



Public Works and  
Government Services  
Canada

Travaux publics et  
Services gouvernementaux  
Canada

# 2007-2008 Second Evaluation of the National DNA Data Bank Program

*FINAL REPORT*

Prepared for:

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## Executive Summary

In 2002, an evaluation of the National DNA Data Bank (NDDDB) and related Biology Casework Analysis Agreements (BCAs) was undertaken. The findings of this review led to substantive program changes related to funding, service levels and training. Government Consulting Services (GCS) (formerly part of Consulting and Audit Canada) of Public Works and Government Services Canada (PWGSC) was retained in August 2006, by the Department of Public Safety (DPS), to undertake a second review of the NDDDB program. The review was based on an evaluation framework that was updated by GCS for the DPS, in consultation with federal, provincial and territorial stakeholders. The resulting report “Updated Evaluation Framework: National DNA Data Bank and Biology Casework Analysis Agreements” was completed and approved by the Federal/Provincial/Territorial (F/P/T) ADM Committee on Policing Issues in May 2006. The updated evaluation framework focused on knowledge and experiences gained from the previous mid-term evaluation, the impact of changes implemented since earlier evaluations (e.g. cost-sharing agreements, funding, forensic service capacity), the impact of various legislative changes, past or anticipated, the impact of potential inclusion of a Missing Persons Index into the Data Bank, and technological changes impacting costs/service levels.

In undertaking this review, several sources of information were used. These included a review of documentation, a quantitative analysis, interviews with various stakeholder groups and research into experiences of other countries. This review was conducted between August and November 2006.

## CONCLUSIONS

### **National DNA Data Bank**

All lines of evidence, data, documentation and interviews, confirm that the NDDDB is both relevant and successful. However, it is clear that the success of the NDDDB would be significantly enhanced if a way could be found to increase submissions to the CSI. Capacity limitations in forensic casework analysis are hampering additional success. While at this point the FLS appears to be under particular capacity constraints, all the forensic lab systems are struggling with workloads, turnaround times and backlogs, and are concerned about how they will deal with increases that will follow the full implementation of C-13 and C-18, let alone the inclusion of other indices. Quite simply, the lack of adequate forensic capacity will by and large ensure that the expected benefits from C-13/C-18 do not materialize, unless steps are taken to ensure adequate capacity to meet the future demand.

### **BCA Agreements**

The new funding formula significantly increased the federal contribution to Ontario and Quebec labs, allowing them to increase lab capacity with the extra money. The modest budget increase received by the RCMP FLS allowed for a modest increase in capacity, but not at all to the level that had been anticipated, or that would have met demand.

Changes brought to the BCA Agreements following the previous evaluation also encouraged contract provinces and territories to stop downloading forensic costs. As a result, forensic submissions levels recovered from the worrying reductions seen in 2002/03. However, this merely served to further highlight the continuing capacity constraints of the FLS.

The new funding formula tied the funds for forensic services directly to the costs of forensic services; with the NDDDB removed from the funding relationship. However the NDDDB never did obtain permanent funding.

No costing information has been provided that could be used to update the BCAs.

### **Forensic DNA Services**

There are some promising developments. New approaches have been developed for handling B&Es involving police training and improved collection methods, which have streamlined the process and cut costs dramatically. Such techniques may be more generally transferable.

While there appears to be a clear bottleneck in DNA forensic capacity, the approaches adopted by the UK and US indicate that care is necessary in allocating additional funds to ensure the most effective use of DNA analysis. A coordinated approach is needed to allocate funds between police, DNA forensic analysis, other forensic services, the databank, and other parts of the criminal justice system, to ensure goals are met, and new bottlenecks are not created.

## **RECOMMENDATIONS**

### **Forensic Services**

The Federal Government, in concert with all the provinces and territories, needs to come to grips with how best to ensure the exploitation of DNA in the criminal justice system. There is a need for an in-depth review of forensic services in general, to determine optimal role, service delivery approach, and appropriate funding, to maximize societal benefits within the context of the overall criminal justice system. Such a comprehensive review would appear to be long overdue, and could be undertaken as part of, or in preparation for, the expected (and also overdue) Parliamentary Review of the DNA Identification Act and related legislation.

In the short term, it is recommended that a way be found to ensure the capacity of the FLS increases to levels comparable to those of Quebec and Ontario.

### **BCA Agreements**

The BCA Agreements expire March 31, 2007, and there is some urgency involved in determining what to do with them. Thus, in the short term, there does not appear to be any other

viable option except to renegotiate the BCAs. In the longer term, there may be some merit in including the services and costs of the FLS under the Provincial Policing Agreements (PPAs). This would result in an effective 70% share of forensic costs for the contract provinces and territories (up from their current share of approximately 54%). However, this would also provide an avenue for the contract provinces and territories to be able to negotiate access and service performance levels, and deal with capacity issues. Provision would have to be made to ensure access to the FLS for municipal and regional forces, and for a governance structure that allows for meaningful input from the user communities. The BCAs could be used as a bridging mechanism to assist in the process of repositioning of the FLS within the PPAs.

If the contract provinces and territories were effectively covering their forensic costs, the justification for a continuing federal contribution to Ontario and Quebec would recede. However, any changes to the existing structure would have to take into account the impact on forensic capacity and forensic staff in the Ontario and Quebec labs. Again, the BCAs could be used as a bridging mechanism.

### **Base Funding for NDDB**

Based on the obvious relevance and continuing success of the NDDB, it is recommended that the NDDB receive permanent allocated funding.

### **Governance Steering Committee**

The DNA National Steering Committee does not appear to be a particularly necessary or useful forum for providing direction. Perhaps the issues are too narrowly-based and/or the forum too senior. In addition, there appears to be considerable overlap in membership between various committees within each level. To simplify governance, it might be better to reposition the DNA Working Group within another forum, such as the F/P/T Assistant Deputy Ministers' Committee on Policing Issues. Such a shift would provide a more structured reporting environment, as the Committee on Policing Issues meets with some regularity, and it might provide a more appropriate forum for discussing DNA forensic analysis issues, should the DNA Working Group become involved in broader forensic issues.

## 1. Introduction

In 2002, an evaluation of the National DNA Data Bank (NDDB) and related Biology Casework Analysis Agreements (BCAs) was undertaken. The findings of this review led to substantive program changes related to funding, service levels and training. Government Consulting Services (GCS) (formerly part of Consulting and Audit Canada) of Public Works and Government Services Canada (PWGSC) was retained in August 2006, by the Department of Public Safety (DPS), to undertake a second review of the NDDB program. This report presents the results of that review.

The review is based on an evaluation framework that was updated by GCS for the DPS, in consultation with federal, provincial and territorial stakeholders. The resulting report “Updated Evaluation Framework: National DNA Data Bank and Biology Casework Analysis Agreements” was completed and approved by the Federal/Provincial/Territorial (F/P/T) ADM Committee on Policing Issues in May 2006. The updated evaluation framework focuses on the following key areas:

- Knowledge and experiences gained from the previous mid-term evaluation
- The impact of changes implemented since earlier evaluations (e.g. cost-sharing agreements, funding, forensic service capacity)
- Impact of various legislative changes, past or anticipated
- Impact of potential inclusion of a Missing Persons Index into the Data Bank
- Technological changes impacting costs/service levels

This review was conducted between August and November 2006. GCS would like to thank the many people who participated in the review.

## 2. Background

### 2.1 National DNA Data Bank

The use of DNA has become an important and powerful tool in combating crime. Canada signaled its intention to make broader use of the power of DNA with the passage of the *DNA Identification Act*, which was proclaimed in force on June 30, 2000. The Act created the NDDB, which began operations upon proclamation.

The NDDB is responsible for two indices, the Convicted Offender Index (COI), which contains the DNA profiles of offenders convicted of designated offences, and the Crime Scene Index (CSI), which contains the profiles recovered from crime scenes for designated offences. The NDDB assists law enforcement agencies in solving crimes by:

- Linking crimes together where there are no suspects;

- Helping to identify suspects;
- Eliminating suspects where there is no match between crime scene DNA and a DNA profile already in the NDDDB, and
- Determining whether a serial offender is involved

Physically, the NDDDB, with its laboratories, sophisticated analytical equipment, computing facilities, and team of scientists and technicians, is located in Ottawa, at the Headquarters of the RCMP. The NDDDB is part of the RCMP National Police Services (NPS). The NPS provides support services to the law enforcement and criminal justice communities across Canada. These services include the Information and Identification Services (e.g. national fingerprint registry and criminal records), the Criminal Intelligence Services, and the Canadian Police College.

## **2.2 Forensic Services**

The Forensic Laboratory Services (FLS) is also a part of the NPS. The FLS provides forensic services to the provinces and territories that contract with the RCMP for provincial and territorial policing services. Ontario and Quebec have their own provincial police departments, as well as their own forensic laboratory systems. The forensic laboratories are key partners of the NDDDB as they analyze crime scene evidence and supply DNA profiles to the CSI. While DNA analysis has become a large part of their work, forensic laboratories also undertake ballistics analysis, paint typing, chemical analysis, and other forms of forensic services.

## **2.3 BCA Agreements**

The Biology Casework Analysis Agreements (BCAs) were originally set-up as a funding mechanism for the NDDDB when it was created in 2000, and to encourage Ontario and Quebec to help populate the new NDDDB. Although the direct financial linkage to the NDDDB was removed in 2003, with separate funding provided for the NDDDB, the BCAs were maintained as a mechanism to “foster the effectiveness of the National DNA Data Bank as a mutual objective” by encouraging the analysis of crime scenes that would better populate the CSI.

Under the terms of the agreements, each party agrees to share the cost of biology casework analysis arising from criminal investigations of designated offences. In effect, the ‘contract’ provinces and territories pay a share of the costs of forensic services to the federal government, while the federal government pays a share of the costs of forensic services in Ontario and Quebec to each of these provinces.

## **2.4 Governance Structure and Partners**

### **2.4.1 National DNA Data Bank Advisory Committee**

This committee reports to and advises the Commissioner of the RCMP on all matters related to the effective and efficient operation of the NDDDB. The work of this Committee is governed by the principles embodied in the *DNA Identification Act* and the DNA Identification Regulations.

To facilitate this work, the Officer in Charge (Research Scientist) of the NDDB provides technical and operational advice to the Committee as and when required.

This Committee consists of members who possess expertise in matters of particular value to the NDDB program, including: science (specific knowledge of current DNA science); bio-medical ethics; policing, and the law. In addition, the Committee includes a representative of the Commissioner of the RCMP, the Officer in Charge of the NDDB; and, a representative of the Privacy Commissioner of Canada.

The Committee deals with matters of strategic importance, such as balancing of privacy issues with public good, scope of legislation, potential new DNA marker standards, technological developments, and the potential use of kinship evidence from profiles. While their work is exceedingly important to the effective use of DNA in the criminal justice system, the role of the Committee essentially falls outside the scope of this evaluation.

#### **2.4.2 DNA National Steering Committee**

The DNA National Steering Committee was set up to deal with operational polices and major funding concerns linked to the BCA agreements. It is composed of F/P/T Deputy Ministers Responsible for Justice and the Commissioner of the RCMP, or their designates. Day-to-day matters relating to the BCA Agreements are managed by the F/P/T Working Group on DNA.

#### **2.4.3 Implementation Committee**

As stipulated in the current BCA Agreements, each province and territory agreed to participate, in conjunction with the RCMP, in a temporary implementation committee responsible for implementation of the current BCA Agreements. These committees were to be composed of members of the F/P/T Working Group on DNA and co-chaired by the Director of Law Enforcement Division at the DPS and the Assistant/Commissioner, RCMP FLS (or designated substitutes). At the end of the first fiscal year 2004-2005 of the current BCA Agreements, implementation committees were to review whether there were outstanding issues requiring their mandate to be extended.

#### **2.4.4 F/P/T Assistant Deputy Ministers' Committee on Policing Issues**

This Committee was created in response to a need identified by F/P/T Deputy Ministers for a dedicated forum to discuss broad policing policies on issues such as the Future of Policing Project, police accountability mechanisms, private policing, human resource issues, extra-jurisdictional authorities, integrated policing models and related issues. It provides a regular mechanism for exchanging views, discussing best practices, and examining policing issues across jurisdiction.

## 3. Evaluation Issues and Methodology

### 3.1 Evaluation Issues

The following summarizes the key evaluation issues identified in the previous evaluation, as well as future changes that are likely to have a considerable impact on the NDDDB and the BCA agreements.

#### 3.1.1 Under-population of Crime Scene Index (CSI)

The previous evaluation found evidence that the Crime Scene Index (CSI) was not being populated to the extent anticipated for two main reasons. Firstly, there was an inability on the part of forensic labs to accept submission requests due to a significant lack of capacity. In the case of the RCMP labs, there were provisions in place to control submission levels. In addition, as charges under the BCA Agreements to the contract provinces and territories were on a fee-for-service basis, many downloaded the costs to local police forces, which had no budget for these costs. This, in turn, acted as a deterrent to the submission of evidence for analysis. In all areas, there was a lack of sufficient funding to expand forensic capacity. As a result of these findings, efforts were made to re-structure the BCA agreements in order to discourage the downloading of costs on a charge per submission basis, and to generally encourage the number of profiles submitted to the NDDDB. For the contract provinces and territories, RCMP labs agreed to all submissions from primary offences and a fixed minimum level of secondary offences.

#### 3.1.2 Future Changes Impacting CSI and BCA Agreements

The full proclamation of Bill C-13 is expected to significantly expand the categories of primary and secondary offences, which will also increase the number of cases eligible for inclusion in the NDDDB (both COI and CSI). This will also significantly increase the amount of forensic services required. Similarly, the potential creation of a national Missing Persons Index (MPI), if it were to be located within the NDDDB, would increase workload for the NDDDB and could put an additional strain on forensic services if they were required to produce profiles for such an index.

