grouping represents the second most frequently indicated reason for not submitting evidence for DNA testing.

In fact, the issue of *lengthy delays* in DNA analysis time was identified as a major concern by a significant number of respondents who chose to include comments with their assessment instrument responses. Police agencies throughout the country often face long delays in requested DNA analysis, which in turn limits the usefulness of DNA as an investigative tool for the police. Delays meanwhile are typically caused by crime laboratory resources that are inadequate to meet the demand for testing. The following comments regarding laboratory delays also reinforce the results discussed previously regarding the fact that law enforcement tends to view DNA as a tool for prosecutors and not for detectives:

> *"[The] state laboratory has over a four-year wait for processing DNA from property crimes. Therefore we do not submit it unless the crime is of major significance."*
>
> *"DNA cases sent to laboratory with no suspect having been <u>arrested</u> are 1-2 year wait, even if a suspect is named and in [a] DNA database."*
>
> *"*
> *[The] State Police Laboratory system is inadequate for producing timely results – average waiting period is 1½ - 2 years."*
>
> *"DNA evidence is beginning to have a significant impact on our investigations…However, the process of DNA evidence is expensive and creates a financial burden for the local police and the state laboratories. If funding was not an issue, DNA would prove to be on [sic] of the most valuable tools in solving cases."*

These comments represent a sampling of the over 100 responding agencies which felt strongly enough about this issue that they were compelled to add written comments on their assessment response. Clearly, the delay in processing time and associated fiscal considerations are issues that law enforcement agencies have identified as obstacles to their use of DNA evidence. There also appears to be a disconnect between local agencies who complain of one to two year delays on DNA testing (and one agency reporting four year), and laboratories who report average processing times of 23-30 weeks (see further discussion in the section on "Processing Time and Output Capacity").

These issues bring to bear a larger question relating to evidence collection. Specifically, if law enforcement officers do not see DNA as a primary part of their investigation, and those agencies which would like to use DNA for investigations are limited in doing so due to evidence analysis turnaround times that are not constructive to ongoing crime investigations, then what

effect do these factors have on the likelihood that investigators will identify, collect and submit DNA evidence? On the basis of discussions with law enforcement officials, that this situation of systematic disincentives occurs more often than would be preferred. Consider the following true story related to researchers in one of these background discussions.

The owners of a car parked on a residential street heard a collision one night and ran outside to find their car had been hit by another vehicle. The local police department was called to the scene for an accident report. The owners of the damaged vehicle had noticed a section of the car where paint from the offending vehicle had been transferred during the collision, and asked the officers if they intended to take paint chip samples for forensic analysis. The officers agreed to collect a sample, but informed the owners that the sample probably would not be sent to the state laboratory for testing because it would be "too expensive." This was news to one of the owner's, who happened to be a state crime laboratory employee. Not only was he certain that local jurisdictions were not asked to pay for such testing, but the trace evidence unit also verified that they had the time and capacity to analyze these types of cases. After some follow-up with the investigating agency, the evidence sample was eventually forwarded to the laboratory for analysis.

While this example is not specific to DNA, it illustrates a line of reasoning which is worth contemplation: how much potentially valuable DNA evidence is simply not collected by law enforcement officials who have little hope that forensic analysis will be conducted in a timely manner? And when collected, how often is such evidence actually sent to the laboratory for testing? This scenario is quite likely for non-violent crimes such as property offenses where a large majority of law enforcement agencies report that their respective crime laboratories do not conduct such testing. In fact, some comments from law enforcement agencies on this issue seem to indicate that this may be a bigger problem than anticipated. For example, the comments from three responding agencies clearly suggest the scale of the problem in question:

> *"I have just recently been trained in collection of DNA. Before my training, I am unaware of any cases where DNA was collected."*
>
> *"I am not familiar enough with DNA collecting to know how it effects* [sic] *my agency."*
>
> *"We provided all property detectives with DNA evidence training 2 months ago with the request to make testing routine. This is in progress. However, it is a cultural change that is difficult."*

This type of observation makes accurate extrapolation extremely difficult, but by looking at the converse of this scenario, the potential value of a fully functional forensic DNA crime laboratory setting may be understood. Virginia's forensic DNA program is among the most mature in the nation and the state database has been averaging one cold hit per day for the last two years. Virginia's processing time for DNA evidence, while not ideal, is by far more efficient than the majority of other forensic crime laboratories in the country. Additionally, and perhaps most importantly, Virginia's crime laboratory does not limit (within reason) the type of case or the type of evidence that can be submitted. This means that the Virginia crime laboratory is just as willing to conduct DNA analysis in a murder case as it is for a breaking and entering case under investigation. These factors – short processing time, database successes, and liberal case submission policy – have resulted in a steady rate of growth every year in the number of cases

submitted for biological testing. In fact the crime laboratory estimates that the amount of evidence submitted by law enforcement for DNA analysis grows by 30 percent every year. Does this mean that there were far *fewer* available DNA cases in previous years? Not likely, but rather the fact that crime investigators feel more encouraged to submit DNA evidence for analysis in Virginia likely accounts for that growth rate. This encouragement, coupled with the positive reinforcement of frequent DNA database matches, has resulted in a cadre of crime investigators across the state who tend to view the processing of crime scene DNA evidence as an effective means of reducing their caseload.

**Table 4.3.** Reasons why law enforcement agencies do not send DNA evidence from unsolved homicide and rape cases to a crime laboratory for testing.

| Explanation for Not Sending DNA Evidence from Unsolved Crimes to Crime Laboratories for Analysis | % of Law Enforcement Agencies Responding |
|---|---|
| A suspect has not yet been identified | **31.4** |
| A suspect has been identified but not yet charged | 10.2 |
| Guilty plea is expected | 13.9 |
| Uncertain how DNA analysis would be useful in case | 6.1 |
| Lack of funding for DNA analysis | 9.4 |
| Inability of laboratories to produce timely results | 10.4 |
| Laboratory is not processing requests for DNA testing | 3.8 |
| Uncertain where to send the case for DNA analysis | 0.9 |
| Analysis not requested by prosecutors | 9.2 |
| Other | 9.7 |

### *Cold Case Review*

The final backlog issue to explore is cold case review squads and policies. Cold case squads have been used in various jurisdictions throughout the country to reopen old cases for new investigatory leads. Many such cases have been found to contain DNA evidence which has been tested to solve crimes that are decades old. This type of review recently led to the identification of a suspect in the "Green River Killer" serial murders. The Green River Killer was thought to be responsible for 49 deaths over three years in the Seattle, Washington area. Biological evidence was collected from many of the murders, which began in 1982, and was kept in storage. After a review of the evidence in 2001, some pieces were selected and sent to the state crime laboratory for possible DNA analysis. The state crime laboratory was able to extract a DNA sample, and the analysis produced a match to a man who had always been considered a

prime suspect by investigators. The suspect was initially charged with seven counts of murder, and eventually pleaded guilty to 48 counts of murder. The example of the Green River case is a valuable one because it demonstrates the utility of DNA to old investigations in which primary suspects are known but could not be linked directly to the crime.

Law enforcement agencies were asked if they have a "cold case squad" or other established policy for reviewing unsolved violent crimes for fresh investigatory leads, such as new DNA testing. It is important to note that many agencies, particularly the smaller ones, do not have the organizational resources to form actual "cold case" squads. For this reason, the assessment instrument question on this topic included language that allowed for "other policy for reviewing unsolved violent crimes." Of those agencies with a cold case squad (or a related periodic unsolved case review policy), the assessment also inquired as to the number of cases potentially eligible for review, how many cases have been reviewed recently, and how many cases have been sent for DNA testing.

Table 4.4 contains the results posed by these questions. As indicated, only slightly more than one-in-five (22.8 percent) law enforcement agencies report that they have a cold case squad or similar review policy, and possibly due to resource issues mentioned above the percentage for large agencies is somewhat higher at 38.6 percent. Among the group of agencies without a current cold case squad or related policy, 49.4 percent of the large agencies (and 37.9 percent of all agencies) report that they plan to review old, unsolved cases for new investigatory opportunities such as DNA testing. This leaves just under half (48.6 percent) of the agencies which neither have cold case review policies in place nor any plans for such a review. One large agency indicated that the task of responding to the DNA assessment inspired a discussion on cold cases in the jurisdiction that could potentially benefit from DNA testing. The agency had not previously considered reviewing cold cases for DNA, but was now planning a systematic agency review. Although it is encouraging to learn that this data collection effort has possibly spurred the review of solvable cases that may otherwise have remained in storage, it is also somewhat telling that the agency had not considered such a review beforehand.

Table 4.4 also shows a significant variation in volumes of cold cases that have been reviewed (or are considered eligible for review) by those agencies reporting the existence of cold case squads or periodic unsolved cases review policies. This variation is evidenced by the fact that the mean and median values are substantially different from one another—indicating significant positive skewness—in the distributions of these variables. In other words, there is a high degree of variation in the responses where many agencies report relatively small numbers and a few agencies report extremely large numbers on these items. Thus, a median number of 0.0 arose due to this severe "upward skewness." A median number of 0 indicates that a significant number of agencies with cold case review squads have not sent any of their cases to a crime laboratory for DNA testing; only a handful of agencies have been responsible for the majority of DNA testing coming out of these specialized units. This failure to submit DNA evidence could be due to a variety of factors, ranging from a determination of non-probative value, to a tendancy of law enforcement to rely more heavily on "traditional" investigative techniques -- particularly when confronted with long backlogs at public crime laboratories and testing fees at private laboratories. While this assessment did not specifically ask cold case squads to quantify underlying reasons for why DNA evidence has not been submitted, clues to possible answers may be found in the previous section's general discussion on treatment of DNA evidence by law enforcement agencies ("Failure to Send DNA for Testing in Rape and Homicide Cases").

**Table 4.4.** Cold case squad review.

| Assessment Item | Statistics | |
|---|---|---|
| Does agency have a "cold case squad"? | Yes = 22.8% | No = 77.2% |
| **Of those jurisdictions that have a cold case squad** | | |
| | ***Median*** | ***Mean*** |
| Cases eligible for review | 5.0 | 71.3 |
| Cases reviewed | 4.0 | 22.3 |
| Reviewed cases sent for DNA testing | 0.0[vi] | 6.3 |

**B. Local and State Crime Laboratories**

***Crime Laboratory Backlogs***

**State and local crime laboratories reported an estimated 57,349 backlogged cases awaiting DNA analysis, with 34,723 cases at state laboratories and 22,626 cases at the local and regional laboratories.** It may be important to note that these backlogged cases appear to be only those crimes that have been identified by the crime laboratory as requiring DNA analysis. The assessment instructions defined a "backlogged case" as an unreported forensic case that has been in the possession of the crime laboratory for more than 30 days. However, after looking at data reported by one state crime laboratory it appears that law enforcement officials in most states have been counting only those cases for which it had already been determined that DNA analysis was needed. The state in question reported 14,695 rape cases, 12,023 homicide cases, 51,616 property crime cases, and 168,414 "other" cases in the "backlogged" crime cases category. While this state's crime laboratory will certainly not be performing DNA analysis on all 210,748 backlogged cases, it is a useful number in illustrating the great demand potentially facing crime laboratories in general, and in explaining the long turnaround times over which some police agencies express considerable concern. (This state crime laboratory also provided the number of backlogged cases that had been identified for DNA testing, which was used in calculating the national total.)

Table 4.5 displays the mail assessment-generated information regarding backlogged rape cases featuring rape kits and known DNA evidence. As indicated, both the local and state crime laboratories report that the majority of their backlogged rape cases (between 75-100 percent) contain rape kits only (additional analyses indicate that both local and state laboratories are also generally consistent in that the majority of these rape kits are likely to contain DNA evidence). Furthermore, a slightly larger percentage of local crime laboratories reported that over half of their backlogged rape cases feature rape kits as well as other forms of DNA evidence. Finally, both state and local laboratories note that backlogged rape cases with other DNA evidence exclusively are quite rare. These responses potentially point to a bigger issue of heavy reliance on rape kits for evidence. As the public acceptance and understanding of forensic DNA continues to grow, there is also a good chance that criminals may become increasingly savvy and begin leaving fewer obvious DNA clues behind at the scene of their crimes. Moreover, not all

rape kits will necessarily yield a testable DNA sample. For these reasons, it is important that investigators do not begin to rely too heavily on the collection of a rape kit in sexual assaults for all of their physical evidence. Full processing of the crime scene may capture DNA evidence that may prove invaluable if the rape kit does not produce results.

One backlog issue *not* discussed in this report regards those cases that have previously been analyzed by crime laboratories, but which require additional analysis before they can be entered into the national DNA index system. These cases fall into one of two categories: cases analyzed using the RFLP method of testing, and cases for which only partial STR analysis was completed. For several years before the current method of DNA testing (STR analysis) was introduced and accepted by the scientific community, forensic DNA analysis was completed using a method called RFLP. Unfortunately, results from cases analyzed using RFLP are not transferrable into an STR result. This means that any testing that yielded RFLP profiles (either offender profiles, or unknown suspect profiles) must be reanalyzed before they can be compared to the database population of STR profiles. These particular cases are not typically counted in a laboratory's "backlog" of cases that need to be analyzed, since, indeed, these cases have already been analyzed. The number of RFLP cases requiring STR analysis for entry into the DNA index system is unknown.

The other type of possible uncounted backlogged DNA cases are those that have only been partially profiled. In order to be eligible for entry into the National DNA Index System, a DNA profile must be analyzed at 13 points, called *loci*. For a number of years many laboratories reduced their costs by analyzing fewer than 13 loci (usually 9 or 10 loci). While these results are typically adequate for evidentiary purposes, and are sufficient for entry into the Local or State level of DNA Index Systems, they are *not* permitted to be loaded to the national system for searching between states. Today there are only a handful of laboratories that are not using all 13 loci in their analysis of National DNA Index System eligible cases. However, the number of cases that were analyzed using partial profiles in the past has not been counted and could be quite sizeable in some jurisdictions. Moreover, since there are a number of laboratories that continue to use partial profiles, this number is likely increasing.