At one time, it was hoped that the average cost per case for DNA analysis would significantly drop in the near future due to technological developments (e.g., robotics). It was felt that such reductions might reduce the overall cost of forensic services (in the absence of volume increases), and that such reductions would need to be reflected in the next round of negotiations regarding the BCA agreements. It is our understanding that the duration of the most recent BCA agreements was specifically kept short for this reason.

#### 3.1.3 Under-population of Convicted Offender Index (COI)

Another key area of concern from the previous evaluation was the serious under-population of the Convicted Offender Index (COI). We understand that the judicial community responded with enhanced processes and training to address this problem. The approach that was used in the last

evaluation to demonstrate the extent of the problem, and based on the incidence of convictions for designated primary offences, could not be used a second time due to the high levels of recidivism that may exist in the criminal population. In other words, it is possible that many new convictions occur among people who have been already convicted of a designated offense, and consequently, their DNA profiles are likely already in the COI. Thus, conviction statistics may no longer be an accurate indicator of the number of convicted offender samples the NDDB should expect to receive. A major study involving a sampling of court files would be required to assess the current situation. We understand that the Department of Justice and the Centre for Justice Statistics are planning such a study. For these reasons, the updated evaluation framework did not incorporate the work required to evaluate the population of the COI and the current evaluation only included a brief review of NDDB statistics to see whether there have been obvious improvements to the population of the COI.

## **3.2 Methodology**

In undertaking this review, several sources of information were used. These included a review of documentation, a quantitative analysis, interviews with various stakeholder groups and research into experiences of other countries. Each line of evidence is described in greater detail below.

### **3.2.1 Documentation Review**

Various documents were collected and reviewed in order to better understand how the NDDB program has evolved since the first evaluation conducted in 2002. Appendix A lists the documents which were reviewed for this evaluation.

### **3.2.2 Statistical Review and Analysis**

Statistical analysis was undertaken to review the success of the NDDB and impediments to success using the NDDB annual reports, FLS activity records, and activity reports provided to the FLS by the forensic laboratories of Ontario and Quebec. This analysis also relied on estimates of crime incidence developed for the first evaluation from crime statistics maintained by the Canadian Centre for Justice Statistics. Estimated increases in workload from new legislation were based on studies undertaken by the Department of Justice and the RCMP, as well as anecdotal information provided during interviews. More detail on the analysis conducted, the findings, and the data used can be found in Appendix B.

### **3.2.3 Interviews**

The evaluation includes the opinions and suggestions of a variety of stakeholder groups. Based on the updated evaluation framework, customized interview guides were prepared for each category of stakeholders. All guides were approved by DPS and shared with potential interviewees prior to conducting interviews.

Interviews were held with representatives of the F/P/T DNA Working Group, National DNA Data Bank Advisory Committee, NPS, NDDB, and forensic laboratories.

In the first evaluation, only 72 police chiefs and heads of special crime units out of 691 responded to the law enforcement survey. It appeared difficult both to ask appropriate questions and to find the right individuals to provide answers. Thus, for the second evaluation, efforts were made to conduct targeted interviews with a select number of representatives of law enforcement agencies.

Appendix C provides a summary of the interview findings. It also lists those interviewed and contains the interview guides used.

### **3.2.4 Research**

The review included research into the experiences of other countries, particularly the US and the UK, on how they manage and fund their DNA Data Banks and Forensic Services, and to look for technological changes that might impact the management and funding of DNA analysis. Appendix D identifies websites and key documents found, as well as a brief summary of information found by country.

## **4. Evaluation Findings**

### **4.1 Success and Impediments to Success**

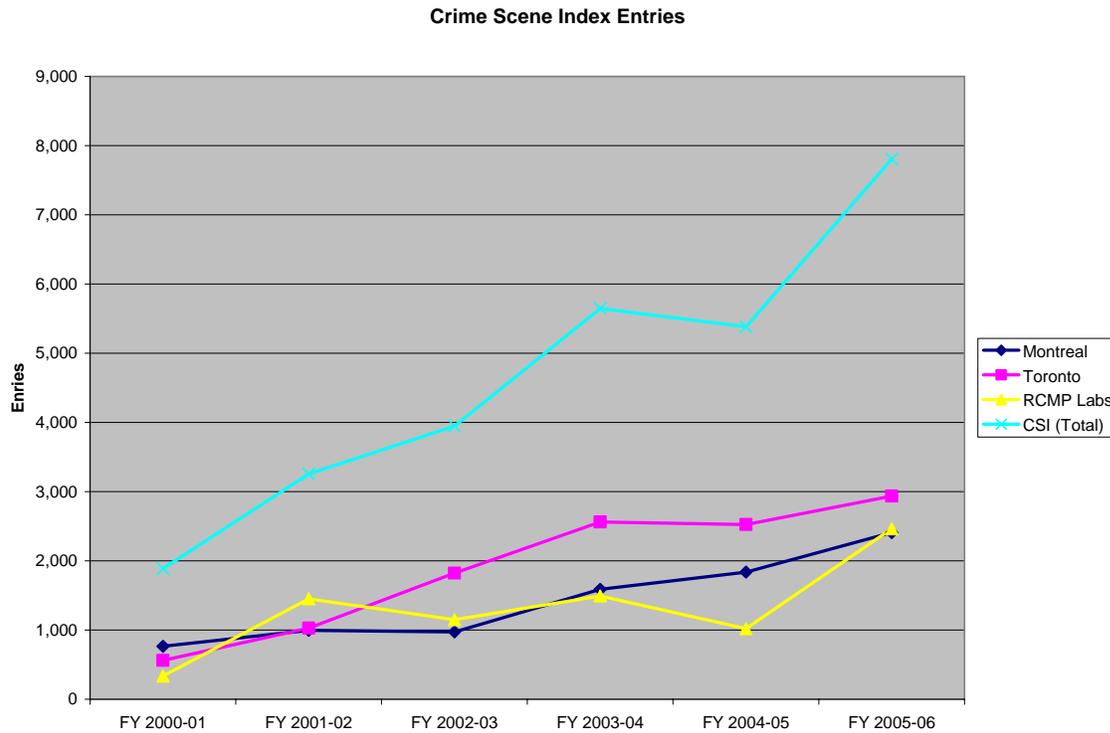
#### **4.1.1 National DNA Data Bank**

As illustrated in Table 1, the number of submissions to the CSI has increased substantially since the first two years of operation.<sup>1</sup> The CSI now receives close to 8,000 submissions per year compared to 3,300 in 2001/02. There have been increases in submission levels from all the forensic laboratories.

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<sup>1</sup> The dip reported in 2004-05 resulted from a change in reporting. Earlier years reflected a fiscal year of May 15<sup>th</sup> to May 14<sup>th</sup>, whereas 2004-05 reflected a fiscal year from May 15<sup>th</sup> to March 31<sup>st</sup>. Subsequent years will report on a government fiscal year basis.

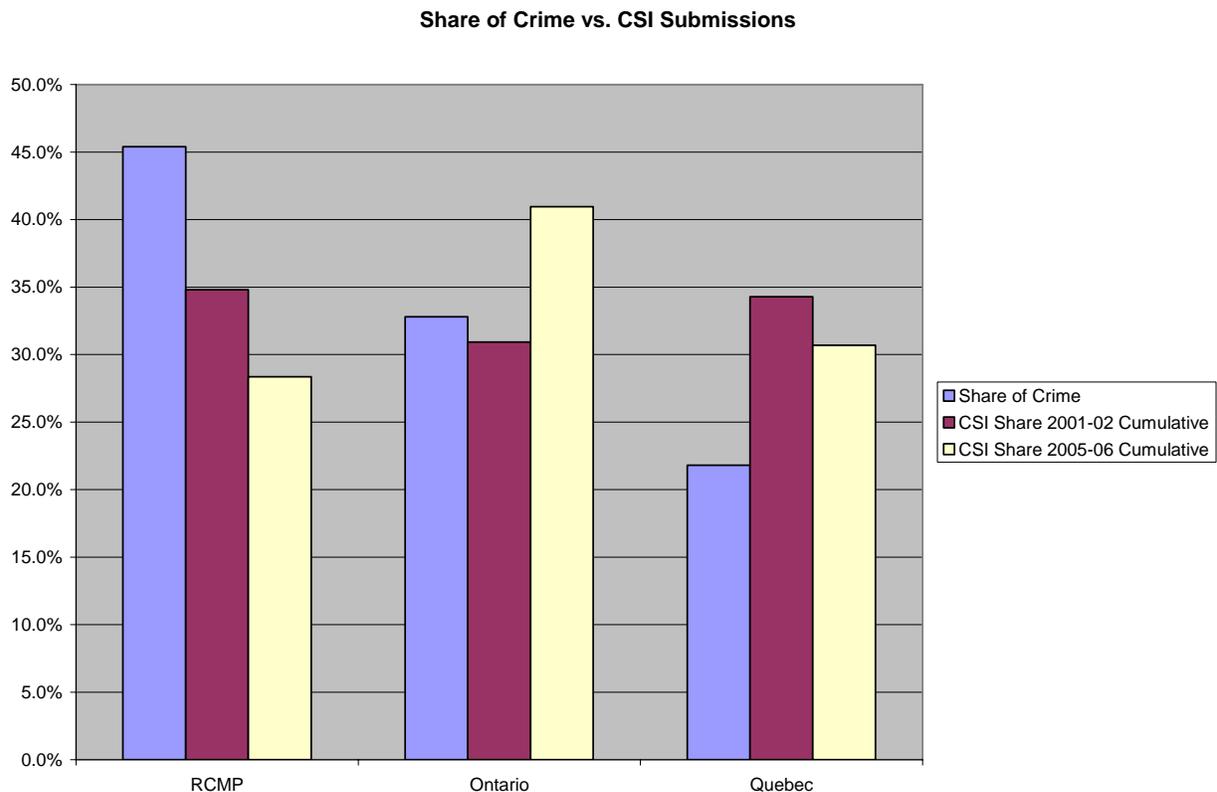
**Table 1: CSI Annual Entries**



However, the bulk of the growth has come from Ontario and Quebec forensic laboratories. As Table 2 shows, the proportion of entries from the RCMP laboratories is now even lower than the share achieved in 2001-02, and both proportions are much lower than the share one would expect, given the share of designated crime in the contract provinces and territories<sup>2</sup>.

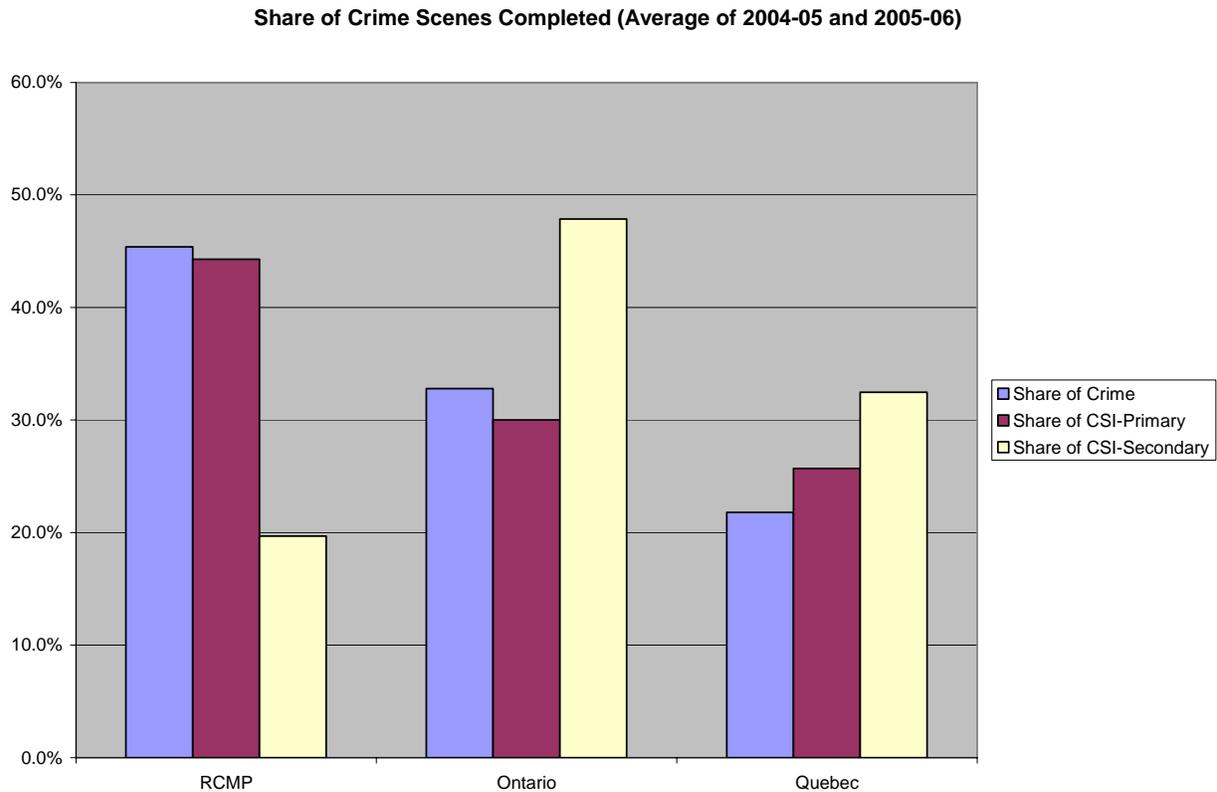
<sup>2</sup> Findings are based on the hypothesis that the proportion of crime for designated offences by Province/Territory have remained the same as when the first evaluation was conducted.