**Table 4.5.** Backlogged rape cases, rape kits, and DNA evidence from local and state crime laboratories.

| Backlog with biological evidence (%) | Jurisdictions with Backlogged Cases with Rape Kits Only (%) | | Jurisdictions with Backlogged Cases with Rape Kits and Other DNA Evidence (%) | | Jurisdictions with Backlogged Cases with Other DNA Evidence Only (%) | |
|---|---|---|---|---|---|---|
| | **Local** | **State** | **Local** | **State** | **Local** | **State** |
| 0-10% | 10.0 | 3.0 | 13.7 | 2.9 | **56.9** | **64.7** |
| 11-25% | 30.0 | 18.2 | 13.7 | 14.7 | 31.4 | 26.5 |
| 25-50% | 14.0 | 21.2 | 19.6 | **41.2** | 5.9 | 5.9 |
| 50-75% | 12.0 | 24.2 | **35.3** | 20.6 | 3.9 | 2.9 |
| 75-100% | **34.0** | **33.3** | 17.6 | 20.6 | 2.0 | 0.0 |

### *Statutes of Limitations and Anticipated Backlogs*

Crime laboratories reported at least 1,637 backlogged rape cases that were expected to exceed the statute of limitations for prosecution by June 30, 2003. A significant number of these cases were reported to be held by the local laboratories. Furthermore, this number was generally expected to increase in the coming six-month period rather than decrease, thereby furthering the possibility that additional cases could have expiring statutes of limitation before the backlog is eliminated.

It should be noted that local jurisdictions were also asked to estimate the number of cases for which the statute of limitations may be a factor, but a very high number of agencies either did not respond to the question or indicated that an educated guess was not possible. This inability to track important information relating to cases points to a considerable deficiency in case management systems. Without such systems, the burden placed on law enforcement to review cases and respond to opportunities provided by advancements in forensic and other crime fighting technologies is overwhelming.

**Table 4.6.** Status of cases with regard to statutes of limitations (SOL) and anticipated backlogs.

| Laboratory Type | Cases within SOL | Cases to Exceed SOL by 6/30/03 | Anticipated Backlog |
|---|---|---|---|
| Local Laboratories | Mean = 232.5<br>Total = 7,440 | Mean = 49.1<br>Total = 1,522 | Mean = 229.6<br>Total = 10,789 |
| State Laboratories | Mean = 372.1<br>Total = 7069 | Mean = 5.5<br>Total = 115 | Mean = 377.6<br>Total = 20,371 |
| Totals | 14,509 | 1,637 | 31,160 |

Criminal justice professionals and policy makers also have been considering statute of limitations issues in conjunction with changes to forensic DNA policies. The issue is twofold. First, there are known instances where DNA backlogs – either in casework samples or offender samples – have resulted in DNA database matches that occurred after the statute of limitations for prosecution had lapsed for the likely guilty party. One state reported an estimated 150 such positive matches being made after the statutory period of exposure to prosecution had expired for repeat offenders in that state.

Secondly, an abbreviated statute of limitations period negates the long-term effectiveness of the DNA database in that the crime investigators making use of the database will not be given a full opportunity to succeed in matching across crimes and/or persons. The DNA database is an effective tool to catch recidivists. In many instances, a known offender entered into the database will be identified at a later date when he or she commits a subsequent offense that leads to the collection of DNA forensic evidence. Even with a year-long backlog, DNA testing should still be completed in sufficient time for the prosecutors to bring forward legal charges. However, the reverse scenario is also equally important in making DNA matches. For example, a crime occurs, and at some later date when the offender commits a crime that requires a DNA sample

for the database, a match is made retrospectively to the earlier unsolved crime(s). These "backwards" matches are those limited by short statute of limitations periods. Consider a state where the statute of limitations is six years where an unknown rapist victimizes a citizen in 2003 and eight years pass before the offender commits a crime that qualifies for the DNA database. In this situation, the 2003 rape can never be prosecuted. In such cases the crime victim may never receive closure, and the public safety is seriously compromised.

To be certain, the statute of limitations represents a very important element of "quality control" in the criminal justice system. The limitation on prosecutorial exposure protects individuals from the natural tendency for most evidence to become increasingly less reliable over time. Eyewitness testimony becomes less certain; a person near the scene of a crime may have difficulties rebuilding the reason for his/her proximity over the passage of several years. The reliability of DNA testing, however, is quite different; it is largely undamaged by the passage of time. DNA forensic evidence has been used quite frequently to convict criminals decades after the commission of their crime. It should also be noted that while a fingerprint may be found at a crime scene for a variety of legitimate and/or illegitimate reasons, a semen sample has very few legitimate reasons for being part of the evidence found in a rape examination of an unknown suspect assault.

Many states have responded to this statute of limitations problem by enacting new legislation intended to extend or remove the statute of limitations for specific violent crimes. One option that is quite popular among U.S. states is to remove the statute of limitations temporarily in sexual assault cases where DNA evidence is available. Once a match is made on the database, however, prosecutors have a set number of years to bring charges against the suspect in question. In this way, matches made on the DNA database can still be prosecuted, but prosecutors cannot indefinitely postpone a trial. Wisconsin, Delaware, and the federal government have enacted statutes that specifically permit "John Doe warrants" for specific crimes. However, Wisconsin subsequently completely removed the statute of limitations, negating the need for such warrants.

### *Processing Time and Output Capacity*

State and local crime laboratories also differ substantially in terms of the average time for processing DNA evidence and the average annual output capacity. Laboratories were asked for the approximate length of time required for the analysis of a typical (non-priority) unnamed suspect case rape kit, assuming a vaginal swab with one perpetrator, one victim, and that the time runs from the date the rape kit is received by the laboratory until analytical results are reported. This question was worded very specifically to control for a number of factors that can affect processing times. For example, cases that have more than one perpetrator, multiple pieces of evidence, or where analysis must control for known consensual partners of the victim, can lead to longer analysis periods. Delays between the collection of evidence and actual submission of the evidence to the crime laboratory can also lengthen the overall turnaround time. Conversely, cases that become a priority, either for public safety reasons or because of publicity, can be sped through the system at a much quicker rate.

The findings reported in Table 4.7 show that state crime laboratories take an average of 23.9 weeks, and local laboratories average 30.0 weeks for DNA processing. In addition, state crime laboratories process an average of 1,284.5 samples per year as opposed to the local

laboratories which average an output of 771.4 samples per year (with an extremely wide degree of variation between lows and highs). A potential explanation for this difference may lie in the fact that state crime laboratories tend to be slightly more process oriented because DNA evidence is generally submitted to the laboratory from remotely located agencies. In contrast, local laboratories are generally embedded in the law enforcement agencies they serve, and hence may have a more significant role in determining which evidence is of the most probative value.

A thorough understanding of the scope of capacity problems must also consider the wide range in existing capacity at crime laboratories. Consider the neighboring states of Virginia and North Carolina in this regard. Virginia has a population slightly smaller than North Carolina (by approximately 1 million, according to 2000 U.S. Census Bureau data), and Virginia's crime rate of 3,178 crimes per 100,000 is lower than that of North Carolina's at 4,938 (according to FBI UCR data). However, Virginia's leaders recognized the importance of DNA to public safety in the late 1980's and the state has steadily built its DNA program to rank among the finest in the country. To date, Virginia has approximately thirty-eight DNA analysts and processes approximately 8,172 DNA samples per year (with approximately 8 samples per case). In contrast, North Carolina has been slow to build its DNA program – its crime laboratories (a state forensic laboratory and a local laboratory serving Charlotte-Mecklenberg) employed a combined total of six DNA analysts (four at the state facility and two at the local laboratory) at the time of this Report. Moreover, as a matter of policy, North Carolina's state laboratory will not accept evidence for DNA analysis for any case in which there is no known suspect (with obvious exceptions for high profile serial cases) and has a processing time of three months. The local crime laboratory for Charlotte-Mecklenberg, which has a six-month processing time, accepts no suspect cases for violent crimes, but places limits on acceptance of property crime cases with no suspects. The two crime laboratories in North Carolina estimate their combined backlog of DNA cases at 720 (320 for Charlotte-Mecklenberg, 400 for the state). Virginia, in contrast, accepts nearly all cases (within reason), has a processing time of four months, and an estimated backlog of just over 2,000 cases.

Intuitively, it is reasonable to assume that higher output capacity should result in shorter processing times and smaller backlogs. However, when considering the Virginia-North Carolina comparison, the opposite was found to be the case. Virginia's capacity nearly doubles that of North Carolina, yet Virginia also has a larger backlog and generally a longer processing time. It seems unlikely that North Carolina simply has fewer crimes with biological evidence. In fact, given the higher crime rate in North Carolina, it is reasonable to assume just the opposite – that the state should have a larger number of crimes for DNA testing. This scenario begs the question of what is happening to biological criminal evidence in states such as North Carolina. There is good reason to believe that many of these cases are sitting in storage, either in crime laboratory evidence rooms or in local law enforcement evidence storage areas. It is also possible that biological evidence simply will not be collected for crimes if there is little real hope that it will be analyzed.

Another important comparison to make at this point involves the average DNA processing time considered acceptable in England. England's nationally established goal for the processing time of forensic DNA evidence is 24 days, and the Government has deemed as unacceptable the current processing time of 33 days for sex assault cases (See the attached report, *The Application of DNA Technology in England and Wales*). By comparison, in the U.S., the current average processing time for unnamed suspect rape kits is between 24 and 30 weeks (on the extremes, one local laboratory reported a 208 week backlog, and a state laboratory

reported a 78 week backlog). Similar to England, many laboratories throughout the U.S. also have a stated goal of reaching a 30-day processing time. While this is a laudable goal, the problem is that most crime laboratories have no actual means of reaching this goal. Take for example the Oregon crime laboratory. In the late 1990's, crime laboratory administrators had announced a processing time goal of 30 days, although many on the DNA staff privately believed that target to be unreachable. However, due to a steady stream of funding and some changes to operational procedures, in 2000 the DNA section had reduced the DNA evidence processing time to sixty days or less. The next target of thirty days suddenly seemed to be an achievable goal. Unfortunately, at about the same time the DNA section was faced with a hiring freeze while demand for DNA testing continued to grow. Then, a budget crisis in 2002 saw the State Police budget decimated and the DNA staff was reduced by 65 percent (a staff of twelve DNA personnel were reduced to only four). By mid-2003, the DNA section was largely reconstituted, but the damage had been done. Oregon currently has a processing time of at least 10 weeks for a non-priority rape kit, and is still not operating at pre-2002 levels with regards to trained staff and output capacity. The goal of 30 days for processing of DNA evidence again seems far-fetched without a significant infusion of additional funding.

**Table 4.7.** Average analysis time and output capacity for state and local crime laboratories.

| Laboratory Type | Avg. Analysis Time (in Weeks) | Avg. Annual Output Capacity |
|---|---|---|
| Local Laboratories | 30.0 | 771.4 |
| State Laboratories | 23.9 | 1,284.5 |

Note: Average analysis time is based on a non-priority, no suspect rape kit. Average annual capacity is measured in samples per year.

### *Barriers to Processing DNA Evidence of Property Crimes*

State and local crime laboratories were also asked about the barriers associated with processing DNA evidence from property crimes (in particular, unnamed suspect property crimes). Table 4.8 displays the results of these items. The most frequently indicated barriers to the processing of evidence in such cases have to do with *personnel shortages* and the *backlog of cases* with higher priority. The more secondary concerns expressed by crime laboratories include reagents and equipment needs and the inadequacy of operational space.

**Table 4.8.** Reported barriers associated with processing DNA evidence from unnamed suspect property crimes for local and state crime laboratories.

| Barriers to Processing DNA Evidence | Local Laboratories (%) | State Laboratories (%) |
|---|---|---|
| Lack of Storage Space | 5.2 | 9.3 |
| More Personnel Needed | **34.5** | **30.2** |
| Backlogs/Other Priority Cases | **39.7** | **30.2** |
| Reagents and Equipment Needed | 12.1 | 18.6 |
| Lack of Operational Space | 10.3 | 16.3 |
| Prosecution Must Request | 8.6 | 4.7 |
| Investigator Must Request | 17.2 | 4.7 |
| Other | 6.9 | 4.7 |

On a related note, an item was included in the local laboratory mail assessment instrument concerning the various obstacles facing local crime laboratories in getting DNA evidence from either unsolved rapes or unsolved homicides in queue at the laboratory. As indicated, and consistent with the previous set of analyses, the findings reported in Table 4.9 indicate that funding and backlog considerations both play an important role in getting DNA evidence from unsolved homicide and rape cases into the queue. This question was not posed to state laboratories because it essentially asks the respondent to opine on why detectives in their jurisdictions have not submitted cases. While local laboratories could reasonably be expected to have good insight on this issue given their closer proximity to the investigative unit, state laboratories, which sometimes serve hundreds of jurisdictions, cannot be expected to have the same detailed understanding.

Even so, several important differences do emerge here. In particular, local laboratories noted the importance of at least three additional reasons why DNA evidence from these types of cases may not be processed: a suspect has not yet been identified (noted as important by 37.0 percent of local laboratory respondents), a guilty plea is anticipated (30.4 percent), or the DNA analysis may not be requested by the prosecution (34.8 percent). Other important factors included the situation in which the subject has yet to be charged (26.1 percent) and cases wherein the agency may be uncertain as to how the DNA analysis my help close the case (28.3 percent).

In short, while both local and state crime laboratories indicate that staff personnel and backlog issues are the primary barriers to processing DNA evidence from property crimes, the results from the local crime laboratory assessment indicate a much more complex picture with regard to the processing of DNA evidence from unsolved homicide and unsolved rape cases.

**Table 4.9.** Reported barriers associated with processing DNA evidence from unsolved homicides and/or unsolved rapes for local crime laboratories.

| Barriers to the Processing of DNA Evidence | Local Crime Laboratories (%) |
|---|---|
| A suspect has not yet been identified | **37.0** |
| Suspect identified but not yet charged | 26.1 |
| Guilty plea is anticipated | **30.4** |
| Agency uncertain how DNA may help case | 28.3 |
| Lack of funding for DNA analysis | **30.4** |
| Backlog at laboratory prevents timely results | **45.7** |
| Laboratory is not processing requests for DNA testing | 2.2 |
| Agencies uncertain as to where to send case for analysis | 15.2 |
| Analysis not requested by prosecution | **34.8** |
| Other | 30.4 |

***Mitochondrial DNA Testing***

Another DNA testing option that warrants some discussion in this study is the analysis of mitochondrial DNA (or mtDNA). Testing of nuclear DNA is by far the most common analysis conducted in the United States and in other countries. This testing results in the measurement of the *short tandem repeats* of nuclear cells in DNA, and is therefore commonly referred to as STR testing. However, only two copies of nuclear DNA are present in human cells (once copy from the biological mother and one copy from the biological father), which means that a deterioration of the cell sample, or a sample that has only a few cells, may not be testable through STR analysis. On the other hand, mitochondrian, which contain mtDNA, are present in hundreds to thousands of copies per cell, and therefore not only withstand degradation better but can also provide more testable molecules per sample. This type of testing is particularly useful for evidence such as bone fragments and hair samples where nuclear DNA may not be present.

However, mtDNA testing is rather limited in criminal forensic identification applications. MtDNA is passed down through maternal lines, with all descendants in a given maternal line sharing the same mtDNA sequence. So, while mtDNA may conclusively prove that a particular person is related through maternal lineage to a specified woman, it does not serve the purpose of uniquely identifying the individual in question. Indeed, persons who would appear to be unrelated may in fact share a common maternal relative at some point in their lineage, and this would lead to the same mtDNA results. As a result, mtDNA testing can be used in criminal cases to positively include or exclude a person as a possible suspect, but does not provide the

discriminatory power that the forensic community has come to expect from nuclear DNA analysis. MtDNA testing is also more labor intensive, and therefore considerably more expensive than nuclear DNA testing.

Both state and local laboratories were asked about the degree to which their unsolved cases may benefit from mitochondrial DNA testing. Specifically, the laboratories were asked to estimate: (1) the total number of forensic cases (for the calendar year 2002) analyzed in the laboratory that failed to yield testable amounts of DNA for STR analysis, but could potentially benefit from mitochondrial DNA testing; and, (2) the number of hair analysis cases received by the laboratory that would benefit from additional mitochondrial testing.

Table 4.10 contains the results of these items. Both local and state laboratories reported that, although not as substantial as that for nuclear (STR) DNA analysis, a number of cases could potentially benefit from mtDNA testing. To be sure, **local laboratories note that a total of 956 cases could benefit from such testing, and state laboratories indicated an additional 2,043 cases.**

This question was not posed to local law enforcement agencies given that a need for mtDNA testing is primarily a scientific determination for which general law enforcement personnel do not have the appropriate expertise to ascertain. However, it is probable that, of the estimated 542,743 backlogged cases with biological evidence held by local law enforcement agencies and crime laboratories, some number of these cases may require mtDNA testing.

This may be especially true for those jurisdictions (70.3 percent) that reported that the need for additional evidence storage space was either "critical" or "highly critical." Many of the evidence storage rooms across the country do not necessarily maintain the climate control conditions that are ideal to DNA evidence preservation. Although DNA can typically withstand fluctuating temperatures and endure over very long periods of time, it is not indestructible. Moreover, many of the evidence policies and protocols at local law enforcement agencies may not be conducive to long-term storage of biological materials. Although this study turned up no such admissions, stories of biological evidence being "stored" in squad car trunks or under stairwells at the stationhouse are commonplace in the forensic science community.

In addition to the evidence contamination and chain of custody problems that the inappropriate storage of any crime scene evidence could present, haphazard storage is also far from an ideal manner of storage for the preservation of biological evidence. In cases where DNA evidence has deteriorated to a point where the more common STR testing cannot be completed, mtDNA testing may be appropriate. Currently, there are only a few crime laboratories around the country with the ability to conduct mtDNA testing. With demand being present but not overwhelming, the question has been raised as to whether it may prove more cost-effective to maintain regional mtDNA testing laboratories rather than attempting to establish this capacity at each state and local forensic laboratory.

Another factor possibly affecting demand for mtDNA testing is that fewer than half of all states have obtained court decisions permitting mtDNA test results as evidence at trial in criminal cases. It is possible that the need for mtDNA testing could expand as more states rule on its admissibility as evidence. It is also worth noting that mtDNA testing results are not comparable to nuclear DNA testing results, and therefore cannot be loaded into criminal DNA database indexes (see CODIS discussion in section V). However, an index for mtDNA analysis has been included as part of the CODIS *Missing and Unidentified Persons Database*. MtDNA testing is being used by a growing number of state laboratories which intend to participate in this database program. According to statistics maintained by the FBI's National Crime Information

Center (NCIC), there are nearly 5,000 reported unidentified persons in the United States at this time.

**Table 4.10.** Forensic and hair analysis cases that may benefit from mitochondrial DNA testing.

| Case Type | Local Laboratories Total (avg.) | State Laboratories Total (avg.) |
|---|---|---|
| Forensic Cases | 336 (8.6) | 897 (28.9) |
| Hair Analysis Cases | 620 (17.2) | 1,146 (47.8) |
| Total | 956 | 2,043 |

***Cost/Funding Issues***

Many of the major obstacles associated with DNA analysis concern the costs/funding issues involved. Accordingly, the local and state crime laboratories were assessed on a number of these issues. As a first step in this process, local and state crime laboratory administrators were asked to indicate from what sources the bulk of their funding comes. Table 4.11 shows that the majority of funding for the local crime laboratories derives from local sources. Accordingly, state crime laboratories receive most of their funding from state sources. Conversely, most state laboratories (91.6 percent) receive little to no funding from local sources, and 88.9 percent of local laboratories report a similarly low level of assistance from the state.

What this table also reveals is that federal funding is not a significant portion of the overall DNA budgets of state and local crime laboratories. Indeed, **only 20.5 percent of state laboratories receive at least half of their funding from federal sources—a figure that drops to a mere 4.5 percent for local laboratories**. Moreover, nearly half of all local laboratories reported that 10 percent or less of their DNA budget was attributable to federal sources. On the other hand, only 23 percent of state laboratories reported this lowest level of funding (see appendix). When considering that many of the local laboratories handle extremely high volumes of forensic DNA cases, this difference in reliance on federal money is startling.

However, there may be two plausible explanations for this difference. First, local crime laboratories are not permitted to apply directly for federal funding grants for DNA analysis. Instead, local laboratories must apply as a consortium through the state laboratory. Although this application process works well for a number of state and local laboratories, some local laboratories privately complain that they do not get a fair amount of this grant money. This situation also potentially leaves local laboratories at the mercy of a state's level of interest in

applying for federal funding. Additionally, the process of coordinating a consortium application – particularly in those states where local laboratories are numerous – can be difficult.

A second reason why these data show a higher degree of reliance at the state level on federal funding is because the question did not allow for a distinction between funding received for casework versus funding received for offender samples. Offender DNA samples are the sole responsibility of the state, and therefore local crime laboratories are not eligible to apply for federal grants for offender DNA analysis.

**Table 4.11.** Sources of funding for state and local crime laboratory budgets for DNA analysis.

| Funding Source | Less than 50% of Funding | 50% or Greater of Funding |
|---|---|---|
| ***Local Crime Laboratories*** | | |
| Local | 19.6 | **80.4** |
| State | **88.9** | 11.1 |
| Federal | 95.5 | 4.5 |
| ***State Crime Laboratories*** | | |
| Local | **91.6** | 8.4 |
| State | 27.8 | **72.2** |
| Federal | 79.5 | 20.5 |

Local and state crime laboratories were also asked to estimate the average cost of processing an unnamed suspect rape kit (assuming a vaginal swab with one perpetrator and one victim). Table 4.12 indicates that both state and local laboratories arrived at the same approximate cost of $1,100. In arriving at this estimate, the majority of local and state laboratories included the costs of reagents and salaries, but very few included costs associated with overhead and equipment. It is important to remember that these estimated costs are for what is considered a very simple rape kit case, as defined above. There are a variety of other factors that can significantly increase costs associated with DNA analysis, including the size, quantity and condition of the evidence, the number of perpetrators involved, and contaminants. To repeat, the $1,100 per case estimate is only for the most rudimentary of rape cases, and it does *not* include many overhead considerations. As forensic cases become more complex, the cost of analysis will quickly rise.

**Table 4.12.** Average cost of rape kit analysis and frequency that factors associated with costs were included in the estimate.

| | Local Laboratories | State Laboratories |
|---|---|---|
| **Average cost of rape kit analysis** | $1,153.95 | $1,041.27 |
| **Factors associated with costs** | | |
| Reagents | **75.9%** | **67.4%** |
| Equipment | 34.5% | 27.9% |
| Salaries | **65.5%** | **48.8%** |
| Overhead | 39.7% | 11.6% |
| Other | 15.5% | 9.3% |

Table 4.13 presents the responses from laboratories regarding how they would choose to spend supplemental funding for their DNA programs. Essentially, the question asks laboratories where there biggest needs lie. The sum totals for all laboratory responses indicates that reagents and analytical equipment were the areas most frequently identified by laboratories for such funding. However, this table shows only how often a particular response was chosen, and no limit was placed on the number of response chosen.

**Table 4.13.** Projected use of supplemental funding for DNA analysis for local and state crime laboratories (frequency of selection).

| Funding Priority | Local Laboratories (%) | State Laboratories (%) |
|---|---|---|
| Salaries | 63.8 | 59.5 |
| Overtime | 46.6 | 48.8 |
| Training | 58.6 | 62.8 |
| Equipment | 60.3 | 67.4 |
| Robotics | 31.0 | 58.1 |
| Reagents | **67.2** | **76.7** |
| Construction/Lease | 29.3 | 48.8 |
| Offender Collection | 10.3 | 41.9 |
| Suspect Case Backlog | 51.7 | 41.9 |
| No Suspect Case Backlog | 55.2 | 51.2 |
| Outsourcing | 29.3 | 34.9 |
| Other | 6.9 | 27.9 |

Table 4.14 sets forth study results in this area in the form of a priority listing of spending priorities for local crime laboratories and state crime laboratories. Of the responses listed in Table 4.13, laboratories were asked to rank the top three most significant priorities, in order of importance. A review of these data clearly shows that salaries were, by far, considered the single

most significant need. Crime laboratories were also subsequently asked if by "salaries" did they mean additional funding to augment current analyst salaries or funding to pay for hiring new personnel? Although a handful of laboratories indicated that current staff needed augmented salaries, the majority of laboratories indicated that the need was for new hires. This issue of salaries is significant because federal grants for DNA analysis may not be used in this manner. Instead, DNA laboratories are solely dependent on state and local funding for salary needs. Two other personnel issues – training and overtime – also ranked among the top needs reported.

Additionally, the fact that local laboratories ranked funding for no suspect casework as a mid-level priority, but state laboratories ranked it last is a point for consideration. Current federal grants for DNA analysis fall into two categories. One grant can be used for DNA analysis of backlogged offender samples, and the other grant is for DNA analysis of backlogged cases with no suspect. As discussed previously, local laboratories privately complain that they do not receive a fair pass-through of the federal funding that is awarded to the state. This complaint would seem to be reinforced by the high priority that local laboratories place on the need for additional money for no suspect casework. This significantly higher need could also be reflective of the fact that many local laboratories serve large metropolitan jurisdictions with high crime rates, as discussed previously in this Report.

Finally, "construction/lease" was selected as a priority by a small number of laboratories, but for those laboratories that indicated this need, it was typically identified as the most significant priority. Of the twenty-five laboratories rating construction/lease as a priority, 14 rated it as the top priority, and eight rated it as the middle priority. Therefore, funding for construction/lease, though not a priority for the majority of laboratories, becomes a significant concern once the need develops.

**Table 4.14.** Rank ordering of spending priorities for local and state crime laboratories.

| Local Crime Laboratories | State Crime Laboratories |
|---|---|
| 1. Salaries | 1. Salaries |
| 2. Reagents | 2. Equipment |
| 3. Equipment | 3. Construction/Lease |
| 4. Training | 4. Reagents |
| 5. Construction/Lease | 5. Outsourcing |
| 6. Overtime | 6. Training |
| 7. No Suspect Case Backlog | 7. Robotics |
| 8. Suspect Case Backlog | 8. Overtime |
| 9. Robotics | 9. Offender Collection<br>Other[viii]* |
| 10. Other[vii] | 10. Suspect Case Backlog<br>No Suspect Case Backlog* |
| 11. Outsourcing | |
| 12. Offender Collection | |

* Ranking of "Offender Collection" and "Other" categories resulted in a statistical tie.
** Ranking of "Suspect Case Backlog" and "No Suspect Case Backlog" categories resulted in a statistical tie.

## V. CODIS ANALYSIS

In 1982, California became the first state to begin requiring blood samples from certain sex offenders. Although DNA was not specifically mentioned in statute, and indeed the basis for modern forensic DNA analysis was not first introduced until 1985, California's identification of the utility of collecting blood samples from a specified group of known offenders was ground-breaking at the time. In 1988, Colorado became the first state to specify through statute the requirement for DNA samples from certain offenders, and in 1990, Virginia became the first state to enact a law requiring DNA from all convicted felons. In the following year (1991), the FBI established guidelines for states on sex offender DNA database laws and began developing the concept of a computer software program that would operate similar to the national criminal fingerprint database (IAFIS). In 1994, this DNA database program was officially created in statute by Congress through the *DNA Identification Act (P.L. 103-322)* and was formally named the Combined DNA Index System, or CODIS.

Today, every State has a DNA database statute that allows collection of DNA from specified offenders. All 50 States require DNA from sex offenders and murderers, and 46 States require DNA from all violent felony convictions (including assault and battery and robbery). Over the past several years, a growing number of states have been expanding their databases to include non-violent felony convictions; 45 States require DNA from burglary convictions, 36 States require DNA from certain drug convictions, and 31 States require DNA from all felony convictions. (These figures are current through July 2003). (See appendix for chart of state statutes.)

An easily understandable description of CODIS was included in a July 2002 Special Report from the National Institute of Justice (U.S. Department of Justice) titled, "Using DNA to Solve Cold Cases" (NCJ 194197). The Special Report's description is as follows:

> *CODIS is a computer software program that operates local, State, and national databases of DNA profiles from convicted offenders, unsolved crime scene evidence, and missing persons. Every State in the Nation has a DNA database that allows for the collection of DNA profiles from offenders convicted of particular crimes. CODIS software enables State, local, and national law enforcement crime laboratories to compare DNA profiles electronically, thereby linking serial crimes to each other and identifying suspects by matching DNA profiles from crime scenes with profiles from convicted offenders. The success of CODIS is demonstrated by the thousands of matches that have linked serial cases to each other and cases that have been solved by matching crime scene evidence to known convicted offenders…*
>
> *…CODIS uses two indexes to general investigative leads in crimes for which biological evidence is recovered from a crime scene. The convicted offender index contains DNA profiles of individuals convicted of certain crimes ranging from certain misdemeanors to sexual assault and murder. Each State has different "qualifying offenses" for which persons convicted of them must submit a biological sample for inclusion in the database. The forensic index contains DNA profiles obtained from crime scene evidence, such as semen, saliva, or blood. CODIS uses computer software to automatically search across these indexes for a potential match.*

*A match made between profiles in the forensic index can link crime scenes to each other, possibly identifying serial offenders. Based on these "forensic hits," police in multiple jurisdictions or States can coordinate their respective investigations and share leads they have developed independent of one another. Matches made between the forensic and convicted offender indexes can provide investigators with the identity of a suspect(s). It is important to note that if an "offender hit" is obtained, that information typically is used as probable cause to obtain a new DNA sample from that suspect so that the match can be confirmed by the crime laboratory before an arrest is made.*

*LDIS, SDIS, and NDIS*

*CODIS is implemented as a distributed database with three hierarchical levels (or tiers)—local, State, and national. All three levels contain forensic and convicted offender indexes and a population file (used to generate statistics). The hierarchical design provides State and local laboratories with the flexibility to configure CODIS to meet their specific legislative and technical needs.*

*A description of the three CODIS tiers follows*

- *Local. Typically, the Local DNA Index System (LDIS) installed at crime laboratories is operated by police departments or sheriffs' offices. DNA profiles originated at the local level can be transmitted to the State and national levels.*

- *State. Each State has a designated laboratory that operates the State DNA Index System (SDIS). SDIS allows local laboratories within that State to compare DNA profiles. SDIS also is the communication path between the local and national tiers. SDIS is typically operated by the agency responsible for implementing and monitoring compliance with the State's convicted offender statute.*

- *National. The National DNA Index System (NDIS) is the highest level of the CODIS hierarchy and enables qualified State laboratories that are actively participating in CODIS to compare DNA profiles. NDIS is maintained by the FBI under the authority of the DNA Identification Act of 1994.*

There are three states (Louisiana, Texas, and Virginia) which, in addition to requiring DNA from all convicted felons, also require DNA from certain offenders prior to conviction (upon arrest or indictment). However, the current national DNA database law only permits those samples that are taken from convicted offenders to be uploaded to NDIS. The wording of this law also does not permit samples from juveniles to be uploaded to NDIS since most juveniles are adjudicated delinquent rather than convicted of crimes. However, individual states may maintain these samples at the SDIS tier, as state laws permit.