**Table 2: Relative Share of Crime and CSI Entries**



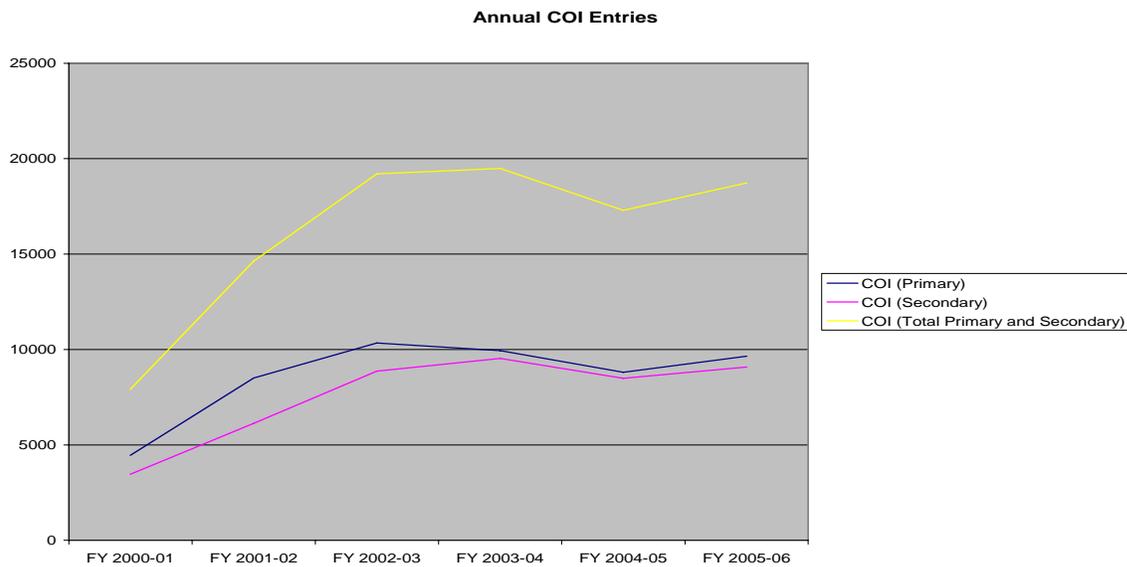
While overall levels of CSI submissions from the contract provinces and territories are low, this appears to be for crime scenes related to secondary offences only. As Table 3 shows, the number of submissions for designated primary offences from all forensic laboratories is, by-and-large, quite consistent with their respective crime proportions. However, submissions levels for designated secondary offences from the Ontario and Quebec forensic laboratories are much higher than one might expect given their proportion of crime, and conversely the submission levels from the RCMP labs are much lower.

**Table 3: Relative Share of Crime and Primary and Secondary CSI Entries**



The statistics for the COI are harder to assess. As Table 4 shows, the level of submissions appears somewhat higher over the past few years, compared to 2001-02.

**Table 4: COI Annual Entries**



However, the increases are not in the 100% range that were earlier considered possible. As stated earlier in this report, it is hard to assess the extent of improvements, given the reduction in retroactive cases, potential reductions due to recidivism, and overall reductions nationally in the incidences of crime. That being said, the relatively high submission level from Ontario (45% of submissions with only 32% of crimes) suggests that there is more that could be done.

As illustrated in Table 5, the number of matches per year (crime scene to offender, as well as crime scene to crime scene), has been steadily increasing since the creation of the NDDDB in FY 2000-01. In fact, since 2001-02, the size of the COI and CSI have increased approximately 5-fold, while useful ‘hits’ have increased 10-fold. That is, the rate of successful hits grows faster than the growth in the indices. Since 2001-02, the hit rate has essentially doubled.

**Table 5: NDDDB Annual Matches**

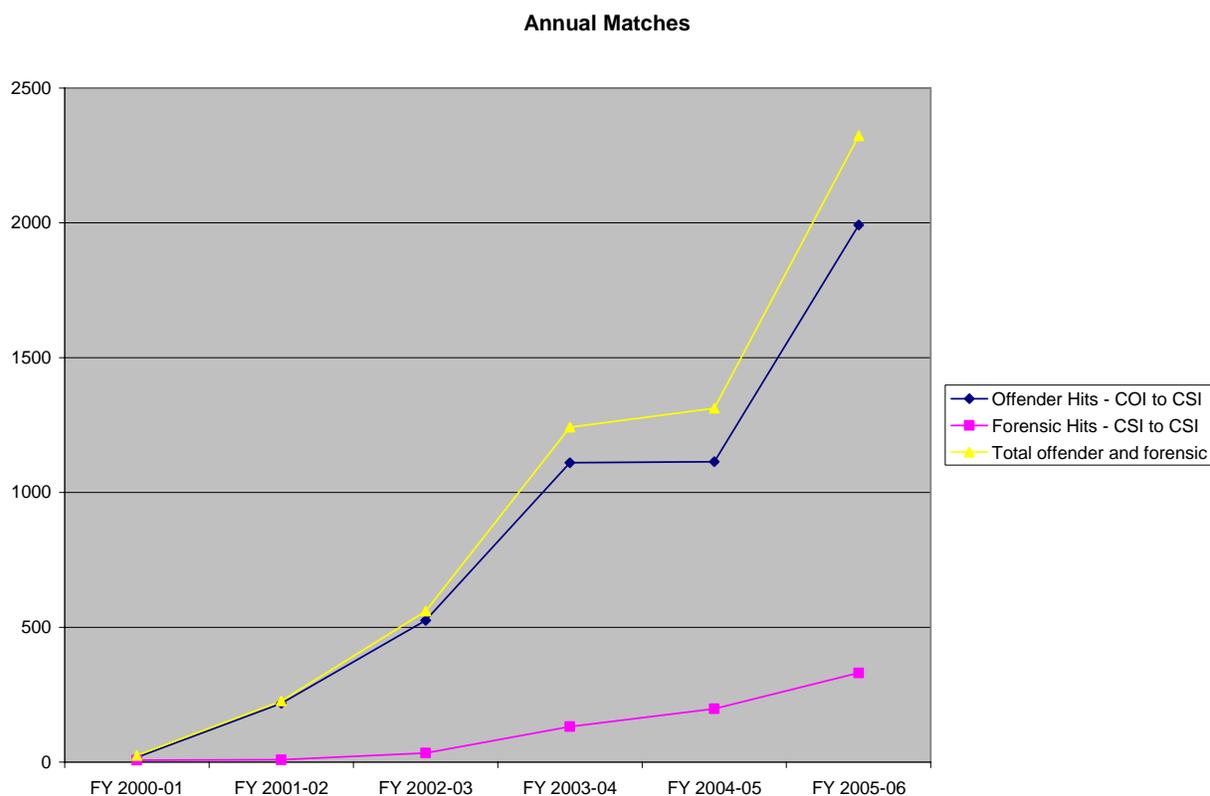
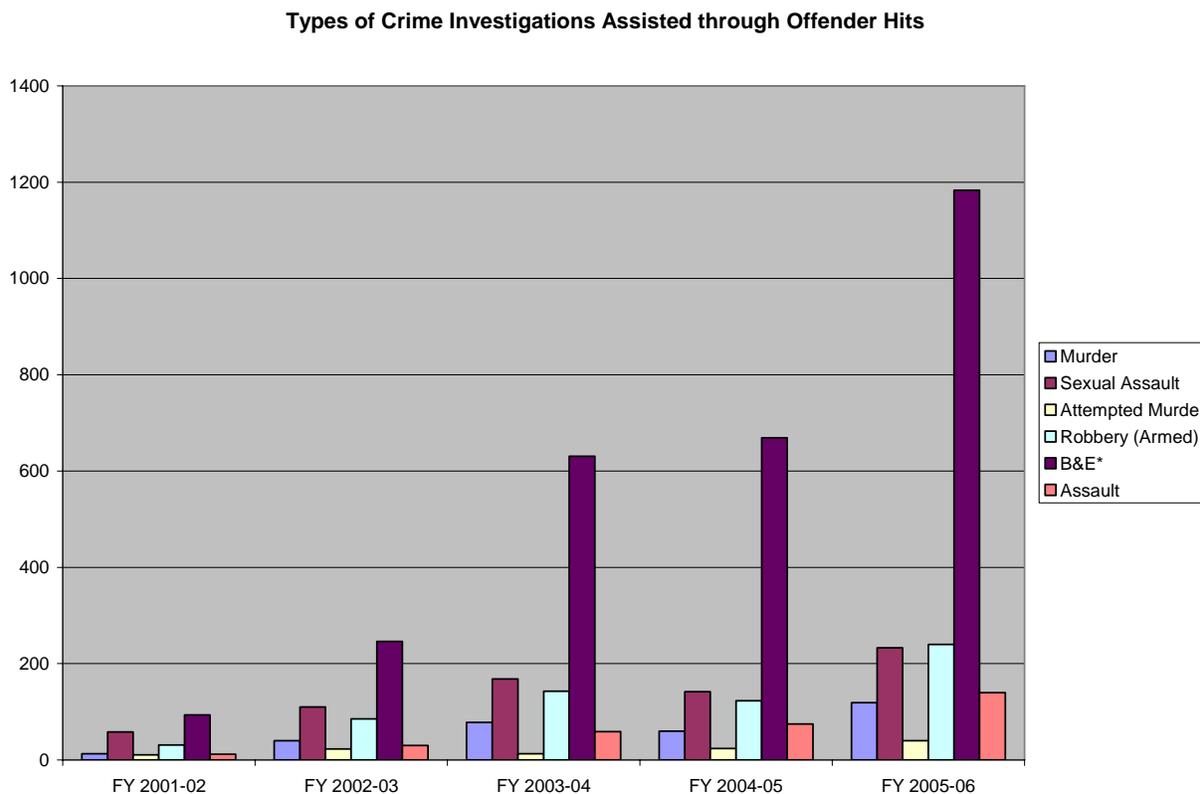


Table 6 shows that there have been steady increases in all types of crimes solved (crime scene to offender hits), although the overall proportion of crimes solved by type is changing (i.e. higher proportion of designated secondary offences solved, compared to designated primary offences). It is considered likely that, as Ontario and Quebec submit more of the secondary crime scene entries, these provinces are, as a result, benefiting disproportionately more from the increase in

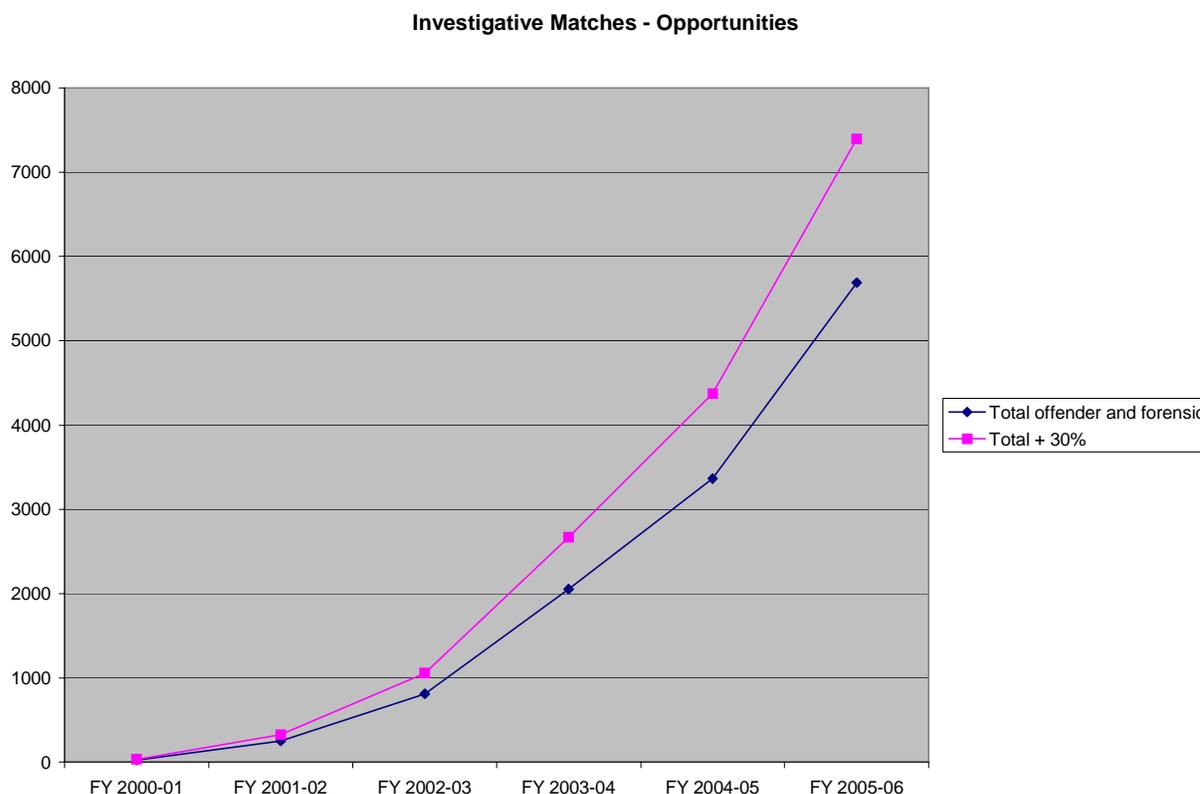
secondary crimes solved through matches, although the data needed to verify this has not been made available.

**Table 6: Types of Crime Investigations Assisted Through Offender Hits**



While these results show the success that has been achieved by the NDDB, it is also clear that the NDDB would be even more successful if the COI and CSI were larger. To illustrate, if the level of submissions to the CSI by RCMP forensic labs were comparable to the level of submissions achieved from Ontario and Quebec, the CSI would be approximately 30% larger (approximately 8,000 more submissions) and another 1700 crimes could have been solved through additional matches. Table 7 illustrates the ‘missing’ 30%.

**Table 7: ‘Missing’ Matches**



#### 4.1.2 BCA Agreements

This section deals with three key aspects of the BCAs, namely: forensic capacity, service levels, and downloading of costs.

##### *Forensic Capacity*

The primary goal of the BCAs was to enhance crime scene analysis capacity, thereby increasing submissions to the CSI, enhancing crime solving and thus contributing to the success of the NDDB. Table 8 shows that there has been significant growth in forensic casework analysis.

In particular, the number of cases completed has grown substantially for Ontario and Quebec. Interviews indicate that this is a direct result of the federal contribution towards forensic analysis costs. Interviews also indicate that the Quebec and Ontario labs completed all the projected cases as per the BCA Agreements.