***Offender DNA Profiles***

According to the FBI CODIS program office, there were 1,321,854 offender DNA profiles in NDIS as of April 2003. Additionally, 41 State CODIS laboratories reported 463,209 offender samples that were expected to be part of the laboratory backlog by June 30, 2003. As a comparison, the English DNA database contains over two million DNA profiles. Given that the United Kingdom's population is approximately 52 million, the two million offender samples on file represent a significantly larger percentage of the entire population than what is represented in CODIS (see the attached report, *The Application of Forensic DNA Technology in England and Wales*). The U.S. DNA database system would need to reach almost ten million profiles to achieve a similar percentage of the total population covered. The difference between these proportions go a long way towards explaining the greater success of England's forensic DNA program compared to that of the United States.

The mail assessment instrument asked those state laboratories with statutes that did not yet require DNA from all convicted felons to provide an estimate of the additional samples that the enactment of such a law would add in the first year, along with the estimated number of annual samples expected in future years. Those laboratories estimated that an expanded DNA database statute would add a combined total of 2,281,000 offender profiles in the first year, with an annual rate of 504,484 additional profiles in future years. Anticipated offender profiles for the first year are more than in future years because laboratories were asked to assume that the expanded requirement would be made retroactive to include offenders who were still incarcerated. A potential pool of backlogged offender samples that these figures do not capture are the uncollected offender sample in states where a requirement for an all felons DNA database has been enacted in statute, but not yet implemented (usually as a result of funding problems).

In the majority of states, offender DNA samples are taken at some point prior to release (72 percent) rather than at the point of sentencing or intake (52 percent). These numbers do not total 100 percent due to the fact that many laboratories responded that samples are collected at both points**,** presumably depending on the particular circumstances of each offender's conviction. For the purpose of solving crimes, it is most desirable to capture DNA samples from the specified offenders at the earliest point possible. Collecting DNA from offenders shortly after sentencing not only allows sufficient time for the sample to make its way through the backlog, but also, if a DNA database match is made to a previously unsolved crime, investigators and prosecutors will have ample opportunity to determine whether additional charges should be pursued while the offender is still in custody.

Another factor determining the number of offender profiles on the DNA database and related backlogs is whether the state requires DNA from specified offenders who are not sentenced to state prison terms. There are a large number of felony convictions in which the offender is either sentenced to a county jail or to community probation. In 2002, Washington State expanded its offender DNA database to include all felony convictions. The State estimated that limiting the database to only those felony offenders sentenced to state prison would mean an additional 5,600 DNA profiles annually. However, including those felony offenders sentenced to jail would mean an additional 15,000 offenders annually, and felons sentenced to serving community probation would add 840 offenders per year. In addition to the large number of felony convictions that these sentences represent, these are also offenders who are likely to have shorter sentences and therefore earlier releases back into the community.

Moreover, the size of the DNA database in the U.S. is further limited by whether the state elects to require DNA samples from persons who had been convicted of qualifying crimes prior to the time of the database expansion statute and are still serving sentences. Many states choose to omit these offenders, primarily due to the additional analysis and logistical problems associated with collections. Again using Washington State as an example, including those offenders who were incarcerated at the time of enactment would have added 6,100 state prison inmates and 1,800 county jail inmates. Making the statute retroactive to include those persons currently on probation and parole would mean adding an additional 10,300 DNA profiles. While this group of offenders included retroactively represent a significant cost increase, it is also worth pointing out that retroactive provisions represent a one-time cost, with no recurring collection issues. And as with the jail and community probation sentences, the groups of felons already serving time for qualifying offenses are the ones most likely to be released into the community soonest.

The type of biological sample required from offenders is another factor affecting both collection and analysis costs. Over half of the state laboratories (52.4 percent) indicated that a blood sample is collected from offenders, with 28.6 percent of states collecting buccal (cheek) swabs. Nearly one-in-five (19 percent) states are taking both types of samples, as conditions warrant. The move towards taking buccal swabs instead of blood draws represents a recent switch. Buccal swabs are less problematic, particularly for those local jurisdictions that are responsible for taking DNA samples from jailed offenders and offenders on probation and parole. Blood collections require a trained phlebotomist and are therefore considerably more expensive for local agencies. Buccal swabs, in contrast, can be accomplished easily with a minimal amount of training. Additionally, many people consider a buccal swab to be less invasive than blood draws. Fortunately, at the same time that the demand for buccal swabs was increasing, the kits for buccal swab collection were becoming increasingly reliable. As evidenced by the crime laboratory assessment responses, many states now use buccal swabs exclusively for offender DNA testing and have independently indicated that they receive adequate samples for analysis. However, for crime laboratories making the switch from the analysis of offender blood samples to offender buccal swabs, it is not an overnight change and requires some planning and changes to laboratory operations.

### *Characteristics of CODIS Hits*

Over the past few years as DNA databases have become increasingly successful, the need for information on the types matches made (or "hits") has become apparent. Virginia's CODIS office has a strong tracking program for identifying the types of crimes solved and the types of offenders linked to such crimes. As other states have considered following the Virginia model of an all felons DNA database, the Virginia information has been a significant tool in driving the debate. However, Virginia's data have brought to light the lack of any comprehensive CODIS hit data on a national scale. As part of the state and local laboratory assessment form, respondents were asked to supply this information. The figures contained in this Report cover 38 states that reported DNA database hits, plus 70 local laboratory hits that were determined to be cases that had not been reported to the state. The local crime laboratory hits reported are matches made at the LDIS tier, but should not be viewed to represent the only hits made at the LDIS tier since many local jurisdictions regularly report such hits to their state CODIS office.

In reporting forensic hits and offender hits, crime laboratories were requested to follow the "CODIS Hit Counting Guidelines" as prepared by the FBI. However, it is possible that there are inconsistencies among states in the manner in which hits were reported. Another issue to bear in mind when reviewing Table 5.1 is that not every "hit" results in an "investigation aided." For example, a DNA profile from an unknown suspect rape case could hit upon the victim's boyfriend, assuming that the boyfriend has a prior offense which resulted in his inclusion on the database. If the victim is certain that her boyfriend was not the rapist, then the "hit" is not valuable to the investigation. Most often consensual partners are controlled for in DNA analysis cases, but such "hits" are not unheard of.

Table 5.1 displays the characteristics of the SDIS hits (hits made within a state) and NDIS hits (hits made between states). As indicated, most of the hits are from state crime laboratories. Furthermore, most (approximately three-in-four) are SDIS offender hits. With respect to the qualifying offense distribution, offenders were more likely to be entered into the CODIS database for a non-violent qualifying offense as a violent offense.[ix] With regard to types of crimes linked to offenders, however, violent crimes predominate; approximately six-in-ten of the crimes solved with DNA hits were violent crimes in the SDIS subset of cases. For the NDIS hits, violent crimes predominate on both the qualifying offense and crimes cleared sides of the equation. A majority of the inter-state hits entailed offenders who had violent qualifying offenses, and nearly three-in-four crimes linked either to offenders or to other cases through DNA evidence were violent crimes.

As is clear from the findings set forth in Table 5.1, the majority of types of crime solved through DNA database hits in the United States have been sexual assaults and other violent crimes. Considering that many crime laboratories will not process non-violent cases (such as property crime cases), or will only do so under a narrow set of circumstances, it is not surprising that the majority of unsolved crimes matched to offenders through the DNA database have been violent crimes. However, a comparison to hits on England's database, which has had an aggressive policy of encouraging submissions from property crimes, shows over 31,000 residential burglaries and over 29,000 commercial burglaries have been matched through hits on the database. In fact, only 14 percent of all DNA cases submitted to England's crime laboratory agency in 2001-2002 were violent crimes. With the FBI reporting that the estimated dollar loss attributed to property crime (excluding arson) in the U.S. was $16.6 billion in 2001, it is reasonable to assume that the untapped potential for using CODIS to solve non-violent crimes is immense. (See attached report, *The Application of Forensic DNA Technology in England and Wales*, for further details.)

The importance of considering non-violent qualifying offenses is also seen in Table 5.1. These figures indicate that in the United States only between 16.8 percent and 25.6 percent of the qualifying offenses for offenders linked to crimes are specified as violent offenses. It is quite possible, however, that a large number of cases comprising the "unknown qualifying offense" category—which contains the majority of responses—are violent offenses. Such a high proportion of violent offenses would be expected since most state DNA databases began as sex offender databases, and slowly expanded to include other violent crimes. For a majority of states, it has only been within the last three years that the database has grown to include non-violent felonies. Consequently, for the non-violent offenders on the database a majority of the hits recorded at this time are for crimes that were previously committed. It will likely take several years before these offenders matriculate through the penal system and new offenses are committed to which they can be linked. This delay in hit levels as the database grows was

experienced by Virginia. Although Virginia has had an all felons DNA database since 1990, it has only been since 2001 that the state has been reporting approximately one hit per day.

In addition to having all convicted felons on the database, another reason that Virginia's program has been so successful is due to its policy of processing a wide array of DNA cases. DNA databases will be limited in success if either the crime file index or offender file index is limited. The FBI reports a total of 54,895 forensic case profiles on the database as of April 2003. This number pales in comparison to the more than 200,000 similar profiles included on England's database – again contributing to the relatively higher level of success of their database compared to that of the United States.

**Table 5.1.** Descriptive statistics for CODIS hit characteristics.

| **Characteristics of CODIS Hits** | **SDIS Hits %** **In State Matches** **(n = 4,092)** | **NDIS Hits %** **Between State Matches** **(n = 289)** |
|---|---|---|
| ***Type of Crime Laboratory**** | | |
| Local | 8.5 | 8.5 |
| State | 91.5 | 91.5 |
| ***Type of Hit**** | | |
| Offender | 72.3 | 57.7 |
| Forensic | 27.7 | 42.3 |
| ***Offense Characteristics*** | | |
| Non-Violent Qualifying Offense | 23.9 | 15.9 |
| Violent Qualifying Offense | 16.8 | 25.6 |
| Qualifying Offense Unknown | 59.3 | 58.5 |
| Non-Violent Crime Solved | 16.4 | 12.1 |
| Violent Crime Solved | 39.2 | 46.8 |
| Type of Crime Solved Unknown | 44.4 | 41.1 |

* Note: these estimates are based on the 2,706 SDIS cases for which states provided case-level information.

In order to portray these findings in a more concrete and detailed format, Tables 5.2 and 5.3 set forth in raw numbers the case combinations between qualifying offenses and the unsolved crimes linked for all SDIS and NDIS cases where such information was available.

Many of the responding laboratories were able to supply both the matched offender's qualifying offense (i.e., the reason the offender was included on the database), and the type of crime linked to the offender. However, a crime laboratory's ability to provide this information depends upon several factors. First, many crime laboratories do not have ready access to offender criminal history information, and therefore may not be able to identify the qualifying offense. Also, several laboratories have not instituted programs that allow them to track database hits. Although such tracking may seem like a simple thing, it requires additional resources from laboratories that are already facing extreme resource shortages. For this reason, there are a

considerable number of offenders in the "unknown" category of Table 5.2 and 5.3. Additionally, a few agencies were able to provide the total number of hits recorded, but could supply neither the offenders' qualifying offense nor the type of crime solved. By default, these hits are recorded in the "unknown" category as well.

**Table 5.2.** SDIS hit distribution by qualifying offense and type of crime solved.

| | **SDIS TIER OFFENDER HITS (Within State Matches)** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Qualifying Offense** | **Forensic Case Type** | | | | | | | |
| | Murder | Sex Offenses | Assault | Robbery | Burglary | Misc. | Unknown | Total |
| Murder | 24 | 18 | 0 | 3 | 2 | 3 | 4 | 54 |
| Sex Offenses | 30 | 220 | 2 | 5 | 11 | 6 | 53 | 327 |
| Assault | 18 | 61 | 6 | 3 | 9 | 11 | 2 | 110 |
| Robbery | 27 | 75 | 4 | 25 | 53 | 12 | 2 | 198 |
| Burglary | 18 | 99 | 4 | 31 | 168 | 16 | 79 | 415 |
| Property Offenses* | 18 | 21 | 3 | 22 | 43 | 15 | 0 | 122 |
| Drug Offenses | 43 | 94 | 2 | 16 | 47 | 26 | 0 | 228 |
| Supervision Violation | 0 | 4 | 0 | 0 | 3 | 0 | 1 | 8 |
| Misc. | 21 | 87 | 4 | 16 | 55 | 18 | 2 | 203 |
| Unknown | 61 | 485 | 3 | 33 | 137 | 36 | 1672 | 2427 |
| Total | 260 | 1164 | 28 | 154 | 528 | 143 | 1815 | N=4092 |

* Note: property offenses include theft, forgery, and breaking and entering. Miscellaneous offenses include: violation of oath as a public official; obstruction as a law officer (7); criminal attempt (3); entering vehicle; driving habitual violator (2); possession of firearm during felony; miscellaneous judicial proceeding; impersonating an officer; cruelty to children; criminal mischief; public lewdness.

The findings set forth in Table 5.2 indicate the presence of many repeat offenders – that is, criminals who tend to specialize in one type of crime and re-offend frequently. For example, the most frequent qualifying offense for burglars was burglary, and for rape and sex offenses was rape and sex offenses. It is also clear, moreover, that property offenses were qualifying offenses for many violent crimes – more than 100 among the cases displayed here. A somewhat different pattern is evident for drug offenses as qualifying crimes. Such offenses are matched to a wide

range of types of crimes solved through DNA evidence. These data begin to show that the non-violent felons, in fact, commit a wider array of crimes than the violent felons. In fact, Virginia estimates that limiting its DNA database to violent offenders would have resulted in missing 82 percent of its hits to offenders.

It also bears pointing out that the "unknown" category for qualifying offenses is quite large. Also, the qualifying offense as reported by states is merely a record of the crime that resulted in the offender's inclusion on the database. As illustrated in the New York data discussed later in this Report, many of these offenders have extensive criminal histories – and many carry convictions for other "lower-level" felonies that were not crimes included on the database at the time of the conviction[x]. Therefore, the relatively larger number of violent offenders matched to crimes on the database is possibly inflated both because most databases began as violent offender only databases, and also because the qualifying database offense is not necessarily the only conviction attributable to the offender.

The likelihood of this scenario is illustrated in the New York study that found that for more than half of the offenders studied, the qualifying offense that resulted in the inclusion of the offenders profile on the database was committed an average of four and a half years after the first criminal conviction[xi]. Moreover, these data are supported in some of the hit data submitted by states. Several states were able to include criminal histories for their offender hits. These criminal histories were, more frequently than not, extremely lengthy with multiple arrests and convictions. A hit in one state linking an unsolved sexual assault to a felon whose qualifying offense was robbery, shows a criminal history that covers two states as well as some federal felonies. The record includes charges on: two rapes, a kidnapping, four robberies, three assaults, two burglaries, three thefts, two counterfeiting crimes, driving while intoxicated, resisting an officer, trespassing, defrauding an innkeeper, and three parole/probation violations. These twenty-one charges (excluding the parole/probation violations) resulted in nine convictions – only the last of which required a DNA sample for the database.

Table 5.2 also reports data which may be of interest for further criminological reasearch. Of the 228 drug offenders linked through the database to another unsolved crime, almost 70 percent of these unsolved crimes were violent offenses. Overall, drug offenders accounted for more than 21 percent of the hits made to unsolved murders and 14 percent of hits made to unsolved sexual assaults. When looking more closely at the sexual assault crimes solved through the DNA database, approximately one-third of these crimes were linked to sex offenders. More surprisingly, nearly 18 percent of the unsolved sex assaults were linked to burglary or property crime offenders; this figure combined with the 14 percent attributed to drug offenders may reveal patterns of criminal activity for study and use in police investigation practices. (For the purposes of these calculations, the "unknown" number of forensic cases was subtracted from the denominator.)

The findings set forth in Table 5.3 address the same question of type of qualifying offense matched to crimes for NDIS hits. This table includes NDIS tier offender hit information for 31 states. Significant efforts were made to ensure that hit counting was not duplicated, but it is possible that some of the hits were counted twice, particularly for those states that were unable to give a breakdown of qualifying offense of type of forensic case matched. A significant number of database hits were made between neighboring states, with Illinois reporting fourteen hits with Wisconsin, and six hits with Missouri. However, hits were also reported between states with little geographical proximity – such as Alaska and Arkansas, Washington and Florida, and

Maine and Texas. In addition, there were five hits reported to the District of Columbia, one hit involving the military, and one international hit with Canada. (See appendix).

Moreover, at least 73 forensic case matches have been made between 27 states, the District of Columbia and the FBI. These cases included 56 sex offenses and 21 homicides and 15 burglaries. The total number of forensic hits is substantially lower than the number of crimes involved because one forensic hit will necessarily link at least two crimes together. Therefore, although only 73 forensic hits were made, 166 unsolved crimes were involved.

**Table 5.3.** NDIS hit distribution by qualifying offense and type of crime solved

| **NDIS TIER OFFENDER HITS (Between State Matches)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Qualifying Offense** | **Forensic Case Type** | | | | | | | |
| | Murder | Sex Offenses | Assault/ Battery | Robbery | Burglary/ B&E | Misc.* | Unknown | Total |
| Murder | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 5 |
| Sex Offenses | 8 | 27 | 0 | 0 | 3 | 0 | 8 | 46 |
| Kidnapping / Restraint | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 4 |
| Assault | 2 | 8 | 1 | 0 | 0 | 0 | 1 | 12 |
| Robbery | 1 | 1 | 0 | 1 | 3 | 0 | 1 | 7 |
| Burglary | 4 | 2 | 0 | 1 | 8 | 2 | 1 | 18 |
| Theft & Receiving | 4 | 4 | 1 | 0 | 1 | 0 | 0 | 10 |
| Misc. | 1 | 10 | 0 | 0 | 4 | 1 | 2 | 18 |
| Unknown | 7 | 38 | 3 | 2 | 11 | 1 | 107 | 169 |
| Total | 28 | 97 | 5 | 4 | 31 | 4 | 120 | **289** |

*Miscellaneous forensic crimes include vehicle theft, criminal trespass, DUI/vehicle accident. Miscellaneous Qualifying Offenses include theft, drug charges, forgery, tampering with evidence, weapons violations, passing bad checks, and juvenile adjudications.

It is clear from the findings set forth in Table 5.3 that most cases entailing complete data for qualifying offenses and crimes solved among the NDIS hits relate to rapes and sex offenses. The vast majority of rape and sex offense crimes cleared entailed rape and sex crime qualifying offenses. However, again there is a large number of "unknown" offenders and forensic cases, which could potentially cause the distribution. This finding, coupled with the same strong

pattern of repeat offending witnessed in Table 5.2, highlights the importance of collecting and processing rape kits and other biological evidence that might render DNA evidence for DNA databases. The following section will add further to our understanding how DNA evidence, if collected and processed with proper dispatch, could in fact prevent re-offending and spare many citizens from avoidable crime victimization.

## VI. FORENSIC DNA AND CRIME PREVENTION

Solving a crime -- and solving it quickly -- has a direct effect on preventing additional crimes by the same perpetrator. An offender who is not apprehended in a timely manner remains free to commit more crimes. The most recent federal studies on recidivism tracked 272,111 released prisoners from 15 states[xii]. The study found that 29.9 percent of the released prisoners were rearrested for a new offense within six months of release; and after three years this percentage grew to 67.5 percent. The arrests in question were almost exclusively either for new felonies or serious misdemeanors. The same study found that the offenders accounted for 4.1 million arrest charges prior to their most recent incarceration, and were responsible for another 744,000 arrest charges within three years of release.

It is precisely such repeat offenders that DNA databases are established to identify to enable timely intervention and the prevention of new crimes by habitual offenders. A match on the DNA database necessarily means that the same offender has committed at least one other criminal offense. Therefore, DNA databases serve the purpose not only of bringing criminals to justice and achieving closure for the victims of crime, but they also offer the prospect of preventing the same perpetrator from victimizing additional citizens. Given the relatively high rates of recidivism in the U.S., the potential for DNA databases to help solve and prevent crime is substantial. DNA analysis cannot stop the first crime from occurring, but it can provide investigators with the tools they need to identity a suspect and remove the threat to public safety before the same perpetrator can re-offend.

However, the effectiveness of DNA databases is restricted by a number of factors. First, to have an effective DNA database, biological evidence must be routinely collected from crime scenes, and that evidence must be sent to crime laboratories for forensic analysis. This set of activities on the part of law enforcement personnel assumes that crime scene investigators have the proper training to identify and collect the DNA specimens, and that the samples are submitted to the crime laboratory in a timely manner.

Secondly, crime laboratories must have a reasonable processing time for DNA analysis of crime scene samples, along with a policy to accept and process most reasonable requests for DNA testing – including crimes with no suspects and property crimes. In England, the current processing time of 33 days has been deemed unacceptable by the Government, which has set a processing time goal of 24 days. As discussed previously in this study, the average turn-around time in the U.S. is approximately 30 weeks, or for purposes of comparison to England's numbers, 210 days.

Additionally, the crime laboratory must accept requests for DNA testing for a variety of crimes. As discussed previously, states with progressive DNA polices have had great success in solving an increasing number of crimes through their DNA database. Limiting the numbers and types of acceptable cases for DNA testing will necessarily limit the number and types of crimes that can be solved through the use of forensic DNA.

Lastly, the DNA database must have a strong pool of offenders for comparison. As described in Section V, the DNA database is a two-index system – a crime scene sample index, and an offender index. The effectiveness of either index is necessarily restricted by any limitations on the other index. As previously discussed, those states with statutes requiring DNA from all convicted felons have shown a high success rate in matches on their DNA database. A 2002 Research Note by the New York Division of Criminal Justice Services further supports this argument[xiii]. The study reviewed the first 102 DNA database matches occurring after a 1999

expansion of the database to include considerably more convicted felons. For 55 of the 102 offenders on the database who were matched to unsolved crimes, the review found that the first conviction was not for an offense that would be included on the DNA database under the current statute. Instead, the conviction that resulted in the offender's inclusion on the database occurred about 4½ years after the first criminal conviction – during which time these particular offenders accumulated an average of 10.2 felony and 5.6 misdemeanor arrests. These types of numbers on repeated offending by known felony offenders are supported by the recidivism study discussed previously. These observations on repeat offenders highlight a clear public safety need – that of identifying these repeat offenders as quickly as possible and monitoring their activities carefully.

Quantifying the number of crimes that could be prevented through a more systematic use of forensic DNA testing presents a difficult problem. As in all matters of documenting the "prevention" of crime, it is difficult to count crimes that did not happen. As a way to deal with this fundamental problem, the following case studies were developed to provide examples of crimes that potentially could have been prevented had a strong forensic DNA program been in existence to call upon. The research on these cases specifically focused on those states that did not require DNA from all convicted felons at the time that the research for this Report began. Such states were chosen for the greater likelihood of uncovering preventable crimes due to a limited offender database. Moreover, many of these states have not expanded their offender databases largely due to resource problems which also affect criminal evidence analysis.

The case studies were developed through the assistance of investigators and prosecutors around the country, and reflect the following assumptions:

- State statutes requiring DNA from all convicted felons were feasible by 1990. This assumption is based on the fact that Virginia enacted such a law in 1990.

- In addition to all felony offenses, state databases could include misdemeanor convictions that arose out of felony charges. Several states currently have such requirements due to the number of felony offenders who plea to misdemeanor crimes.

- A 30-day turn-around time is both desirable and possible, given sufficient resources. In fact, laboratories will often expedite testing and can finish analysis in a week or less if the crime(s) warrant priority treatment.

When reviewing the cases presented below, the reader should bear in mind the following points:

- Backlogs at crime laboratories are primarily the result of growing demand and limited resources. "Preventable crimes" that may in part be due to backlogs at crime laboratories, should be considered as a byproduct of resource limitations. In fact, crime laboratory analysts often work overtime and weekends to complete analysis on high profile cases.

- Law enforcement and prosecutors should not be expected to be able to identify offenders of unsolved crimes when they have not been given access to the necessary tools, such as DNA. These case studies should not be read to point blame at criminal justice professionals who did not immediately detect the offender's involvement in additional crimes. Indeed, many of these cases would still be unsolved if not for other extraordinary detective work.

- States with multiple case studies should not be considered to have a particular deficit in DNA testing. For several of the case studies, it was the fact that DNA testing is being conducted that allows law enforcement to determine that serial offenders were at work.

## ALASKA

### FOUR PREVENTABLE RAPES

*Between January of 2000 and January of 2001, an unidentified perpetrator raped five women in the area of Anchorage. All five rapes were all linked to the same unknown offender through DNA analysis.*

*Police identified a suspect after the January 2001 rape, and that individual has since been convicted of all five attacks.*

The suspect in question had a long criminal history of felony charges which resulted in misdemeanor convictions. Felony charges levied against him included burglary with sexual intent, and his misdemeanor convictions ranged from criminal trespass to forgery. If this individual had been required to supply a DNA sample from a 1995 felony burglary charge that was reduced to a criminal trespass conviction, he could have been identified after the first rape in January 2000, ***thereby preventing the following four rapes.***

### ONE PREVENTABLE RAPE

*In 2000 in Anchorage, a woman was raped by a stranger and a DNA sample from the crime was entered into the state DNA database. No DNA hit was made, and the crime remained unsolved.*

*In 2001, another woman was raped in the remote village of Kotzebue on the Seward Peninsula – an area primarily accessible only by airplane. In this case, authorities identified the suspected perpetrator and he was convicted of sexual assault. Upon his conviction, a DNA sample was collected for the DNA database, and was matched in June of 2002 to the 2000 Anchorage rape.*

A review of the offender's criminal history shows at least nine prior convictions for a variety of crimes ranging from criminal trespass to felony burglary. Several of the convictions also carried sexual assault charges which were dismissed. In 2000, Alaska expanded the DNA database to include burglars, but did not make the provision retroactive to include prior convictions for those still serving probation or on parole. If the state had required DNA from this group of offenders, the DNA database would have matched the offender to the 2000 rape, ***thereby preventing the rape in 2001.***

### ONE PREVENTABLE PROPERTY CRIME

*In 1993, a murder was committed in Kodiak, but with no suspect the case remained unsolved. In recent years, the case was reopened and a cigarette butt collected from the crime scene was tested for DNA. A DNA profile was extracted, and it matched up with a felon on the database for a 1996 felony armed robbery.*

*However, before this murder identification was made, the offender remained criminally active in the community and was arrested and convicted of another theft in 2002.*

With proactive policies to review cold cases for possible DNA evidence, the offender's DNA sample could have been matched to the 1993 murder prior to the 2002 theft – ***thereby preventing at least one property crime.***

## ARKANSAS

### FOUR PREVENTABLE RAPES

*Between 1995 and 1997, seven rapes were committed against women and young girls across four counties in Arkansas. In at least four of the cases, the victims were assaulted after being stopped by a man posing as a police officer, whom newspapers subsequently dubbed the "Blue Light Rapist."*

*In 1997, a suspect was identified as the suspected rapist through the assistance of one of his acquaintances who was working with law enforcement. Subsequent DNA testing linked him to several of the rapes, with other evidence and victim descriptions tying in the remaining cases.*

The suspect had been convicted in 1996 on charges of theft by receiving a stolen rifle. Had the state required a DNA sample for this felony conviction, ***up to five of the subsequent rapes could have been prevented.***

## CALIFORNIA

### SIX PREVENTABLE RAPES

*In the Alameda County area, a series of 12 sexual assaults occurred in 1997 over a two-month period, all of which were attributed to the same unidentified suspect. The offender wore a ski mask in all the attacks, often robbed his victims, and in many instances attacked two women on the same day. This rapist struck quickly and frequently – his first five detected attacks occurred over a period of 10 days. Due to the extremely violent nature of the offenses and other similarities linking the attacks, it is reasonable to expect that DNA analysis would be expedited in these cases, as is often done when a serial offender is at large in a community.*

*A latent fingerprint found at the scene of the 12th attack was linked to a former high school track and field coach who had an extensive criminal record. This individual was formally charged and convicted in 6 of the cases, and is currently serving a 59-year to life imprisonment sentence.*

The perpetrator's criminal record included 21 prior arrests, most of which were felony charges ranging from murder to interfering with a police officer. Although most of the offenses occurred prior to the introduction of DNA databases, the man's last brush with justice was a 1993 parole violation for a 1989 felony burglary conviction; the offender was discovered to be in possession of weapons and spent another 16 months in prison.