The Quebec lab indicated that all funds received through the BCA Agreement are used by the lab. They feel that, without those funds, they would not have been able to invest as heavily as they have in their staff and infrastructure. Since the last evaluation the Quebec lab has been able

to increase its human resources from 12 to 26 professionals. It has also invested in robotics, which has been fully operational since the fall of 2005. For future agreements, they would prefer a funding formula similar to the one used for Ontario.<sup>3</sup> The Ontario lab also reported a significant increase in personnel, in part as a result of the BCA contribution from the federal government. Ontario notes that they are now dependent on this funding to maintain their level of contribution to the NDDB.

**Table 8: Forensic DNA Cases Completed**

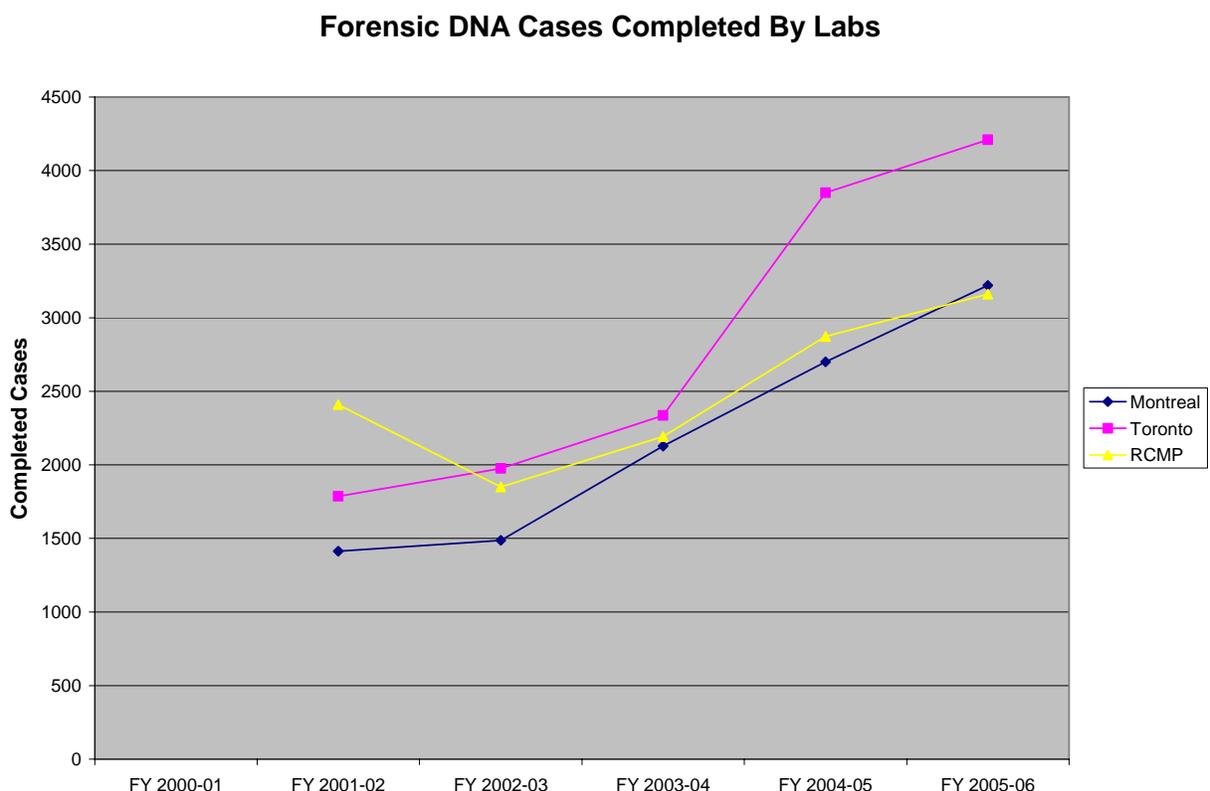


Table 8 indicates a more modest increase in forensic capacity for the FLS. Interviews with members of the F/P/T Working Group from the contract provinces/territories indicate that all designated primary offences and the allocated number of designated secondary offences, as specified in the BCAs, are being accepted and processed by the FLS. Statistical information confirms this finding. However, as identified earlier, there appears to be substantial demand, especially for secondary offence analysis, that is not being met. The RCMP indicated that, while they invested in robotics, they received little additional funding, and consequently, capacity increases for secondary offences were limited to non-suspect B&Es.

<sup>3</sup> Under the current BCAs, Ontario receives a fixed amount per year based on historical submission levels, while Quebec's payments are based on achieved submission levels, up to a maximum that cannot exceed the amount received by Ontario.

All respondents from contract provinces indicated that quotas on cases for designated secondary offences are not adequate. Many indicated that they reach their quotas early on in the fiscal year, in some cases in the first few months. Although the FLS meets and may slightly exceed the agreed minimum level for secondary crime scene analyses, the quotas do not meet the demand.

Interviews confirm that the FLS is having difficulties managing demand for secondary crime scene analysis. Consequently, the FLS has implemented various screening levels to control whether and when cases will be accepted or queued for analysis.<sup>4</sup> The FLS has also adopted a policy restricting the number of samples that can be submitted per crime scene (6 to 8). Once the analysis of those samples is completed, additional samples can be submitted if more analysis is required. Some interviewees identified that this two stage process, which can result in a 240 day turnaround, can seriously impact the ability to solve crimes. However, the same interviewees also indicated that the system works reasonably well when the police are sufficiently trained to identify the most probative samples (those with the highest potential for yielding good evidence).

However, it should be noted that the FLS received no additional funding from the BCAs. We understand that some additional funding was requested by the FLS and has been approved; namely: \$900K per year for 2004/05, 2005/06 and 2006/07. At the time of the original request, this amount was considered adequate, based on the assumption that the introduction of robotics would significantly increase capacity through efficiency gains. However, interviews indicated that efficiency gains were fully consumed by annual increases in caseload submissions, and that capacity growth has been insufficient to meet the caseload.

### *Service Levels*

Backlogs continue to exist and turnaround times remain long in all forensic lab systems, particularly for secondary crimes. Documents indicate that the RCMP labs have established a standard of 30 days for routine cases. However, they aim for 60 days, and achieve an average of approximately 120 days. We understand that 60 day turnarounds are the goal for the Quebec lab, but they are also routinely much longer. Ontario does not track performance based on turnaround times, but aims to report 80% of their cases within 90 days. It should be noted that 30 days has been cited as a reasonable turnaround time for DNA testing.<sup>5</sup>

It should be noted that all the lab systems have procedures in place to identify and fast-track urgent cases, which are usually processed within 11-15 days. In addition, all labs reported streamlined processes for Break and Enter (B&E) offences. Police crime scene officers were trained in the identification and collection of B&E evidence to simplify the processing stage without compromising the ability to extract usable DNA profiles.

Interviews found only one or two instances where police had used the services of private forensic labs to expedite analysis. Although the practice does not seem to be widespread, we understand

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<sup>4</sup> It should be noted that all forensic laboratories have policies regarding acceptance of exhibits; however, these are more critical for the FLS due to current capacity limitations.

<sup>5</sup> Justice Campbell's report on the Bernado investigation.

from the Working Group that many police forces are seriously considering the use of private labs in the future, in spite of the additional costs and the downstream impact on the success of the NDDDB. The Working Group are concerned that this practice may grow considerably if capacity levels and long turnaround times are not adequately addressed.

### *Downloading*

Interviews with members of the F/P/T Working Group and representatives of law enforcement agencies revealed that the downloading of forensic costs to the local law enforcement agencies that had been identified as a significant obstacle to the population of the CSI in the previous evaluation, has stopped, except in New Brunswick. Interviews suggested that with forensic budgets now in place in New Brunswick, the impact of downloading is no longer considered significant, at least in the larger centres.

## **4.2 Cost-effectiveness and Management / Operational Effectiveness**

### **4.2.1 National DNA Data Bank Operations**

The costs of operating the NDDDB have remained stable at about \$2.3M per year, not including RCMP overheads. The NDDDB, in spite of clear benefits as a national crime solving tool, has not yet been allocated permanent funding. It is our understanding that Treasury Board has only approved temporary funding, which will end on March 31<sup>st</sup>, 2007.

As the NDDDB was set up on the expectation of higher COI and CSI submissions, it has been able to absorb increases in submission levels within its existing budget.

Interviews with individuals responsible for the management of the National DNA Data Bank indicated that there have been no privacy or security incidents or any lab errors resulting in compromised investigations or prosecutions and that the legislation has successfully met a court challenge regarding privacy.

### **4.2.2 Governance of the NDDDB and BCA Agreements**

Although most F/P/T DNA Working Group members indicated that the roles and responsibilities of the various stakeholders are clear, some were not aware of the existence and role of the DNA National Steering Committee. This committee has not met for several years. The Working Group has provided guidance on operational concerns. Surprisingly, some members of the Working Group were not aware that they are officially part of the Working Group. Noteworthy as well, Implementation Committees were not formed in some provinces and territories as there appeared to be no need for such a committee. However, some members of the Working Group expressed the desire to play a larger oversight role into the effectiveness and efficiency of forensic labs and one contract province indicated that they would like to see the Implementation Committee reinstated. The Quebec lab indicated that it wished to see benchmarking data from all

labs and that it would welcome the opportunity to meet and discuss operational issues (productivity, service levels, etc.) and share best practices.

Most Working Group members feel that the location and reporting relationship of the NDDB, within the RCMP, is appropriate. The Province of Quebec, however, would prefer to see the NDDB housed within an independent body. It should be noted that with the recent organizational changes within the NPS, the NDDB no longer reports through the FLS.

### **4.2.3 BCA Agreements**

One purpose in setting fixed BCA payment levels for the contract provinces and territories was to minimize administrative burden for them, as they would no longer have to deal with detailed costing information or download the costs. While this has worked to some extent, interviews indicated that the administrative burden of downloading the costs has been replaced in some provinces by the new burden of rationing the quota for secondary crime scene analysis.

The contract provinces and territories also generally feel that a five year term for the BCAs, as opposed to the current three year term, with an option to renew for one year, would bring more stability and reduce the burden associated with the re-negotiation of the BCA Agreements.

The Ontario lab indicated that the BCA Agreements work well, but feel they are a somewhat artificial means to secure funding. While they feel the duration may be appropriate, they would prefer negotiations to begin earlier. Delays incurred in the previous re-negotiation of the BCA Agreements had significant repercussions since they were left without the new and increased funding at a critical period of time. They felt that the process and timelines for negotiations should be part of the agreements themselves. Further, they feel that the reporting requirements are sometimes cumbersome and there should be more thinking in terms of defining units of work versus a case.

The management of the RCMP forensic labs indicated that none of the money generated through the BCA Agreements has reached the RCMP forensic labs. As well, in addition to the administrative burden of monitoring laboratory activity in Ontario and Quebec, the FLS now incurs a new contracting charge (\$100K lost from FLS budget) to cover internal RCMP overhead charges for cutting the contribution cheques for Ontario and Quebec laboratories.

## **4.3 Relevance and Strategic Issues Affecting Overall Impact of NDDB Program**

### **4.3.1 Current and Future NDDB and Forensic Laboratory Capacity**

It would appear that demand for forensic DNA analysis is still growing. The RCMP labs estimate that requests for DNA analysis for designated primary offences cases increases approximately 5% each year. Although existing quotas on secondary offences restrict the number of submissions, the RCMP estimate that if there were no quotas, and in the absence of other impacts, the secondary submissions would increase dramatically.

In addition, there are other developments that will likely increase the demand for both primary and secondary COI submission, and crime scene analysis relating to CSI submissions. In particular, Bill C-13 (and Bill C-18), when fully implemented, will move some major secondary crimes into primary (e.g. B&E and Robberies), and add new crimes to the list of secondary offences (in particular, any indictable offence under the *Criminal Code* or *Controlled Drugs and Substances Act* with a minimum five year sentence).

Several studies have been undertaken to assess the impact of these legislative changes. A study by DOJ estimates that the number of primary cases could increase by 120% and secondary cases by 180%. The forensic labs expect demand for forensic DNA analysis to increase by 42% (RCMP) and 20-25% (Ontario and Quebec) once Bill C-13 and C-18 are fully implemented. Interviews confirm that the DOJ estimated increases were based on an analysis of crime statistics and hence would apply more to the impact of the C-13 and C-18 on the sample collection, analysis, and retention of convicted offender profiles. However, the RCMP analysis reflects the likelihood of DNA evidence being present at crime scenes, and would apply more to the impact on forensic crime scene analyses. The lower levels for Ontario and Quebec may reflect the higher levels of analysis currently undertaken by these labs, and thus a lesser impact from C-13/C-18.

Interviews with the management of the NDDB indicate that they anticipate greater increases in submission levels due to C-13/C-18, beyond those that can be managed within existing budgets, and that they are now seeking additional funding to handle the increase. If other indices, such as a Missing Persons Index, were to be added, they expect that additional funding would be made available to handle the new workload.

The FLS is expected to receive additional federal funding upon proclamation of the Bills, sufficient to expand capacity by approximately 10%. (However, we understand that even this minimal level of increased funding would not be provided in advance to allow for any ramp up of service capacity.) The Ontario and Quebec laboratory systems were not allocated direct funding through the legislative process. It is our understanding that this will be a topic for discussion in the next round of BCAs negotiations. What is clear is that, in the absence of significant additional funding for all labs, it is unlikely that they will be able to absorb the additional work without incurring much longer processing delays and much larger backlogs.

Regarding a potential Missing Persons Index (MPI), most DNA Working Group members indicated that more research, analysis and discussion is required before any decisions could be made. They felt unanimously, that if an MPI is to be included, that it not be funded through the BCAs, but centrally and federally. All agreed that this would add stress to an already stressed forensic system. Currently, it is not clear whether, with the creation of an MPI, there would be more funding provided for additional forensic work, or whether the work would be expected to be handled by the existing forensic laboratories without additional funding, or whether private labs might be utilized.