DNA evidence from the first rape in 1997 could have been matched to the offender by the time of the sixth attack (occurring 11 days after the first attack) if the state had required DNA from all convicted felons – ***thereby preventing six rapes.***

## THREE PREVENTABLE RAPES

*In 1998, a woman was raped in Ventura County. A DNA profile from the criminal evidence was uploaded to the DNA database, but no match was made. Two additional rapes that occurred four months apart in 2002 were subsequently matched to the 1998 case, and new testing of a 1993 case was also eventually linked to the same unknown offender.*

*The offender became a suspect in these crimes after being identified in another case. He provided a DNA sample that linked him to the four rapes. He is currently awaiting trial.*

The suspected rapist had a prior conviction of felony drug possession in 1990. If the state statute had required DNA from all convicted felons, including felony drug possession, and if the 1993 rape case had been submitted for DNA testing in a timely manner, ***at least three rapes could have been prevented.***

## ONE PREVENTABLE ASSAULT

*On an April evening 1997, an intruder entered a residence in the Berkeley area and sexually assaulted a woman in her bed while threatening her with a knife. Before burglarizing the house and fleeing the scene, the intruder bound the victim with duct tape and stockings and viciously beat her.*

*In a second incident in 1997, an intruder entered a residence in Berkeley and began to burglarize the house. A male resident awoke and a struggle ensued during which the resident was stabbed in the face and back. In a sweep of the neighborhood, police stopped a suspect who was eventually determined to be responsible for both attacks.*

The offender had a prior record that included charges on 13 felonies. However, only six of these charges resulted in convictions and all six convictions were reduced to misdemeanors. Had California required DNA from criminals whose misdemeanor conviction arises from the same set of circumstances as a felony charge, ***at least one potentially deadly assault could have been prevented.***

## HAWAII

### TWO PREVENTABLE SEXUAL ASSAULTS, TWO PREVENTABLE ASSAULTS

*Over a period of two months in 1994, two women were sexually assaulted at knifepoint in parking garages in Honolulu. These two crimes occurred two weeks apart, so it is reasonable to assume that the case could have been prioritized and expedited DNA testing could have been conducted. More than a month later, a third attack was attempted, but the offender broke off the attack when a man nearby heard the victim's screams. The offender then chased after the man, but both the male and female were able to evade further contact with the offender.*

*Relying on latent fingerprints and victim identifications, police eventually arrested a suspect. During the course of the investigation that suspect was also linked to two unsolved home invasion sexual assaults. He pled guilty to 21 counts pursuant to a plea agreement, and ultimately was sentenced to 40 years in prison.*

The criminal in question was a registered sex offender in Hawaii, but his sentence terms were completed prior to the establishment of a DNA database in Hawaii in 1992. As it turns out, the 1994 attacks coincided with dates when he was required to check in with his parole officer in the downtown area. Had Hawaii extended its DNA database to include all registered sex offenders, he could have been identified prior to the third attack.

Moreover, this individual's criminal record contains a kidnapping conviction for which he was paroled in 1994. If the state had required a DNA sample from persons incarcerated for kidnapping at the time of the DNA database establishment, ***at least two sexual assaults and two related attempted attacks could have been prevented.*** Hawaii is the only state that still does not require DNA from kidnapping convictions.

## IDAHO

### ONE PREVENTABLE DEATH

*In September of 2002, a woman was kidnapped, raped and murdered. DNA collected from the crime scene was entered into CODIS, but no offender was identified. In March of 2003 another woman was raped and murdered, and the DNA database linked that crime to the 2002 unsolved murder case. The man who was a suspect in the 2003 murder case was arrested and confessed to the crime. Further DNA testing reconfirmed that the man had in fact committed both murders.*

The murder suspect had been convicted on felony burglary charges in 1991. If the state had required DNA for this conviction, ***one death could have been prevented.***

## INDIANA

### ONE PREVENTABLE DEATH, SEVERAL PREVENTABLE PROPERTY CRIMES

*In May of 2000, an elderly woman was brutally raped while on her way to vote in an election. Ten days later a suspect, who had not been identified as the woman's rapist, was charged and subsequently convicted of felonious receiving of stolen property and trespass. Upon his release, he was remanded to another jurisdiction where he was wanted on felony theft charges. The suspect was released from this county correctional facility in May of 2001, and the next day an elderly woman was found raped and murdered. Tracking dogs lead police to an area where the suspect's mother lived, and within a few days the suspect was arrested for the murder. Subsequent DNA testing linked both the 2001 murder and the 2000 rape to the suspect in question.*

In 1998, the perpetrator of these crimes was convicted on felony charges of receiving stolen property, and he was again convicted on a similar charge while still under confinement in prison. From 1999 through 2000, he was charged or arrested on four separate occasions for felony theft by receiving, one of which resulted in a misdemeanor conviction and the last one brought the felony conviction in May of 2001. If the offender in question had been required to give a DNA sample upon the 1998 felony conviction, the 2000 rape could have been solved, ***and the rape and murder of an elderly woman, and several property crimes could have been prevented.***

### TWO PREVENTABLE SEXUAL ASSAULTS

*In October of 2001, a woman was raped by an unknown assailant who broke into her home; a rape kit was collected for analysis in this case. In July of 2002, another woman was raped and burglarized, and another rape kit was collected for forensic analysis. Then once more in August of 2002 a third woman was burglarized and sexually battered. All three violent assaults took place in the Indianapolis area.*

*Use of the Indiana state DNA database eventually led to the matching of the rape that occurred in October of 2001 to the rape of July 2002. In addition, a match was also made to a DNA sample obtained from a suspect. Upon questioning by detectives, the suspect in question incriminated himself in a third sexual assault which had taken place in August of 2002.*

The perpetrator in this set of cases received a 20-year sentence for his second rape conviction in December 1986, and was released from prison on parole in October 1995. However, the Indiana DNA database did not become effective until July 1996, and upon going into effect it did not require DNA samples from qualifying offenders who were still serving community sentences of probation or parole. Had the Indiana statute on DNA evidence collection included a provision to collect DNA from persons still serving community sentences, ***at least two sexual assaults could have been prevented.***

## KENTUCKY

### SEVEN PREVENTABLE RAPES

*In October 1998 a female attendant at a gas station was raped. In this case, DNA was collected but was not tested. Approximately ten days later, another female gas station attendant was raped, and over the next three years an additional seven rapes were committed by the same repeat offender.*

*Investigators identified a suspect in the last rape in August of 2002 after he used the victim's ATM card. In 2003, DNA testing finally linked the man to the first two rapes in 1998, and other evidence linked the remaining cases to one another.*

The suspect was a known sex offender in Kentucky who had committed twelve documented rapes as a juvenile. His first rape committed as an adult occurred within a month of his release from juvenile detention facilities. Unfortunately, the State of Kentucky did not require DNA from juvenile offenders adjudicated delinquent of sex crimes at the time of the suspect's juvenile sentences. If the state had required DNA from juveniles adjudicated delinquent of felonies, ***at least seven rapes could have been prevented.*** Moreover, in 2002, the requirement was not made retroactive to encompass persons on probation or parole. Had it not been for good police work, this rapist could still be a threat to public safety today.
when amending the state's DNA evidence law governing the DNA database to include juveniles

### FIVE PREVENTABLE RAPES

*From June of 1997 through October of 2000 six rapes and several attempted rapes took place in the Louisville area. In addition to DNA evidence that linked these rapes to one another, the rapist frequently used a flashlight to blind his victims -- thus earning the nickname of the "Flashlight Rapist."*

*In November of 2000 a suspect was arrested and subsequently convicted on numerous burglary charges in Louisville. A sex crime detective began to suspect the man as the Flashlight Rapist and obtained a warrant for a DNA sample. The DNA analysis positively identified the man as the Flashlight Rapist, and he later pleaded guilty to the crimes.*

The flashlight rapist had been previously convicted on felonious burglary charges in 1991 in Florida, which did not yet require DNA from all convicted felons. Had DNA been required, ***at least 5 rapes could have been prevented.*** Moreover, although Kentucky altered its law to require DNA for burglary convictions in 2002, the provision was not made retroactive to include probationers or parolees and the implementation date of the law was delayed. Thus the 2000 burglary conviction in Kentucky may also have "slipped through the cracks" and allowed the crimes to remain unsolved if not for good detective work.

## LOUISIANA

### FOUR PREVENTABLE DEATHS

*Between September of 2001 and March of 2003 five women were raped and murdered in the Baton Rouge area. All five crimes were linked to the same unidentified perpetrator through DNA testing. In May of 2003, a volunteered DNA sample collected from a mass sampling of potential suspects resulted in the identification of a suspect. Subsequent to this match, at least one additional murder has been tied through DNA to the suspect, and over 20 additional cases are being reviewed for possible connections to the suspect in question.*

The suspect had a 1993 conviction on felony burglary charges arising from an attack on a 74 year-old man. If his DNA sample had been collected and entered into the database, ***at least four deaths could have been prevented.*** The suspect also had prior convictions for beating up his girlfriend in a bar and trying to run over a Sheriff's deputy at a roadblock.

### ONE PREVENTABLE RAPE AND BURGLARY

*In 1997 and unknown suspect committed attempted aggravated rape on a child in her home. A DNA sample was collected as evidence, but was not matched to an offender.*

*In December 1998, a woman was raped and her home burglarized by an unknown assailant. A suspect who was in close proximity to the crime scene and matching the victim's description was arrested. Subsequent DNA testing linked him to both the 1997 and 1998 crimes. The same perpetrator is suspected in the commission of two other similar crimes for which no DNA evidence was available. He has been sentenced to 50 years of imprisonment.*

The offender's criminal history included a 1990 conviction on unauthorized entry of a place of business, and a 1996 felony theft conviction. If a DNA sample had been required for

either of these crimes, the database could have matched the offender to the 1997, ***thereby preventing the 1998 rape and burglary.***

**MASSACHUSETTS**

**THREE PREVENTABLE RAPE/MURDERS**

*In late 1997, a woman was found raped and murdered in her home in Springfield. In early 1998, another three women were found raped and murdered – one in her home, two others in alley ways. All four murders were linked through DNA, and due to the unique positioning of the bodies which became the offender's "signature."*

*Following the fourth murder, a voluntary DNA sample was collected from a person who had become a suspect in the case. Within a few weeks, that suspect was tied through a DNA match to the crimes.*

The suspect's criminal record included two prior felony convictions in 1996 – one for larceny and the other for breaking and entering, for which he was sentenced to community supervision. If Massachusetts had required a DNA sample for either of the 1996 non-violent felony convictions, a DNA match could have been obtained after the first rape/murder, ***thereby preventing the subsequent three rape/murders.***

**MISSOURI**

**TEN PREVENTABLE RAPES**

*Between 1988 and 1997, an unidentified masked man was beating up and raping women in areas of Missouri and across the Mississippi River in Illinois. Because many of the 29 or more attacks happened in south St. Louis, the media dubbed the attacker the "South Side Rapist." DNA linked at least 13 of the cases together, but the police were unable to identify a perpetrator.*

*In October of 1998 St. Louis City Police were called when a man was seen breaking into a house. A van registered to a person known to the police was reported leaving the scene of the break-in. This person's appearance matched a physical description of the South Side Rapist and police asked for a DNA sample. The suspect voluntarily agreed to have his mouth swabbed. Several weeks later the DNA results were returned and positively identified the suspect as the South Side Rapist, who by this time had disappeared. He was arrested several months later in Albuquerque, New Mexico after a worried mother found his hotel number in her daughter's belongings. The suspect ultimately confessed to raping at least 100 women since his late teens.*

Sometime in 1991 the suspect was convicted of felony burglary for which he served a sentence in the state prison. Prosecutors indicate that there were a minimum of ten rapes occurring after this conviction that are attributable to the suspect. If the state had required a

DNA sample from this perpetrator after the burglary conviction, the suspect could have been linked to serial rapes occurring prior to his conviction, ***thereby preventing at least 10 additional rapes.***

### ELEVEN PREVENTABLE RAPES AND MURDERS

*From April of 2001 through May of 2002, police began finding the bodies of women who had been raped and murdered in the St. Louis/western Illinois area. Investigators recovered semen from the victim's bodies that was sent for crime laboratory analysis. The DNA profiles from the semen recovered from the victims all matched.*

*A person known to the police became a suspect in the crimes after he wrote an anonymous letter to a local newspaper. An internet-generated map enclosed with the letter led to some computer forensics that eventually identified the specific computer that downloaded the map. The suspect was ultimately arrested in June of 2002 when police found videotapes of himself killing and torturing his victims. On the videotape, the suspect states that he had just committed "murder number seventeen". Police have conclusively linked 12 victims to this offender thus far, and believe the number could be as high as 20. This individual committed suicide shortly after his arrest.*

In March of 1988, this offender committed a series of five robberies and was sentenced to fifteen years for robbery and armed criminal action. In June 1994, he was paroled after serving five years and three months of his sentence. Unfortunately, Missouri does not require DNA from convicted robbers, and this offender was released without submitting a DNA sample for the state database. With a DNA sample in the database, this offender could have been identified as the killer of the first victim ***long before a minimum of eleven additional women lost their lives.***

## NEBRASKA

### TWO PREVENTABLE SEXUAL ASSAULTS

*In 1995, an unknown perpetrator raped a woman in Ohio. DNA was collected during the investigation, but was not submitted for testing.*

*In 1999, a woman was sexually assaulted by an unknown assailant at a hotel in Nebraska. DNA evidence was collected from this crime scene. Later the same day in Colorado, a woman was sexually assaulted by a man who had answered an advertisement in the newspaper for furniture that she was selling. DNA was collected from this crime scene as well.*

*Using an electronic bulletin board that serves a nine-state area in the Midwest, a Nebraska police detective posted a digitized photo of the suspect in the Nebraska hotel attack. Within 30 days police in Iowa identified the person in the photo as a known offender resident in their area. The man in question was arrested and subsequent DNA testing linked him to both 1999 attacks.*

*Subsequently, an Ohio police detective noticed similarities to the 1995 attack, and the DNA from that crime was submitted for testing and was found to match that of the offender.*

The offender's extensive criminal history dates back to a 1979 felony burglary conviction, and included two separate burglary convictions in Iowa in 1989 (for which he was sentenced to a maximum of 25 years) plus a 1993 misdemeanor indecent exposure conviction and several acquittals on sexual assault. If Iowa had required DNA prior to releasing the offender for the 1989 felony burglary charge, and if the DNA evidence in the Ohio case had been submitted and analyzed in a more timely manner, ***at least two sexual assaults in Nebraska could have been prevented.***

This case is an excellent example of the importance of each state's DNA program to solving and preventing crimes in other states. It is also worth noting that Iowa expanded its offender DNA database to include all convicted felons in 2002, but Nebraska still does not require DNA from felony burglary charges.

### THREE PREVENTABLE RAPES

*In July of 2000, a woman was raped in her home after answering a knock at her door, but no DNA was collected. Between September of 2001 and September of 2002, four more rapes were committed by a perpetrator using the same modus operandi – but in these cases DNA was collected and linked to the same unidentified perpetrator.*

*Acting on a tip, police tracked down a suspect in November of 2002 and the man was subsequently convicted on all four rape cases for which DNA was collected. He is eligible for parole in 140 years.*

The rapist in question had several convictions for misdemeanor thefts from 1996 through 1998. Moreover, he was convicted as a juvenile on felony theft charges in 1996. If a DNA sample had been required for the felony theft adjudication, ***at least three rapes could have been prevented.***

## NEW JERSEY

### THREE PREVENTABLE RAPES

*In mid-May 1998, a woman was raped at a public library in Essex County. One month later, a second woman was raped in a library. DNA samples were taken from both cases and loaded into the DNA database, where it was discovered that the two rapes were linked. Importantly, in matching these cases to each other, DNA also excluded two men being held by police as possible suspects.*

*In late June of 1998, a child was abducted and raped. A DNA sample was collected and sent to a private laboratory for testing, and the victim provided a description of the attacker to police.*

*The police eventually identified a suspect, and DNA testing subsequently tied him to the child attack. After the sample was loaded into the state database, it was discovered that the same offender was the library rapist. Additionally, the same DNA profile was eventually matched to an October 1999 rape in New York City.*

The offender had a prior felony arrest on a weapons possession charge. The charge was later reduced to a misdemeanor crime to which the offender pled guilty. If a DNA sample had been required of felony charges that result in misdemeanor convictions, the perpetrator could have been identified after the first rape, ***thereby preventing the following three rapes.***

## SEVEN PREVENTABLE ROBBERIES, FIVE PREVENTABLE RAPES

*In October of 2002, the first in a series of ten robberies began. The incidents included seven aggravated sexual assaults, spanned four months and included victims in at least nine different New Jersey cities.*

*A person known to the police became a strong suspect in the first offense, and a DNA sample was collected from him four days later. A DNA match was finally made in January of 2003 to the third offense, but only after a unit commander requested expedited testing of the evidence.*

The offender in question was convicted in the 1980's on federal felony robberies charges, and was released from a federal prison in 1999. Unfortunately, the federal government did not begin requiring DNA from felony robbery convictions until 2000. Moreover, law enforcement had custody of all the DNA information that they needed to arrest this offender within only a few weeks of the first offense. The omission of his DNA from the federal DNA database, along with the backlog delay in processing DNA evidence, allowed the offender to remain on the streets. With stronger federal statutes and shorter DNA testing delays, the perpetrator could have been identified after the third attack, ***thereby preventing the subsequent seven robberies and five rapes***.

## FOUR PREVENTABLE RAPES

*Between April of 2002 and May of 2003, five women were raped in the Trenton area. DNA testing linked all five offenses to the same unknown perpetrator. After police released a composite sketch of the suspect in 2003, nearly 75 tips were called in identifying the same person. In June 2003, U.S. Marshals eventually arrested the suspect in Pennsylvania on a parole violation warrant that was issued in July of 2002. Trenton Police obtained a DNA sample from the suspect through a court order, and thanks to expedited testing at the state laboratory the man was linked to the crimes within a few days. The charges on 16 counts involving five victims are pending as the suspect awaits extradition to New Jersey from Pennsylvania.*

The suspect's criminal record included two felony convictions for theft and forgery related offenses in New Jersey, and nine felony convictions for theft, forgery, and receiving stolen

property in Pennsylvania. If the suspect had been required to give a DNA sample for any of these crimes *in either state*, he could have been identified after the first assault, ***thereby preventing the subsequent four rapes.***

**NEW YORK**

### THIRTEEN PREVENTABLE RAPES

*In August of 1993 a young woman was raped in the Bronx in what was to be the first of up to 51 rapes attributed to the same offender over a five-year period. The perpetrator was dubbed the "Bronx Rapist" by the media.*

*A person known to the police became a suspect when he was identified in a transaction involving a victim's jewelry at a pawnshop. He was arrested and subsequent DNA testing linked him to several of the rapes. He has been convicted on fourteen counts of rape in the Bronx, six counts of sexual abuse, nineteen counts of robbery, and two counts of criminal possession of a weapon. He has been sentenced to two life sentences.*

This offender had a prior conviction in 1989 for felony robbery and assault, for which he received a seven-year sentence. If the State of New York had begun requiring DNA from all convicted felons in 1990 this offender would have been on the DNA database prior to the first rape in 1993, and ***at least thirteen rapes could have been prevented.*** Moreover, when New York's database was established in 1994, an inclusion of all convicted felons and retroactive application to persons previously convicted but still under supervision would have captured this offender's DNA sample much earlier in the investigation.

### TWO PREVENTABLE SEXUAL ASSAULTS, ONE PREVENTABLE DEATH

*From 1991 to 1999, three young women were murdered in New York City and four others were raped. The youngest victim was 13, and several of the crimes were noted for their brutality. During the course of the investigation, police identified a man who had just been released from jail for a sex crime in the same area in which a victim had been raped. He had been seen in the neighborhood just before and after the rape, and was picked out of a lineup. The man was jailed for four months, but DNA testing subsequently eliminated the man as a suspect.*

*Another person known to the police became a suspect in these crimes in 1999 and was placed under surveillance by police. He was eventually arrested on petty theft charges and DNA testing later linked him to evidence from the crimes. This person had been released from custody pending the DNA testing, and was arrested again in Miami after the DNA match was made. He was found with a young woman who may have been his next victim. This offender was found guilty on twenty-two counts, and sentenced to 400 years in prison.*

This offender had been convicted of felony robbery in 1992 at a time when New York did not collect DNA samples from criminals convicted of felony robbery. Moreover, if a 1996

expansion of the database to include robbery convictions had been applied retroactively, he could have been required to provide a DNA sample at this point. The sample would have been linked to one of the previous crimes, ***thereby preventing at least two sexual assaults against juveniles and one death.*** It is also worth noting that a sooner DNA match would have prevented an innocent man from spending four months in prison.

### SEVEN PREVENTABLE RAPES AND ROBBERIES

*In 2001 it was revealed that New York City had between 14,000 and 16,000 unanalyzed rape kits that were sitting in a storage rooms. Through a focused backlog reduction program, the City has been analyzing the rape kits and loading them into the state DNA database system.*

*In 2002, two unsolved rapes that were part of the backlog reduction project were connected to the same offender. The offender's criminal history included five prior arrests which resulted in two separate felony convictions – in 1991 for robbery and sexual abuse, and in 1997 for armed robbery. Although New York was not collecting DNA from robbery convictions in 1997, a 2000 law expanded the database to include robbery and included offenders who were still incarcerated for previous convictions. Upon release in 2001, the offender in question was required to give a DNA sample for the database.*

This offender was arrested in December 2001 for a series of rapes and robberies (seven separate incidents). If the 1996 rape kits had been tested sooner, this person would have been linked to these assaults in 2001 prior to his release, ***thereby preventing the subsequent 7 attacks occurring after his release.***

## NORTH CAROLINA

### TWO PREVENTABLE RAPES

*A series of three undetected rapes occurred in the Charlotte-Mecklenberg County area – one in February of 2000, and two more in May of 2002.*

*Police identified a suspect after the first attack in May, and positively identified the perpetrator through fingerprints found at the scene. Subsequent DNA testing also linked all three rapes to the suspect.*

The offender was convicted in December of 2000 on felony breaking and entering and larceny charges. However, the North Carolina DNA database statute did not include either felony crime as a qualifying offense for the DNA database. If the suspect had been required to give a DNA sample for his December 2000 conviction, he could have been connected to the February 2000 rape, ***thereby possibly preventing two rapes in May of 2002.***

## NORTH DAKOTA

### ONE PREVENTABLE RAPE

*In June 2000, a woman in Fargo was sexually assaulted in her home by an unknown intruder. DNA evidence was collected from the crime scene, but was not matched to an offender. Police had identified a man as a possible suspect, but did not have sufficient cause to obtain a warrant for a DNA sample.*

*In August 2002, a teenager was sexually assaulted by an intruder in an apartment where she was babysitting. Several days later, police were finally able to obtain a warrant for a DNA sample from the suspect, and he was linked to both rapes.*

The offender was convicted in Minnesota for felony possession of stolen property and burglary in September 1996, and for felony burglary in June 1997. At the time Minnesota did not require DNA from convicted burglars. North Dakota still does not require DNA from convicted burglars. If a DNA sample had been collected from the offender for either the 1996 or 1997 felony conviction, the June 2000 sexual assault could have been solved and the perpetrator apprehended, ***thereby preventing one rape.*** The offender also had a 1996 domestic assault misdemeanor conviction, which is also a DNA database crime in some states.

## OHIO

### ONE PREVENTABLE RAPE

*In early April of 2002 a man who was hired for yard work at a Columbus residence returned in the evening and burglarized the home where he had worked. In gaining entry, the burglar left blood that was collected and analyzed for DNA. The man had given the owner of the home a fictitious name and false credentials. However, through diligent detective work investigators assigned to the case identified a possible suspect and requested a DNA sample from him. The suspect complied with the request and the police returned to arrest the suspect in question after DNA forensic analysis matched the suspect's DNA and the DNA collected at the scene of the crime. Unfortunately, the suspect had disappeared in the interim.*

*In mid May of 2002, the offender in question raped a young girl who was able identify him. Investigators arrested him and found that his fingerprints matched felony prints on file noting that he was wanted in the April burglary. DNA testing subsequently confirmed that the suspect in question raped the young girl, and that he was the missing suspect in the home burglary.*

The perpetrator in this case had a prior conviction in 1996 on felony drug trafficking and drug conspiracy charges. If the state of Ohio had required DNA from convicted felony drug offenders, police could have arrested this man after the burglary offense rather than asking him for a DNA sample which prompted his disappearance. This offender would have been

incarcerated for the burglary rather than being allowed to go into hiding, ***and the rape of a young girl could have been prevented.***

### TWO PREVENTABLE RAPES

*Between 1993 and 1994, three rapes were committed by the same unknown perpetrator in the Hamilton County area. After the third rape, the victim was able to notify police officers promptly and they were able to apprehend a suspect in short order. DNA testing linked the suspect in question to all three rapes.*

The perpetrator had a 1993 felony conviction for carrying a concealed weapon and served a sentence in state prison. He also had a 1984 conviction in California on felony sexual battery. If Ohio had required DNA from the 1993 concealed weapon conviction, the 1993 rape could have been solved, ***thereby preventing two subsequent rapes.***

### ONE PREVENTABLE RAPE, ONE PREVENTABLE PROPERTY CRIME

*In 1999, two rapes occurred several months apart in nearby counties. Both rapes were linked through DNA, and the database was used to identify a suspect in 2001.*

The perpetrator's criminal history includes a 1994 burglary for which he was required to give a DNA sample for the database. The DNA sample was collected in 1997, and he was released from prison in 1999 on "shock probation" -- three months prior to the first rape. Unfortunately, the offender biological sample was in a backlog and remained unanalyzed until 2001 when the "cold hit" was made to both rapes. If not for the backlog, the man would have been identified and arrested as a suspect in the first rape, ***thereby preventing the subsequent rape.*** The offender in question was also convicted in late 1999 of a home burglary and theft of prescription drugs – ***another crime he would not have been free to commit if the DNA match had been made sooner.***

## PENNSYLVANIA

### TWO PREVENTABLE RAPES

*In 1994, an elderly woman was raped in her home by a stranger. This case was followed in 1998 by two similar attacks on elderly women – one of whom lived independently before the attack but was particularly traumatized and moved to a nursing home thereafter. She died before the case was solved. DNA linked all three cases to one unidentified offender.*

*A person known to police became a suspect in the case when detectives realized the modus operandi was similar to a local known repeat offender who targeted elderly victims. The offender's parole officer supplied detectives with an envelope that had been sent by the suspected person, and DNA from the saliva was determined to be consistent with that of the attacker.*

*Detectives subsequently procured a search warrant for a blood sample, and that lead to a match between the three crimes and this specific offender.*

The offender's criminal record included two separate felony convictions for a series of home invasion burglary crimes committed against elderly victims. His first sentence began in 1987, and he was released on parole in 1992. The second sentence began in 1995. If Pennsylvania had required DNA from felony burglaries in either 1992 or 1995, this repeat offender could have been linked to the 1994 rape, ***thereby preventing two rapes in 1998.***

### FIVE PREVENTABLE RAPES

*In 2002, an unknown assailant in the Pittsburgh-area raped or attempted to rape six women and assaulted two other women. The youngest victim among these women was 14. In each case, the suspect approached the victim from behind, attempted to make conversation, and either made threats with a gun or displayed a firearm.*

*The suspect was eventually apprehended when his last victim shot him. The woman, who worked as a security guard, was approached by the offender in question in a park and she narrowly escaped him after he threatened her life. After reporting the incident to police, she continued her walk and was again approached by the same man. This time, instead of running away she shot the assailant twice in the stomach and then notified police. The offender in question has been linked to several of the crimes noted through DNA testing, and he is currently awaiting trial on multiple charges.*

The offender's felony record included convictions in 1997 and 2002 for felony receiving of stolen property, and a 2001 conviction for felony theft. This offender's most recent release from incarceration occurred just weeks before the first rape. If the state had required DNA from all convicted felons at any point since 1997, the offender's DNA profile would have been on record and potentially could have identified him after the first rape, ***thereby preventing the subsequent 5 rapes.*** Pennsylvania still does not collect DNA from these felons.