### **4.3.2 Forensic Costs**

As stated previously, there have been general expectations that the average cost per case for DNA analysis might significantly drop in the near future due to technological developments such as robotics. The FLS indicated that the introduction of robotics did achieve some economies that enabled them to increase their capacity to some extent. However, interviews with the management of the NDDDB and forensic laboratories indicated that other factors have contributed to costs remaining high. For example, the bulk of the costs relate more to the human side of operations, with technological improvements having little impact in total costs. As well, the costs of collection kits required by both the NDDDB and the forensic labs to prepare blood samples for DNA analysis have increased substantially in recent years (i.e. 40%). Each kit now costs approximately \$4,500.

The Quebec Lab indicated that although they received increased contributions through the current BCA Agreements, their unit costs did not change and they simply processed more cases.

Ontario has reported that, in their experience, as their capacity increased due to greater efficiency, they were asked to not only do more, but to do more difficult analyses. They note that a large component of doing biology casework analysis involves searching for body fluids, and that this component is time-consuming and not shortened by improvements in robotic technology.

It should be noted that the evaluation team was not provided with current cost information and was therefore unable to determine whether unit costs are decreasing, increasing or remaining stable. As well, any new costing exercise should take into account the existence of new streamlined processes and workloads, which may have very different costs.

### **4.3.3 Technological Development**

Since the last evaluation, there have been technological advances that now permit the recovery of useful DNA from smaller and smaller samples. A technique called mini-STR (short tandem repeats) allows forensic experts to make positive identifications from very small pieces of DNA found in stressed exhibits. This technique was used on remains found at the World Trade Center and released commercially in 2006. These advancements have created more and more demand for forensic work on crime scenes previously considered unworkable.

Labs are currently working with fourth generation DNA technology, with additional changes expected within the next five years. Interviews with the management of the NDDDB and the forensic labs confirm that the adoption of new technology would be essentially driven by the U.S.A., and the manufacturers who operate in a virtually monopolistic market. Given these circumstances, it is unlikely to expect that unit costs, or overall costs, will reduce significantly in the near future. Some interviewees raised the possibility of having to re-assess all existing DNA profiles should new technology standards be adopted internationally.

#### **4.3.4 Experiences of Other Countries**

Both the United States and the United Kingdom have implemented major new programs to fix inadequacies in forensic services and better exploit DNA technology. While it is recognized that their respective legislative environments are different, their experiences are still useful.

The UK Government implemented the DNA Expansion Program in 2000, spending an additional £240M over five years to ensure that all crime scenes that might contain DNA evidence were analyzed and the DNA profiles entered in the National DNA Database. The money was spent on police (equipment, training, staff for crime scenes) as well as on forensic budgets and in other areas. As a result of the UK program, detection rates doubled and quadrupled, and more, for those sites where DNA was found (success rate for B&E of 41% versus 16% overall; theft from vehicle 63% versus 8% overall). The average time to process a crime scene is 10-12 days. There is a mobile laboratory that can do 'real-time' analyses when and where needed. The development of Pace kits that allow police to collect samples to the evidentiary level saw costs per unit drop from £450-£600 to £50. The program has been extended indefinitely and is being expanded to other forensic areas.

An equivalent-sized program in Canada would require about \$240M over 5 years (or approx. \$48M per year), based on population and exchange rates. This is in contrast to an annual budget of approx. \$20M per year in total spent on forensic services in Canada just a few years ago.

In March 2003, the US government also committed significant funds to advance justice through DNA technology. They allocated over \$1B over 5 years, or approx. \$233 million per year. On an annual basis, the money is being used to: eliminate backlogs (\$93M), strengthen lab capacity (\$90M), stimulate research and development (\$25M), train the criminal justice community (18M), and protect the innocent and identify missing persons (\$7M).

These examples demonstrate not only the massive commitment to DNA analysis made by the US and UK, but also reflects decisions to allocate funding in many areas of the criminal justice process, not just into forensic services.

#### **4.3.5 Continuing Relevance of BCA Agreements**

Interviews with members of the F/P/T Working Group indicate that the BCA Agreements are tolerated by the contract provinces and territories, while Ontario and Quebec are pleased with the additional contribution that has allowed them to expand forensic capacity. However, the BCAs are generally considered to be neither fair nor understandable. The RCMP FLS is concerned because they receive no additional funding through the Agreements to increase their DNA capacity, and must devote both time and money to managing the Agreements.

The contract provinces and territories are concerned about their ability to influence service levels for forensic services, and fear that the minimal influence they have now through the BCAs would be further compromised if FLS costs were to be rolled into the Provincial Policing Agreements.

#### **4.3.6 Grey Data Banks**

Interview results indicate that the emergence of so-called 'Grey' Data Banks is not expected to impact the NDDB in any way.

## **5. Conclusions**

### **5.1 National DNA Data Bank**

All lines of evidence, data, documentation and interviews, confirm that the NDDB is both relevant and successful. As well, no issues have been identified regarding privacy concerns, or any other aspect of operations or management of the NDDB.

It is also clear that the success of the NDDB would be significantly enhanced if a way could be found to increase submissions to the CSI. However, capacity limitations in forensic casework analysis are hampering additional success. While at this point the FLS appears to be under particular capacity constraints, all the forensic lab systems are struggling with workloads, turnaround times and backlogs, and are concerned about how they will deal with increases that will follow the full implementation of C-13 and C-18, let alone the inclusion of other indices. Quite simply, the lack of adequate forensic capacity will by and large ensure that the expected benefits from C-13/C-18 do not materialize, unless steps are taken to ensure adequate capacity to meet the future demand.

### **5.2 BCA Agreements**

Results for the BCAs are more mixed.

The new funding formula significantly increased the federal contribution to Ontario and Quebec labs, allowing them to increase lab capacity with the extra money (while at the same time becoming more reliant on the extra funds).

The modest budget increase received by the RCMP FLS allowed for a modest increase in capacity, but not at all to the level that had been anticipated, or that would meet demand. It had been hoped at the time that the quotas imposed on secondary submission would have disappeared by now; however, the FLS continues to impose strict limits on secondary submissions, and there are worrying backlogs.

Changes brought to the BCA Agreements following the previous evaluation also encouraged contract provinces and territories to stop downloading forensic costs. As a result, forensic submissions levels recovered from the worrying reductions seen in 2002/03. However, this merely served to further highlight the continuing capacity constraints of the FLS.

The new funding formula tied the funds for forensic services directly to the costs of forensic services; with the NDDDB removed from the funding relationship. However the NDDDB never did obtain permanent funding.

The BCAs remain complex and difficult to explain, based as they are on a combination of historic and current forensic casework demand and activity, crime incidences, averaged casework costs, targets and quotas. As well, no costing information has been provided that could be used to update the BCAs.

The BCAs were conceived of as a mechanism to help fund the NDDDB at a time when federal funding was difficult to obtain, and to encourage the submission of crime scene analyses to the NDDDB from Ontario and Quebec labs. Changes implemented following the previous evaluation addressed immediate problems, through discouraging downloading, and increasing forensic capacity, particularly in Ontario and Quebec. However, there are still serious problems in forensic capacity, problems that can only grow as a result of legislative changes and technological developments.

If we were not so preoccupied with the BCA Agreements (or if they did not exist), the focus of concern would likely be on two key questions: 1) how to best exploit DNA in the criminal justice system, and 2) how best to deal with the explosive growth in demand for DNA forensic analysis. Perhaps it is time to comprehensively explore the funding of forensic services and other related pressure points. It is not clear that the BCAs are the best mechanism for dealing with these issues. Perhaps it is time to rethink the whole approach, or to transform the BCAs into something that may better address these issues.

### **5.3 Forensic DNA Services**

The current evaluation was not intended to be an evaluation of DNA forensic services in Canada. Mechanisms were not in place to conduct such an evaluation. However, all trails lead to forensic services as the supplier of the critical CSI submissions to the NDDDB, and thus the primary determinant of NDDDB success (and barriers to greater success). Forensic services also form the basis for the BCA Agreements.

There is no question about either the relevance or success of forensic services (Note: Operational efficiency and capacity of RCMP FLS is currently under review by OAG). However, there is clearly unsatisfied demand for DNA forensic analysis, which will only grow. Today, there are serious limitations regarding secondary crime scene analysis in the FLS, coupled with backlog issues and long turnaround times. However, the Ontario and Quebec labs also worry about turnaround and backlogs. In all cases the labs have established performance targets for turnarounds that are routinely not met (although high priority cases are handled expeditiously)

There are some promising developments. New approaches have been developed for handling B&Es involving police training and improved collection methods, which have streamlined the process and cut costs dramatically. Such techniques may be more generally transferable to other high volume types of crimes.

While there appears to be a clear bottleneck in DNA forensic capacity, the approaches adopted by the UK and US indicate that care is necessary in allocating additional funds to ensure the most effective use of DNA analysis. A coordinated approach is needed to allocate funds between police, DNA forensic analysis, other forensic services, the databank, and other parts of the criminal justice system, to ensure goals are met, and new bottlenecks are not created.

## 6. Recommendations

### 6.1 Forensic Services

**The Federal Government, in concert with all the provinces and territories, needs to come to grips with how best to ensure the exploitation of DNA in the criminal justice system. There is a need for an in-depth review of forensic services in general, to determine optimal role, service delivery approach, and appropriate funding, to maximize societal benefits within the context of the overall criminal justice system.** Such a review would:

- aim to determine the appropriate level of funding, the best sources for this funding, how it should be shared and where spent (e.g. police resources, additional prosecutors, training, equipment, forensic capacity, etc.);
- include all segments of criminal justice system (judiciary/prosecution/defense; Provincial/Municipal police, Forensics, National Policing Programs and Tools (including the NDDDB), and involve these stakeholders in the review;
- assess the requirements of Bill C-13/C-18 and other potential legislative developments
- determine the role and responsibilities of Federal Government and Provinces and Territories, and the levers available to each;
- draw on experiences and lessons learned from other countries; and
- assess costs and performance levels.

Such a comprehensive review would appear to be long overdue, and could be undertaken as part of, or in preparation for, the expected (and also overdue) Parliamentary Review of the DNA Identification Act and related legislation.

**In the short term, it is recommended that a way be found to ensure the capacity of the FLS increases to levels comparable to those of Quebec and Ontario.** It is beyond the scope of this report to recommend how this could or should be accomplished. The current BCA agreements do not directly link payments made by the contract provinces and territories to the FLS. If such a linkage were introduced, a mechanism would be required to ensure that such payments would be used to expand capacity in the FLS. In addition, while it appears likely that the FLS is operating under severe financial constraints, quantitative information has not been provided that would allow this conjecture to be assessed.

## 6.2 BCA Agreements

The BCA Agreements expire March 31, 2007, and there is some urgency involved in determining what to do with them.

One option would be to let them expire. However, this does not appear to be a feasible option for two reasons:

- There does not appear to be any justification for returning to a situation where the forensic work within the contract provinces and territories is paid for completely from federal taxes, and
- Ceasing federal payments to Ontario and Quebec would significantly impact their forensic capacity and forensic staff, as these labs rely on the payments as part of their operating budgets and have expanded capacity relying on this funding.

Thus, in the short term, there does not appear to be any other viable option except to renegotiate the BCAs.

In the longer term, there may be some merit in including the services and costs of the FLS under the Provincial Policing Agreements. This would result in an effective 70% share of forensic costs for the contract provinces and territories (up from their current share of approximately 54%). However, this would also provide an avenue for the contract provinces and territories to be able to negotiate access and service performance levels, and deal with capacity issues. Provision would have to be made to ensure access to the FLS for municipal and regional forces, and for a governance structure that allows for meaningful input from the user communities. The BCAs could be used as a bridging mechanism to assist in the process of repositioning the FLS within the policing agreements.

**Thus it is recommended that the possibility of including the costs of the FLS under the Provincial Policing Agreements be investigated.**

If the contract provinces and territories were effectively covering their own forensic costs through the Provincial Policing Agreements (or some other similar mechanism), then the rationale for a continuing federal contribution to Ontario and Quebec lab would arguably recede, in order to put all provinces and territories on a roughly equivalent footing.

However, as noted above, any changes to the existing structure must take into account the impact on forensic capacity and forensic staff in the Ontario and Quebec labs. Again, the BCAs could be used as a bridging mechanism.

In addition, it should be noted that the simple existence of the NDDDB has already helped create additional demand for forensic work across the country (e.g. re-opening of cold cases and cases of potential wrongful conviction, additional B&E work, etc.). Bill C-13/C-18 will undoubtedly change the landscape regarding demand for forensic services, across the country. Similarly, the results of a full review of forensic services and how best to exploit DNA, as well as further

technological developments, may all highlight the need to encourage additional forensic work. To this end, the federal government might well determine it is in the interest of Canadians in general to continue supporting forensic analysis, on an equitable basis to all provinces and territories. This might take the form of a financial contribution towards the costs of forensic services across the country, through a BCA-like mechanism.

### **6.3 Base Funding for NDDB**

**Based on the obvious relevance and continuing success of the NDDB, it is recommended that the NDDB receive permanent allocated funding.**

### **6.4 Governance Steering Committee**

The DNA National Steering Committee does not appear to be a particularly necessary or useful forum for providing direction. Perhaps the issues are too narrowly-based and/or the forum too senior. For example, the updated evaluation framework was reviewed and approved by the F/P/T ADM Committee on Policing Issues, as this was more simple and expeditious than convening a meeting of the DNA National Steering Committee. In addition, there appears to be considerable overlap in membership between various committees within each level. To simplify governance, it might be better to reposition the DNA Working Group within another forum, such as the F/P/T Assistant Deputy Ministers' Committee on Policing Issues. Such a shift would provide a more structured reporting environment, as the Committee on Policing Issues meets with some regularity, and DNA/NDDB could become a standing agenda item. In addition, should the DNA Working Group become involved in broader forensic service issues, the Committee on Policing Issues could provide a more appropriate forum for discussing DNA forensic analysis issues, as well as providing a more direct mechanism for police forces, as the primary users, to have input on matters relating to forensic services.

## **Appendix A – List of Documents Reviewed**

- Current BCA Agreements
- NDDB Annual Reports (2000-2006)
- RCMP Business Case (Operational Impacts of Bill C-13 - 2005)
- DNA and Criminal Justice in Canada (Dept. of Justice - 2005)
- Legislation in force and pending implementation (C-13 &C-18)
- Financial Records
- Laboratory Policies and Procedures Manual, Chapter 2: Laboratories Operations – General; Forensic Laboratory Services, Royal Canadian Mounted Police.

## Appendix B – Statistical Analysis

### Second Evaluation of the National DNA Data Bank Program and Biology Casework Analysis Agreements Statistical Analysis

#### Impact of National DNA Data Bank on Solving

#### Crimes

#### Number of Matches\*

##### Number of Matches(Cumulative)

	FY 2000-01	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
Offender Hits - COI to CSI	18	236	762	1872	2986	4978
Forensic Hits - CSI to CSI	7	16	50	182	380	711
Offender Duplicate	0	286	794	1469	2047	2803
Identical twins	0	9	15	26	31	48
Total	25	547	1621	3549	5444	8540
Total offender and forensic	25	252	812	2054	3366	5689

##### Number of Matches (Annual)

	FY 2000-01	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
Offender Hits - COI to CSI	18	218	526	1110	1114	1992
Forensic Hits - CSI to CSI	7	9	34	132	198	331
Offender Duplicate	0	286	508	675	578	756
Identical twins	0	9	6	11	5	17
Total	25	522	1074	1928	1895	3096
Total offender and forensic	25	227	560	1242	1312	2323

\*Note that first 4 years reflect May 15 to May 15,  
FY 04-05 is May 15 - March 31, and FY 05-06 is March 31 to March 31

	2001-02 to 2005-06	2002-03- to 2005-06				
<b>Growth in matches 2001-02 to 2005-06</b>						
Offended Hits	11066.7%	913.8%	378.7%	179.5%	178.8%	100.0%
Forensic Hits	4728.6%	3677.8%	973.5%	250.8%	167.2%	100.0%
Combined	9292.0%	1023.3%	414.8%	187.0%	177.1%	100.0%

**Second Evaluation of the National DNA Data Bank Program and Biology  
Casework Analysis Agreements  
Statistical Analysis**

**Crimes Solved by Offender Hits (Cumulative)**

	FY 2000-01	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
Murder	Not available	13	53	131	191	310
Sexual Assault	(18 total)	58	168	336	478	711
Attempted Murder		11	34	47	71	111
Robbery (Armed)		31	116	259	382	622
B&E*		94	340	971	1640	2823
Assault		12	42	101	176	316
Other		17	9	27	48	85
<b>Total</b>		<b>236</b>	<b>762</b>	<b>1872</b>	<b>2986</b>	<b>4978</b>

**Crimes Solved by Offender Hits (Annual)**

	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
Murder	13	40	78	60	119
Sexual Assault	58	110	168	142	233
Attempted Murder	11	23	13	24	40
Robbery (Armed)	31	85	143	123	240
B&E*	94	246	631	669	1183
Assault	12	30	59	75	140
Other	17	-8	18	21	37
<b>Total</b>	<b>236</b>	<b>526</b>	<b>1110</b>	<b>1114</b>	<b>1992</b>

\* B&E with Intent, Committing offence, or breaking out  
Note that FY 2004-05 covers May 15 2004 to March 31 2005 only

**Second Evaluation of the National DNA Data Bank Program and Biology Casework Analysis Agreements  
Statistical Analysis**

**Crime Scene Index**

	DNA Profiles entered into the NDDB CSI (Cumulative)					
	FY 2000-01	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
Montreal	765	1763	2737	4326	6163	8571
Toronto	562	1590	3414	5976	8501	11436
RCMP Labs	336	1789	2939	4433	5454	7918
CSI (Total)	1887	5142	9090	14735	20118	27925

	DNA Profiles entered into CSI (Annual)					
	FY 2000-01	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
Montreal	765	998	974	1589	1837	2408
Toronto	562	1028	1824	2562	2525	2935
RCMP Labs	336	1453	1150	1494	1021	2464
CSI (Total)	1,887	3255	3948	5645	5383	7807

\*Laboratoire de sciences judiciaires et de médecine légale - Montréal)

\*\*Centre for Forensic Science

\*\*\*RCMP Labs - Ottawa, Edmonton, Vancouver, Regina, Winnipeg, Halifax)

Source: NDDB Annual reports

(except values for individual lab systems for 2000-01 taken from first evaluation. Note these do not sum to the total)

Note May 15-May 15 for first 4 years

May 15 - March 31 for 2004-05

March 31-March 31 for year 2005-06

Hit Rate						
Offender Hits	0.95%	4.24%	5.79%	7.53%	5.54%	7.13%
Forensic Hits	0.37%	0.18%	0.37%	0.90%	0.98%	1.19%
Total	1.32%	4.41%	6.16%	8.43%	6.52%	8.32%

CSI Growth:2001-02 to 2005-06	14.80	5.43	3.07	1.90	1.39	1
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**Second Evaluation of the National DNA Data Bank Program and Biology Casework  
 Analysis Agreements  
 Distribution of Crime and CSI Analyses**

**Share of Crime**

RCMP	45.4%
Ontario	32.8%
Quebec	21.8%

*Source: Analysis from Initial Evaluation (2001)*

	Share of Crime	CSI Share 2001-02 Cumulative	CSI Share 2005-06 Cumulative
RCMP	45.4%	34.8%	28.4%
Ontario	32.8%	30.9%	41.0%
Quebec	21.8%	34.3%	30.7%
	100.0%	100.0%	100.0%

	Share of Crime	Share of CSI-Primary	Share of CSI-Secondary
RCMP	45.4%	44.3%	19.7%
Ontario	32.8%	30.0%	47.9%
Quebec	21.8%	25.7%	32.5%

**Second Evaluation of the National DNA Data Bank Program and Biology Casework Analysis Agreements**  
**Statistical Analysis**

**Estimate of 'Missing' CSI Submissions**

Crime incidences indicate that for every primary or secondary crime committed in Quebec, there are approximately 1.5 crimes committed in Ontario, and 2 committed in the rest of the country.

Therefore:

RCMP CSI output, if equivalent to Ontario:

Ontario produced 11,436 CSI submissions

RCMP equivalent =  $(11436/1.5) \times 2 = 15,248$

RCMP produced 7,918, so shortfall estimate =  $15,248 - 7918 = 7,330$

RCMP CSI output if equivalent to Quebec:

Quebec produced 8,571 CSI submissions

RCMP equivalent =  $8571 \times 2 =$

17,142

RCMP produced 7,918, so shortfall estimate =  $17,142 - 7918 = 9,224$

Conclusion: Approximately 7-9K CSI submissions 'missing'. CSI could have been 30% larger, and approximately 30% (e.g. 1700) more crimes might have been solved though additional matchings.

**Number of Matches(Cumulative)**

	FY 2000-01	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
Total offender and forensic	25	252	812	2054	3366	5689
Total + 30%	32.5	327.6	1055.6	2670.2	4375.8	7395.7

**Second Evaluation of the National DNA Data Bank Program and Biology Casework Analysis Agreements  
Statistical Analysis**

**Convicted Offender Index**

	COI DNA Profiles submitted to NDDB (Cumulative)					
	FY 2000-01	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
COI (Primary)	4449	12958	23298	33245	42052	51694
COI (Secondary)	3465	9592	18456	27990	36479	45565
COI (Other)	0	127	255	359	492	812
COI (Total submitted)	7914	22677	42009	61594	79023	98071
COI (Total Primary and Secondary)	7914	22550	41754	61235	78531	97259

	COI DNA Profiles submitted to NDDB (Annual)					
	FY 2000-01	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
COI (Primary)	4449	8509	10340	9947	8807	9642
COI (Secondary)	3465	6127	8864	9534	8489	9086
COI (Other)	0	127	128	104	133	320
COI (Total submitted)	7914	14763	19332	19585	17429	19048
COI (Total Primary and Secondary)	7914	14636	19204	19481	17296	18728

\*Note that first 4 years reflect May 15 to May 15,  
FY 04-05 is May 15 - March 31, and FY 05-06 is March 31 to March 31

	CO Profiles added to COI (Cumulative)					
	FY 2000-01	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
COI (Total)(Input-Not received))	6322	21862	40097	59008	75138	92980

	CO Profiles added to COI (Annual)					
	FY 2000-01	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06
COI (Total)(Input-Not received))	6322	15540	18235	18911	16130	17842

COI Growth: 2001-02 to 2005-06	12.29	4.31	2.33	1.59	1.24	1.00
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**Second Evaluation of the National DNA Data Bank Program and Biology Casework  
Analysis Agreements  
Statistical Analysis**

**Forensic Cases Completed**

	FY 2000- 01	FY 2001- 02	FY 2002- 03	FY 2003- 04	FY 2004- 05	FY 2005- 06
Montreal		1413	1487	2128	2700	3220
Toronto		1787	1975	2335	3850	4209
RCMP		2409	1850	2192	2872	3160

	FY 04/05	FY 05/06	Total 04/05 & 05/06	%
<b>Primary</b>				
Montreal	1058	1128	2186	25.7%
Toronto	1233	1320	2553	30.0%
RCMP	1813	1954	3767	44.3%
Total	4104	4402	8506	100.0%

<b>Secondary</b>				
Montreal	1642	2092	3734	32.5%
Toronto	2617	2889	5506	47.9%
RCMP	1059	1206	2265	19.7%
Total	5318	6187	11505	100.0%

Source: Forensic Laboratory Services Annual statistics  
Note that fiscal years consistently run from March 31 to March 31

**Second Evaluation of the National DNA Data Bank Program and Biology Casework  
Analysis Agreements**

**Basic Crime Statistics from First Evaluation**

Primary Designated Crime				Secondary Designated Crime			
Year	2001	2000	1999	Year	2001	2000	1999
CANADA	78995	76045	72995	CANADA	565057	569201	584788
NF&L	1284	1211	1191	NF&L	7307	7752	7882
PE	195	197	167	PE	1705	1729	1770
NS	1975	1878	2083	NS	15546	15991	17447
NB	1746	1640	1725	NB	11501	11668	12009
QC	14994	14111	13170	QC	125211	132218	132995
ON	27863	26863	24988	ON	183890	179878	183182
MB	5198	5113	4817	MB	28397	29605	30261
SK	5260	5008	4739	SK	32131	31283	31571
AB	8420	7780	7810	AB	54265	53932	56209
BC	11004	11172	11246	BC	98929	99153	105915
YT	235	255	235	YT	1564	1628	1387
NWT	393	406	470	NWT	2420	2488	2537
NU	428	411	354	NU	2191	1876	1623
<b>Total</b>				<b>%</b>			
Year	2001	2000	1999	Year	2001	2000	1999
CANADA	644052	645246	657783	CANADA	100.0%	100.0%	100.0%
NF&L	8591	8963	9073	NF&L	1.3%	1.4%	1.4%
PE	1900	1926	1937	PE	0.3%	0.3%	0.3%
NS	17521	17869	19530	NS	2.7%	2.8%	3.0%
NB	13247	13308	13734	NB	2.1%	2.1%	2.1%
QC	140205	146329	146165	QC	21.8%	22.7%	22.2%
ON	211753	206741	208170	ON	32.9%	32.0%	31.6%
MB	33595	34718	35078	MB	5.2%	5.4%	5.3%
SK	37391	36291	36310	SK	5.8%	5.6%	5.5%
AB	62685	61712	64019	AB	9.7%	9.6%	9.7%
BC	109933	110325	117161	BC	17.1%	17.1%	17.8%
YT	1799	1883	1622	YT	0.3%	0.3%	0.2%
NWT	2813	2894	3007	NWT	0.4%	0.4%	0.5%
NU	2619	2287	1977	NU	0.4%	0.4%	0.3%

## Appendix C - List of Individuals Interviewed, Interview Guides and Interview Summary

F/P/T Working Group		
Date of Interview	Interviewee(s)	PWGSC-GCS consultants Conducting the Interview
August 30 <sup>th</sup> , 2006	<b>Kevin Barnes</b> , Provincial Advisor, Justice and Corrections PEI, Office of the Attorney General – Community and Cultural Affairs, Prince Edward Island	Francine Dubuc & Sonia Desaulniers
September 1 <sup>st</sup> , 2006	<b>Betty-Ann Pottruff</b> , Executive Director, Policy, Planning and Evaluation Branch, Department of Justice, Saskatchewan	Francine Dubuc & Sonia Desaulniers
September 1 <sup>st</sup> , 2006	<b>Michael Thompson</b> , Department of Public Safety and Solicitor General, British Columbia	Francine Dubuc & Sonia Desaulniers
September 6 <sup>th</sup> , 2006	<b>Bob Dufour</b> , Directeur du Laboratoire de sciences judiciaires et de médecine légale, Québec & <b>Frédéric Laberge</b> , Chef de service de l'ADN au laboratoire, Laboratoire de sciences judiciaires et de médecine légale, Québec	Francine Dubuc & Sonia Desaulniers
September 7 <sup>th</sup> , 2006	<b>Mike Quigley</b> , Manager, Municipal Policing, Department of Public Safety, New Brunswick	Francine Dubuc & Sonia Desaulniers
September 8 <sup>th</sup> , 2006	<b>Kevin Begg</b> , Director, Police Services Division, Department of Public Safety and Solicitor General, British Columbia	Francine Dubuc & Sonia Desaulniers
September 11 <sup>th</sup> , 2006	<b>Michelle Turcotte, Manager</b> , Financial Services, Department of Justice, Government of Northwest Territories	Francine Dubuc & Sonia Desaulniers
September 12 <sup>th</sup> , 2006	<b>Koovian Flanagan</b> , Department of Justice, Nunavut & <b>Sgt. Mike Toohey</b> , RCMP, Nunavut	Francine Dubuc & Sonia Desaulniers
September 13 <sup>th</sup> , 2006	<b>Drew Goddard</b> , Community Law Enforcement, Department of Justice, Manitoba & <b>Karen Lamberg</b> , Financial Analyst, Community Law Enforcement, Department of Justice, Manitoba	Francine Dubuc & Sonia Desaulniers