## RHODE ISLAND

### ONE PREVENTABLE SEXUAL ASSAULT

*In Providence in 2000 an assailant kidnapped at gunpoint a male college student who was attempting to enter his apartment. The offender forced the student withdraw funds from two banks, then returned to the student's apartment and burglarized it.*

*In a second incident, a female and a male college student were both kidnapped and the two victims were robbed at gunpoint. The male student was forced to withdraw money from a bank, and both students were sexually assaulted. DNA was collected from this crime scene.*

*In a third incident, a female college student was kidnapped at gunpoint while she was entering her apartment. She was robbed of her money and her apartment was burglarized. The woman was then forced to drive to a bank in an attempt to have her withdraw additional money from the ATM. The offender then drove the female student to a secluded area and sexually assaulted her.*

*The offender in this case was ultimately identified through a photograph taken by an ATM Bank surveillance machine during commission of the second crime. The offender was arrested by police one day after the third crime, and he eventually received a 70-year sentence for his violent gun-involved crimes.*

The offender was charged of felony possession of a stolen vehicle in 1999, which is not a crime included in the Rhode Island DNA database. With a DNA sample from this conviction, the crime laboratory could have linked the second incident to the offender, ***thereby possibly preventing the third crime involving a sexual assault.***

## SOUTH CAROLINA

### UNKNOWN PREVENTABLE CRIMES

*In August of 2000 a teenager in Aiken was raped and murdered in her home. There was no suspect in the case, but DNA evidence from the crime was sent to the laboratory for testing and a profile was sent to the national database. Meanwhile, police actively pursued the investigation, conducting between 300 and 400 interviews and collecting 94 DNA samples for comparison.*

*In August of 2002 an offender's DNA sample was submitted to the Georgia DNA database after he was returned to state prison for violating his parole on a felony theft by taking conviction. When the sample was compared against the national database, it was matched to the South Carolina murder. The person in question had worked for a package delivery service in 2000. During one of his deliveries, the offender met the teenager and later he returned to kill her.*

The offense which resulted in this offender's inclusion in Georgia's DNA database, and which eventually lead to the closure of the teenager's murder, is a crime that is excluded from the South Carolina database. Had the offender committed his prior crimes in South Carolina instead of Georgia, he would likely still be undetected and living unsuspected in the community. In addition to the theft by taking conviction, the repeat offender in question also had convictions for numerous other crimes. Among those crimes are escape, possession of a firearm by a convicted felon, theft of a motor vehicle, and entering a vehicle – none of which are qualifying offenses for the DNA database in the State of South Carolina.

### THREE PREVENTABLE RAPES

*In September 1995, a woman was raped by a stranger and a rape kit was collected at the scene of the crime and submitted to the crime laboratory. The DNA profile was loaded into the state database system, but no match was made. In July, September and November of 1996 three more*

*women were raped, but no rape kits were collected from these crime scenes. However, all three women identified the same suspect as their attacker through mug shot photographs. Investigators interviewed a suspect at his home and made an arrest in early 1998. A DNA sample was collected from the suspect and was matched to the DNA profile from the first rape. The offender was tried and convicted for rape and burglary, and he was sentenced to life over 30 years in prison.*

> The offender was convicted in 1980 on two separate rape and burglary charges. He completed his sentence in June of 1995. Unfortunately, while the South Carolina database statute was enacted in 1994, it did not contain an emergency clause and therefore it did not come into effect until July of 1995 – one month too late to capture this offender's DNA sample. If the South Carolina statute had become effective immediately upon enactment, this offender could have been identified after the first rape, ***thereby preventing the following three rapes***.

## Conclusion

The case studies reported here serve their purpose well – namely, they illustrate quite clearly the concrete benefits to crime prevention of DNA databases. Many violent and property crimes committed by repeat offenders could have been prevented in these cases. Of course, the few cases set forth here only represent the tip of the iceberg; many more exemplary cases could be listed for each of these states. The following section moves on to the cost factors associated with gearing up to use DNA databases for proactive crime prevention and the clearance of unsolved cases.

## VII. COST AND BENEFIT QUESTIONS

A full cost-benefit analysis of forensic DNA testing and DNA databases is problematic since many of the potential benefits do not lend themselves to direct quantification. This Report did not attempt to develop this type of analysis, but presents the following discussion as a listing of relevant matters for consideration and possible further study.

The costs of DNA testing at crime laboratories are generally known, and have been discussed to some extent in other sections of this Report. In addition to the costs of equipment and reagents needed to complete DNA testing, an ever-increasing demand for DNA testing means a corresponding increase in the need for more capacity. Increased capacity, in turn, means more personnel, more equipment, and occasionally more space. Personnel costs, as demonstrated elsewhere in this Report, pose a considerable hurdle to DNA testing at many crime laboratories. The fact that these costs are relatively easy to calculate, and nonetheless have not been addressed adequately in some jurisdictions, raises an interesting question of funding priorities geared properly to community needs.

Beyond the quantifiable crime laboratory costs, there are also costs associated with the proper training of criminal justice professionals. Law enforcement training is needed to ensure the identification and collection of appropriate DNA evidence, as well timely collection of evidence from offenders. In order to ensure that DNA analysts are receiving quality DNA samples, there is also a need to ensure that medical professionals, particularly those responsible for rape kit collection, are adequately trained in evidence gathering and storage. Another group sometimes overlooked in this equation are the victim service providers who could prove instrumental in integrating the victim into the evidence gathering process and ensuring his/her informed participation so that DNA analysis is not performed needlessly.

Of course, once a DNA match has been made and a suspect arrested, criminal investigators, prosecutors and defense lawyers must devote their limited resources to determining whether to bring the case to trial. The training of prosecutors, criminal defense lawyers, and judges poses problems for legal professionals who must now be versed in the scientific issues of DNA analysis and related population probability statistics. Beyond training is the cost of simply having additional cases to be investigated, prosecuted and defended in an already over-burdened criminal justice system. Newspaper accounts quite frequently report on offenders who, when faced with DNA evidence, become inclined to accept plea bargains or provide admissions of guilt. Although this is certainly true for some cases, this study did not undertake to determine if the additional justice system caseload resulting from cases due to DNA matches is offset by increasing plea bargains. Moreover, some attorneys have argued that prosecutors actually may be less inclined to allow plea bargains once they have the advantage of DNA evidence, thus resulting in a heavier caseload.

Some of the most obvious benefits to forensic DNA testing are the potential to bring criminals to justice and closure to victims and their families. These, again, are largely immeasurable benefits. The "preventable crimes" case studies presented in this Report begin to paint a picture of potential added benefits to public safety from investment in DNA programs, but they do not provide a calculable measurement. There are certainly benefits to victims in DNA cases that bring an offender to justice, and individual stories can again give a glimpse into this world, but these cannot be computed in a manner that can be compared easily against costs. The question has also been raised as to whether DNA testing and DNA matches have an indirect

effect in encouraging victims of violent crimes to come forward. Again, anecdotally there are victims who will say this is the case, but further study of this question might be useful in providing reliable cost efficiency data.

Moreover, every match of an offender to a crime on the DNA database represents a case that an investigator may soon consider "cleared." Clearing these cases in turn allows the investigator to turn his or her attention to other unsolved crimes. To understand cost efficiencies to investigations, data including man-hours involved in a "typical" investigation in cases without DNA, would need to be compared to "typical" case with DNA – and/or cases in which DNA matches have named potential suspects. Without this type of data, it is difficult to have a full understanding of potential cost efficiencies.

And last, but by no means least, benefits are also derived from ensuring that the appropriate person faces justice for a crime. Post conviction DNA testing in the United States has been instrumental in the release of over 100 persons who have been wrongly convicted. Increasingly, DNA testing is now being used to exonerate persons prior to conviction. Indeed, crime laboratories estimate that in cases requesting a match of DNA evidence from an unsolved crime to a DNA sample from a known potential suspect, the analysis exonerates the suspect identified by investigators in approximately a third of the cases. Such exonerations not only have a significant benefit to the misidentified suspect, but also allow law enforcement to refocus their efforts and avoid wasting time investigating the wrong person. In addition to the direct benefit supplied to both the accused and investigators, DNA exonerations provide the general public with a greater level of confidence in the criminal justice system.

## VIII. CONCLUSIONS AND POLICY IMPLICATIONS

In the relatively brief amount of time that forensic DNA has been available to the criminal justice system, its impact has already proven remarkable – from the conviction of rapists and murderers to the exoneration of wrongly convicted inmates on death row. However, the proven effectiveness of forensic DNA has resulted in a tremendous demand for additional testing which has not been met by a corresponding increase in available supply. The purpose of this study was to provide a basis for extrapolating the potential number of DNA cases sitting in law enforcement evidence rooms and storage areas throughout the country. In developing these figures, crime laboratories were also asked to supply data regarding their backlogged cases in order to arrive at a more precise national sum. It was also important in this study to have a discussion as to the reasons for the unanalyzed DNA cases found both at the law enforcement agencies and the crime laboratories. This discussion included capacity issues facing both law enforcement and crime laboratories as well as a discussion of how forensic DNA is viewed by law enforcement. Finally, the study also assembled an overview of DNA database matches in the United States along with a discussion on the potential of DNA to not just solve crimes, but also to prevent crimes. The following summarizes the major conclusions drawn from the Report.

1. *The backlog of unsolved rapes and homicides in the U.S. is massive*.

When unsolved property offenses with possible biological evidence are added into the equation, there are an estimated 700,000 of these unsolved cases nationally. Furthermore, of the 400,000+ unsolved rapes and homicides nationally law enforcement agencies reported that roughly half of such cases are likely to contain biological evidence for DNA testing. Thus, when including the extant unsolved property offenses with biological evidence, there may be **a national total of 553,821 unsolved rapes, homicides, and property offenses that may be amenable to DNA testing**.

2. *The majority of law enforcement agencies have insufficient evidence storage capacity*.

This issue is critical since, as demonstrated in Section III, pressures on storage space can result in biological evidence being maintained under improper conditions or, even worse, discarded or not collected at all. This issue is also significant given the finding that the overwhelming majority of law enforcement agencies (over 70 percent) reported their storage capacity limitations to be either "critical" or "highly critical."

3. *A significant proportion of law enforcement agencies continue to misunderstand the potential benefits of DNA testing*.

As reported by nearly one-fourth of all law enforcement agencies, one of the primary reasons for not sending DNA evidence to a crime laboratory is due to the lack of a suspect. To be sure, this is exactly the kind of situation where an offender DNA database would be most useful.

As a particularly notable example of this lack of understanding of the potential utility of DNA testing, during a telephone conversation with researchers the sex assault unit commander of the largest local law enforcement agency in a particular state reported that it had *never* submitted a DNA sample for testing.

4. *Both state and local crime laboratories are overworked, understaffed, and insufficiently funded*.

These agencies simply do not have the capacity to handle their current caseloads—let alone their anticipated backlogs for the near future—in a timely manner. This problem would appear to be broadly present across the country.

5. *The role of the federal government in funding forensic DNA analysis has been, up to this point, important but rather minimal*.

Indeed, the majority of funding for local crime laboratories is derived from local sources, and the majority of funding for state crime laboratories comes from state sources. Only one-in-five state crime laboratories, and fewer than one-in-twenty local crime laboratories, report that the majority of their funding comes from federal sources. Clearly, not only is there a greater potential role for the federal government to play in assisting with the current backlog problem, but there is also a certain need for state and local governments to re-evaluate their degree of investment in their forensic crime laboratories given that demand for services has far outstripped availability of analysis over the past several years.

6. *Forensic DNA databases are important tools in solving a variety of crimes, committed by a variety of criminals.*

The DNA database system has been used by an increasing number of law enforcement agencies throughout the nation to identify recidivist criminals and to provide investigatory leads to detectives, particularly in cases involving serial crimes. While the DNA database, to date, has been limited largely to violent offenders and violent unsolved crimes, this trend is changing. As demonstrated by states such as Virginia, the potential for DNA to play a vital role in solving non-violent crimes is considerable.

7. *There are numerous crimes that are potentially preventable through better, more efficient use of forensic DNA analysis.*

Although it is extremely difficult to document the number of preventable crimes associated with the timely availability of DNA evidence, a look at specific case studies from a variety of states clearly demonstrates the potential for DNA to prevent repeat offender criminals from victimizing multiple citizens.

8. *The cost, and the offsetting benefits associated with DNA testing present several questions relating to return on investment which merit further study.*

Many of the costs associated with DNA testing are discussed in this study, but a more comprehensive study of the costs of DNA forensic evidence collection and processing is needed to provide policy makers with additional valuable information required to make informed decisions during budgetary discussions. The benefits of DNA analysis to investigators, prosecutors, victims and the falsely accused are an important part of the cost/benefit puzzle that budget writers must take into consideration in allocating resources to the national DNA collection and analysis system.

[i] Where a state forensic DNA laboratory does not exist, the local crime laboratory appointed as the FBI CODIS point of contact is treated as the state laboratory in this study. This is the case for Nevada (Washoe County Sheriff's Office laboratory), and Hawaii (Honolulu Police Department Crime Laboratory). The local laboratory in Albuquerque, New Mexico serves as the CODIS point of contact instead of the DNA state laboratory. As such, Albuquerque assisted in completing two assessment forms – one on behalf of the local laboratory, and the other calculating state laboratory figures.

[ii] Since we are dealing with extrapolating to the total population of law enforcement agencies (18,000) with our sample (over 1,500), researchers have taken the most methodologically rigorous (and therefore conservative) approach possible so that they could avoid any potential charge that these estimates are inflated. Accordingly, there is a possibility that the true numbers of unsolved homicides and rapes are actually higher than what is reported here.

[iii] The assessment form specified that law enforcement agencies should only count those cases that "were still in your control (i.e., had not been sent to a laboratory for testing)." Similarly, crime laboratories were asked for the number of cases "backlogged at your laboratory." For this reason, double counting of cases by law enforcement agencies and crime laboratories was not an issue.

[iv] "Critical" was defined as "available storage is quickly disappearing."

[v] "Highly Critical" was defined as "no additional storage space available."

[vi] A "median" figure of 0.0 results from a severely skewed distribution featuring many zero values.

[vii] "Other," as defined by state laboratories, included expert software for CODIS review, IT support/informatics, in house offender analysis, software for case management, equipment and reagents used to address suspect/no suspect backlogs, and personnel (3).

[viii] "Other," as defined by local laboratories included personnel (2) and validation projects.

[ix] The non-violent offenses include property offenses (theft, forgery, breaking and entering, burglary), drug offenses, and supervision violations. The violent offenses include murder/homicide, rape and sex offenses, assaults, and robbery.

[x] Gilmer, James A., van Alstyne, David J., *The First 100 Hits — Forensic-Offender Matches on the New York State DNA Data Bank,* Research Note, New York State Division of Criminal Justice Services, Bureau of Research and Evaluation: 1.

[xi] Ibid., 1.

[xii] Langan, Patrick A., Levin, David D., *Recidivism of Prisoners Released in 1994*, Special Report, Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics, January 2002, NCJ 191191: 1.

[xiii] Ibid., Gilmer, *The First 100 Hits*, 1.