September 19 <sup>th</sup> , 2006	<b>Lesley Carberry</b> , Director of Crime Prevention and Policing, Department of Justice, Yukon	Francine Dubuc & Sonia Desaulniers
September 19 <sup>th</sup> , 2006	<b>Ray Prime</b> , Director, Centre of Forensic Sciences, Ontario <b>Stephanie Reilander</b> , Deputy Director, Centre of Forensic Sciences, Ontario	Francine Dubuc & Sonia Desaulniers
September 28 <sup>th</sup> , 2006	<b>Kathy Collins</b> , Department of the Solicitor General, Alberta	Francine Dubuc & Sonia Desaulniers

<b>Law Enforcement Community</b>		
<b>Date of Interview</b>	<b>Interviewee(s)</b>	<b>PWGSC-GCS Consultants Conducting the Interview</b>
September 25 <sup>th</sup> , 2006	<b>Insp. Ian Grant</b> , Brandon City Police, Manitoba	Francine Dubuc & Sonia Desaulniers
September 29 <sup>th</sup> , 2006	<b>Sgt. R.J. (Bob) Johnson</b> , I/c "M" Division Major Crimes, RCMP, Yukon	Francine Dubuc & Sonia Desaulniers
October 3 <sup>rd</sup> , 2006	<b>Cst. Stu Wyatt</b> , New Westminster Police, British Columbia	Francine Dubuc & Sonia Desaulniers
October 19 <sup>th</sup> , 2006	<b>Alain Cassista</b> , Manager, RCMP Lab, Alberta	Greg Spence & Sonia Desaulniers
October, 25 <sup>th</sup> , 2006	<b>Insp. Luc Beaudoin</b> , Service de police de Gatineau, Québec	Francine Dubuc & Sonia Desaulniers
November 1 <sup>st</sup> , 2006	<b>C/Supt Randy Robar</b> , RCMP, Prince Edward Island	Greg Spence & Sonia Desaulniers
November 2 <sup>nd</sup> , 2006	<b>Chief Al Bodechon</b> , Saint John Police Force, New Brunswick	Greg Spence & Sonia Desaulniers

<b>NDDB Management</b>		
<b>Date of Interview</b>	<b>Interviewee(s)</b>	<b>PWGSC-GCS Consultants Conducting the Interview</b>
October 6 <sup>th</sup> , 2006	<b>Frederick Fromm</b> , A/Director, Integrated Support Services, Forensic Science and Identification Services, RCMP <b>Dr. John Bowen</b> , Director, Investigation and Enforcement Services, RCMP <b>Isabelle Trudel</b> , National DNA Data Bank	Francine Dubuc & Mara Lee McLaren
October 6 <sup>th</sup> , 2006	<b>Dr. Ron Fourney</b> , Director, Research and Development, Forensic Science and Identification Services, and <b>David Bird</b> , Counsel (DoJ) with RCMP	Francine Dubuc & Mara-Lee McLaren

<b>DNA Data Bank Advisory Committee</b>		
<b>Date of Interview</b>	<b>Interviewee(s)</b>	<b>PWGSC-GCS Consultants Conducting the Interview</b>
November 20 , 2006	<b>Richard A. Bergman,</b> Chairperson , National DNA Data Bank Advisory Committee	Greg Spence & Mara Lee McLaren

## **Draft Interview Guide**

### **Second Evaluation of National DNA Data Bank Program and Biology Casework Analysis Agreements**

#### **Members of the Federal, Provincial and Territorial Working Group**

#### **Background Notes**

In 2002, an evaluation of the NDDB and related Biology Casework Analysis (BCA) Agreements was undertaken. The findings of this review led to substantive program changes related to funding, service levels and training. In the spring of 2006, the original Evaluation Framework was updated to cover the key areas of concern relating to the previous evaluation and anticipated developments. Specifically, the original Evaluation Framework was revised to focus on the following key areas:

- Knowledge and experiences gained from the previous mid-term evaluation
- The impact of changes implemented since earlier evaluations (e.g. cost-sharing agreements, funding, forensic service capacity)
- Impact of various legislative changes, past or anticipated
- Impact of potential inclusion of a Missing Persons Index into the Data Bank
- Technological changes impacting costs/service levels

Based on this updated Evaluation Framework, the Department of Public Safety has asked Government Consulting Services (GSC) (formerly Consulting and Audit Canada), PWGSC to undertake a second evaluation of the NDDB program.

The objective of the evaluation is to assess the operation and management of the NDDB program from three areas of investigation: 1) success and impediments to success, 2) cost-effectiveness and management/operational effectiveness, and 3) relevance and strategic issues affecting overall impact. A number of tasks/activities will be carried out as part of the evaluation, including: documentation review, statistical review and analysis, research into experiences of other countries and technological developments, and a series of interviews with Federal/Provincial/Territorial Working Group (FPT Working Group) Members, DNA Advisory Committee members, Department of Justice and Provincial Crowns or Attorneys General, and technical experts.

As a member of the FPT Working Group, you have been identified as a key contact for the evaluation. A GCS consultant will be contacting you shortly to schedule an interview.

The attached interview guide provides further information on the content of the evaluation exercise.

Your participation in this exercise is greatly appreciated.

## **Interview Guide Questions**

Questions are divided into six (6) main areas:

- Population of the Crime Scene Index (CSI)
- Biology Casework Analysis (BCA) Agreements
- Governance of NDDDB Program and BCA System
- Future Lab Capacity
- Other Data Banks
- General

### Population of the Crime Scene Index (CSI)

- 1) To what extent have the changes to the funding formula helped to encourage the population of the CSI (e.g. resolving the downloading of forensic costs to local police forces, removing restrictions on primary offences and increased thresholds for secondary offences)?
- 2) Are the current quotas on secondary submissions adequate (e.g., break and enter files)? What has been the impact of lifting submission restrictions on forensic services?
- 3) To what extent has the capacity of the forensic labs increased? Are capacity constraints still considered a major challenge and in which areas (e.g., turnaround times and backlogs)? Are sufficient resources being provided to support biology casework analysis needs?

### Biology Casework Analysis (BCA) Agreements

- 4) In your view, are the BCA agreements an effective mechanism for encouraging and fostering the population of the Crime Scene Index? Are parties able to live up to their commitments in the agreements? Is the structure easy to work within?
- 5) Is the current scope and duration of the BCAs appropriate?
- 6) To what extent have the BCAs created an administrative burden on different parties?
- 7) To what extent do the BCA agreements remain an appropriate mechanism for dealing with the costs of forensic services? Should the current funding formula be used in the future? In your view, are the funding arrangements for the BCAs equitable for all parties? What improvements can be made? Should consideration be given to combining the BCA agreements with the contract policing agreements? (not relevant for Ontario or Quebec)

### Governance of NDDDB Program and BCA System

- 8) In your view, are roles and responsibilities of the various parties within the NDDDB program clear?

- 9) How effective are the existing governance mechanisms (FPT Steering Committee and DNA Working Group) with regard to the operations of the BCA agreements, forensic services and the NDDDB? Is there a continuing need for these committees or are there other governance/oversight mechanisms that might be more appropriate?
- 10) In your view, is the current location and reporting structure of the NDDDB (within the RCMP organization) appropriate? Is there a more appropriate location/reporting structure for it?
- 11) Has the new funding of the NDDDB, independent of BCA payments, worked successfully? Has it been beneficial for all parties?

#### Future Lab Capacity

- 12) In your view, what has been the impact of past legislative changes (legislative changes resulting from Bill C-13 – e.g. retroactive provisions) on lab capacity? What is likely to be the impact of other legislative changes resulting from Bill C-13 and C-18, a parliamentary review of the DNA legislation, potential new Missing Persons Index (MPI)?
- 13) In your view, what would be the impact of an increase in demand for lab services on BCA Agreements for both contract and non-contract provinces? Should a Missing Persons Index (MPI) be included as part of the BCA agreements? If so, how should this be done?

#### Other Data Banks

- 14) In your view, is the growth of other Data Banks hampering the effectiveness of the NDDDB? To what extent? Should changes be considered to include other types of input, e.g., Child Find, Sex Offender Registry, Sex Trade Workers, victims, etc?

#### General

- 15) Overall, how satisfied are you with the operation of the NDDDB? Have you other comments you would like to make about the NDDDB?
- 16) Overall, how satisfied are you with the operation of the BCA Agreements? Have you other comments you would like to make about the BCA Agreements?

## **Interview Guide**

### **Second Evaluation of National DNA Data Bank Program and Biology Casework Analysis Agreements**

#### **Law Enforcement Community**

##### **Background Notes**

In 2002, an evaluation of the NDDB and related Biology Casework Analysis Agreements (BCAs) was undertaken. The findings of this review led to substantive program changes related to funding, service levels and training. In the spring of 2006, the Department of Public Safety requested that the original Evaluation Framework be updated to focus on the key problems identified in the evaluation, the impact of the changes introduced in response to these findings, and current developments that may impact on the Data Bank and BCA agreements. This work resulted in a more streamlined Evaluation Framework document, which was revised to focus on the following key areas:

- Knowledge and experiences gained from the previous mid-term evaluation
- The impact of changes implemented since earlier evaluations (e.g. cost-sharing agreements, funding, forensic service capacity)
- Impact of various legislative changes, past or anticipated impact of potential inclusion of a Missing Persons Index into the
- Data Bank
- Technological changes impacting costs/service levels

Based on this updated Evaluation Framework, the Department of Public Safety has asked Government Consulting Services (GSC) of PWGSC, (formerly part of Consulting and Audit Canada), to undertake a second evaluation of the NDDB program.

The objective of the evaluation is to assess the operation and management of the NDDB program from three areas of investigation: 1) success and impediments to success, 2) cost-effectiveness and management/operational effectiveness, and 3) relevance and strategic issues affecting overall impact. A number of tasks/activities will be carried out as part of the evaluation, including: documentation review, statistical review and analysis, research into experiences of other countries and technological developments, and a series of interviews with stakeholders.

As part of the law enforcement community, you have been identified as a key stakeholder in this evaluation.

Your participation in this exercise is greatly appreciated.

## **Interview Guide Questions**

Questions are divided into five (5) main areas:

- Population of the Crime Scene Index (CSI)
- Current and Future Lab Capacity
- NDDDB Operations
- Other Data Banks
- General

### Population of the Crime Scene Index (CSI)

- 1) To what extent have the changes to the funding formula (in the Biology Casework Analysis Agreements (BCAs)) helped to encourage the population of the CSI (e.g. resolving the downloading of forensic costs to local police forces, removing restrictions on primary offences and increased thresholds for secondary offences)?
- 2) Are the current quotas on secondary submissions adequate (e.g., break and enter files)? What has been the impact of lifting submission restrictions on forensic services?

### Current and Future Lab Capacity

- 3) To what extent has the capacity of the forensic labs increased? Are capacity constraints still considered a major challenge and in which areas (e.g., turnaround times and backlogs)? Are sufficient resources being provided to support biology casework analysis needs?
- 4) What is likely to be the impact of other legislative changes resulting from Bill C-13 and C-18, a parliamentary review of the DNA legislation, and the potential inclusion of a new Missing Persons Index (MPI)?
- 5) In your view, what would be the impact of an increase in demand for lab services on BCA Agreements for both contract and non-contract provinces? Should a Missing Persons Index (MPI) be included as part of the BCA agreements? If so, how should this be done?
- 6) Which forensic lab does your police agency/unit or detachment interact with most often?
- 7) Within your unit, approximately how many times a year (i.e. number of cases) is biological forensic evidence collected at crime scenes?

8) Are there any reasons why you might not submit biological crime scene evidence for DNA analysis? If yes, what are the reasons?

- Too costly
- Lack of proper training in collection procedures
- Lack of personnel
- Evidence not required for solving case
- Lack of timely response from labs
- Onerous collection procedures
- Submission rules adopted by provincial/territorial government
- Submission rules adopted by forensic lab
- Submission rules adopted by Provincial/Regional Monitoring Committee
- Other (please specify)

9) Are you charged a fee for services rendered by the forensic lab? If you are charged a fee for forensic lab services, who are you charged by? If you are charged directly for forensic lab services, what is the average cost to you per case?

10) Do you make use of private forensic labs? In what circumstances?

#### NDDDB Operations

11) Are privacy and security requirements being adequately addressed in the operation of the NDDDB? e.g., Have there been any lab errors that have resulted in compromised investigations or prosecutions?

12) Are there any capacity or throughput concerns for the NDDDB regarding processing of samples and notification of matches?

#### Other Data Banks

13) In your view, is the growth of other Data Banks hampering the effectiveness of the NDDDB? To what extent? Should changes be considered to include other types of input, e.g., Child Find, Sex Offender Registry, Sex Trade Workers, victims, etc?

#### General

- 14) Overall, how satisfied are you with the operation of the DNA DB?
- 15) Have you other comments you would like to make about the DNA DB?
- 16) Overall, how satisfied are you with the operation of the BCA Agreements?
- 17) Have you other comments you would like to make about the BCA Agreements?

## **Interview Guide**

### **Second Evaluation of National DNA Data Bank Program and Biology Casework Analysis Agreements**

#### **NDDDB Management**

##### **Background Notes**

In 2002, an evaluation of the NDDDB and related Biology Casework Analysis Agreements (BCAs) was undertaken. The findings of this review led to substantive program changes related to funding, service levels and training. In the spring of 2006, the Department of Public Safety requested that the original Evaluation Framework be updated to focus on the key problems identified in the evaluation, the impact of the changes introduced in response to these findings, and current developments that may impact on the Data Bank and BCA agreements. This work resulted in a more streamlined Evaluation Framework document, which was revised to focus on the following key areas:

- Knowledge and experiences gained from the previous mid-term evaluation
- The impact of changes implemented since earlier evaluations (e.g. cost-sharing agreements, funding, forensic service capacity)
- Impact of various legislative changes, past or anticipated impact of potential inclusion of a Missing Persons Index into the
- Data Bank
- Technological changes impacting costs/service levels

Based on this updated Evaluation Framework, the Department of Public Safety has asked Government Consulting Services (GSC) of PWGSC, (formerly part of Consulting and Audit Canada), to undertake a second evaluation of the NDDDB program.

The objective of the evaluation is to assess the operation and management of the NDDDB program from three areas of investigation: 1) success and impediments to success, 2) cost-effectiveness and management/operational effectiveness, and 3) relevance and strategic issues affecting overall impact. A number of tasks/activities will be carried out as part of the evaluation, including: documentation review, statistical review and analysis, research into experiences of other countries and technological developments, and a series of interviews with stakeholders.

As part of the law enforcement community, you have been identified as a key stakeholder in this evaluation.

Your participation in this exercise is greatly appreciated.

## Interview Guide Questions

Questions are divided into six (6) main areas:

- Population of the Crime Scene Index (CSI)
- Biology Casework Analysis (BCA) Agreements
- NDDDB Operations
- Governance of NDDDB Program and BCA System
- Future Lab Capacity
- Other Data Banks
- General

### Population of the Crime Scene Index (CSI)

1) To what extent have the changes to the funding formula (in the Biology Casework Agreements (BCAs)) helped to encourage the population of the CSI (e.g. resolving the downloading of forensic costs to local police forces, removing restrictions on primary offences and increased thresholds for secondary offences)?

2) Are the current quotas on secondary submissions adequate (e.g., break and enter files)? What has been the impact of lifting submission restrictions on forensic services?

3) To what extent has the capacity of the forensic labs increased? Are capacity constraints still considered a major challenge and in which areas (e.g., turnaround times and backlogs)? Are sufficient resources being provided to support biology casework analysis needs?

### Biology Casework Analysis (BCA) Agreements

4) In your view, are the BCA agreements an effective mechanism for encouraging and fostering the population of the Crime Scene Index? Are parties able to live up to their commitments in the agreements? Is the structure easy to work within?

5) Is the current scope and duration of the BCAs appropriate?

6) To what extent have the BCAs created an administrative burden on different parties?

7) To what extent do the BCA agreements remain an appropriate mechanism for dealing with the costs of forensic services? Should the current funding formula be used in the future? In your view, are the funding arrangements for the BCAs equitable for all parties? What improvements can be made? Should consideration be given to combining the BCA agreements with the contract policing agreements? (not relevant for Ontario or Quebec)

### NDDDB Operations

- 8) Are privacy and security requirements being adequately addressed in the operation of the NDDDB? e.g., Have there been any lab errors that have resulted in compromised investigations or prosecutions?
- 9) Are there any capacity or throughput concerns for the NDDDB regarding processing of samples and notification of matches?
- 10) Is there a monitoring and quality assurance system in place for the NDDDB and if so, how well is it working?
- 11) Is the use of accredited private laboratories for DNA analysis impacting the effectiveness of the Crime Scene Index (e.g., data integrity and quality assurance)? Extent of use?

### Governance of NDDDB Program and BCA System

- 12) In your view, are roles and responsibilities of the various parties within the NDDDB program clear?
- 13) How effective are the existing governance mechanisms (FPT Steering Committee and DNA Working Group) with regard to the operations of the BCA agreements, forensic services and the NDDDB? Is there a continuing need for these committees or are there other governance/oversight mechanisms that might be more appropriate?
- 14) In your view, is the current location and reporting structure of the NDDDB (within the RCMP organization) appropriate? Is there a more appropriate location/reporting structure for it?
- 15) Has the new funding of the NDDDB, independent of BCA payments, worked successfully? Has it been beneficial for all parties?

### Future Lab Capacity

- 16) In your view, what has been the impact of past legislative changes (legislative changes resulting from Bill C-13 – e.g. retroactive provisions) on lab capacity? What is likely to be the impact of other legislative changes resulting from Bill C-13 and C-18, a parliamentary review of the DNA legislation, potential new Missing Persons Index (MPI)?
- 17) In your view, what would be the impact of an increase in demand for lab services on BCA Agreements for both contract and non-contract provinces? Should a Missing Persons Index (MPI) be included as part of the BCA agreements? If so, how should this be done?

18) What role will (or has) automated processing (robotics) or other technological developments play in reducing costs or expanding capacity of forensic services? e.g., reducing need for BCAs or changing provisions in the agreements.  
enhancing forensic capabilities and removing impediments

#### Other Data Banks

19) In your view, is the growth of other Data Banks hampering the effectiveness of the NDDDB? To what extent? Should changes be considered to include other types of input, e.g., Child Find, Sex Offender Registry, Sex Trade Workers, victims, etc?

#### General

The current evaluation also includes a research component into new developments in DNA analysis and more specifically costs of DNA analysis. To your knowledge, are there specific resources (documentation and / or individuals) that the project team should review / contact?

## **Interview Guide**

### **Second Evaluation of National DNA Data Bank Program and Biology Casework Analysis Agreements**

#### **National DNA Data Bank Advisory Committee**

1. What is your role on the Advisory Committee?
2. How effective are the existing governance mechanisms (FPT Steering Committee and DNA Working Group) with regard to the operations of the BCA agreements, forensic services and the NDDDB? Is there a continuing need for these committees or are there other governance/oversight mechanisms that might be more appropriate?
3. In your view, what is likely to be the impact of other legislative changes resulting from Bill C-13 and C-18, a parliamentary review of the DNA legislation, and the potential inclusion of a new Missing Persons Index (MPI)?
4. Are there any technological developments that may significantly impact the operation of the NDDDB (e.g Mini-STR)?
5. *Perhaps the most pressing issue coming out of our evaluation is the persistent bottleneck in forensic services. We strongly believe that for the program to be successful, all parties need to make sure that if this bottleneck gets 'fixed' there isn't simply another bottleneck somewhere that may make any improvements a waste of time and/or money. Since forensic services was not in the scope of the current evaluation, we are proposing the idea of the need for a more in-depth review of forensic services in general, to determine optimal role, service delivery approach, and appropriate funding, to maximize societal benefits within context of overall criminal justice system.*
  - a. Do you agree with such a review? Are there other issues or topics which could be reviewed for future evaluations? Would it be worthwhile considering the experiences of other countries, such as the UK or US?

## **Interview Summary**

### **Second Evaluation of National DNA Data Bank Program and Biology Casework Analysis Agreements**

#### **Background**

As part of the Second Evaluation of the National DNA Data Bank (NDDDB) and Biology Casework Analysis (BCA) Agreements, interviews were held with representatives of the Federal / Provincial / Territorial Working Group, the Chairperson of the National DNA Data Bank Advisory Committee, individuals responsible for the management of the National DNA Data Bank and the RCMP forensic laboratories as well as some technical experts. Given the relatively small response rate (9.6%) to the survey of law enforcement agencies conducted during the first evaluation of the National DNA Data Bank program conducted in 2002, targeted interviews were conducted with a select number of representatives of law enforcement agencies. In some cases, others were invited to take part in the interviews, as the interviewee felt appropriate.

Interviews were scheduled between the end of August and November, 2006. Most interviews were conducted by telephone, although the occasional interview was conducted in person.

Based on the updated evaluation framework, customized interview guides for each category of stakeholders was designed by PWGSC. All guides were approved by DPS and shared with potential interviewees prior to conducting interviews.

#### **Findings**

##### A) Success and Impediments to Success

###### A1) National DNA Data Bank

All provinces and territories agree that the DNA Data Bank is a success and that it constitutes a useful and powerful tool for law enforcement. However, to ensure its continued success, forensic lab capacity needs to be increased, backlogs need to be eliminated and turnaround times need to be improved.

###### A2) BCA Agreements

Most contract provinces and territories feel that, short of centrally funded services such as fingerprinting, BCA Agreements are an adequate mechanism for fostering the population of the CSI although quotas and funding are clearly inadequate. Some indicated that this need will not go away but will only increase; consequently, more permanent solutions need to be found. Ontario felt that these agreements are more geared to RCMP needs than their own.

Most provinces, including Quebec and Ontario, agree that the new funding formula has helped to encourage the population of the CSI. Only one contract province, New-Brunswick, continues to download costs but interviews with law enforcement agencies in that province indicate that this is not a deterrent to submitting cases for analysis. However, almost unanimously, contract provinces (except New Brunswick) indicated that quotas on secondaries allocated via the BCAs are insufficient. In some instances, contract provinces reach their quotas after only a few months.

Capacity constraints continue to exist for all provinces, including Quebec and Ontario, and include long turnaround times and backlogs. The Ontario lab indicated that average turnaround is 83 to 85 days and they have a stable backlog from year to year. The Quebec lab indicated that turnaround times vary from 3 to 5 months. Almost unanimously, contract provinces and territories and law enforcement representatives indicated that, although turnaround times are usually quite long. The RCMP confirmed that the turnaround times can reach 120 days. Almost unanimously interviewees indicated that the urgency of cases could always be discussed with lab officials and that time sensitive cases were usually dealt with on a priority basis. Two provinces indicated that law enforcement agencies have, on rare occasions, made use of private labs when turnaround times were an issue; this was confirmed by law enforcement agencies in both provinces.

Contract provinces and territories indicated that the RCMP have adopted a policy restricting the number of samples per case that can be provided (6 to 8). Some contract provinces and some law enforcement representatives indicated that they use specialists to determine which samples are to be submitted to the labs and all labs indicated that they triage samples submitted based on professional opinion and likelihood of finding DNA to maximize results. The Ontario lab indicated that they have a streamlined process for large volume requests such as B&Es whereby they limit the number of exhibits, standardize and automate processing of samples, assign dedicated staff and offer training on taking swabs to law enforcement officers. As a result, they are able to guarantee a four week turnaround time.

Some provinces and territories feel that the BCAs are not equitable. Some indicated that the funding formula does appropriately take into account the crime rates and nature of crimes. Others feel that they are paying more than they should and that the subsidies between contract provinces and territories and the other two other provinces are not fair.

## B) Cost-effectiveness and Management / Operational Effectiveness

### B1) NDDDB Operations

Interviews with individuals responsible for the management of the National DNA Data Bank indicated that there have been no privacy or security incidents or any lab errors resulting in comprised investigations or prosecutions and that the legislation has successfully met a court challenge regarding privacy.

The same individuals indicated that there are no capacity constraints even with the retroactive provisions of the new legislation. In fact there is, most likely, sufficient capacity to deal with the entire workload associated with the new legislation.

## B2) Governance of the NDDDB Program and BCA System

Most provinces and territories indicated that roles and responsibilities of the various stakeholders are clear although perceptions of what these were varied depending on the interviewee. A few felt that roles and responsibilities could be specified.

Some provinces and territories, although they are aware of the FPT Steering Committee, are unsure as to how useful this committee is. Some believe it meets rarely and some have never seen any record of deliberations. However, most feel that the Working Group is useful; some would like to see its role expanded to include more involvement in the operations of the forensic labs. Some also feel that it should convene more often and occasionally meet face to face as opposed to simply via conference call.

Few contract provinces and territories created an Implementation Committee as stipulated in the current BCA Agreements. One province that had created one indicated that they would like to see this committee reinstated since it played a pivotal role in adequately preparing for the Working Group meetings.

Smaller contract provinces and territories indicated that they do not want to increase the number of committees nor the frequency of meetings since the commitment required would far exceed the potential benefits. Some also indicated that they would not likely attend face to face meetings.

The Quebec lab indicated that they would like to see data from other labs in order to identify best practices and set benchmarks. Furthermore they would like opportunities to meet, ideally in person, with their Canadian counterparts in other labs to discuss productivity, service quality and other challenges as they arise.

Most provinces and territories feel that the current location and reporting structure of the National DNA Data Bank within the RCMP organization is adequate. One contract province indicated specifically that the National DNA Data Bank should be part of the RCMP. However, the Province of Quebec would prefer to see the NDDDB housed within a body independent of law enforcement.

## B3) BCAs

Quebec indicated that without the funding provided through the BCA Agreement, it would not have been able to acquire robotics technology and more qualified staff. Ontario also indicated that the funding formula had allowed them to hire additional resources. Administratively, the new funding formula also makes it easier for contract provinces and territories to budget. The only administrative burden identified was the actual negotiation of the agreements themselves

which require significant effort and must be done every three years. There were varying opinions as to the optimal duration of the agreements. Although some indicated that they should be longer to bring stability (a duration of five years was most often suggested), others felt that if negotiations began sooner in the process and were quicker, the current three year duration would be appropriate. Most contract provinces and territories like the option to renew for an additional year.

As for using the same funding formula in the future, most contract provinces agreed that it is was acceptable if overall funding was increased. The Quebec lab would like a funding formula similar to that used for Ontario.

All provinces and territories believe that funding for the NDDB separate from the funding allocated for forensic work is a good idea. However, the Quebec lab cited the lack of funds for particular equipment and supplies required to upload samples to the NDDB as an issue.

### C) Relevance and Strategic Issues Affecting Overall Impact of NDDB Program

#### C1) Future Lab Capacity

Most provinces and territories indicated that they have been able to manage the increase in workloads attributable to the past legislative changes such as the retroactive provisions. However, all contract provinces estimate that the impact of other legislative changes resulting from Bill C-13 and C-18 will be significant with increased turnaround times and backlogs. One contract province indicated that, without additional capacity, RCMP forensic labs will be forced to further prioritize work. The Quebec lab estimates an increase of 20% to 25% over 3 to 4 years with the inclusion of more primary offences. The Ontario lab conducted a similar study as the RCMP and also estimated significant increases.

Notwithstanding differing opinions (legal, ethical and privacy issues) as to whether a Missing Persons Index (MPI) should be added to the National DNA Data Bank, most interviewees felt that if the work associated with this index was added to the current lab work, it would push the system beyond the breaking point. The Ontario lab specifically indicated that they would not do lab work associated with the MPI since they exist for public safety purposes not humanitarian purposes. There was general consensus that the inclusion of an MPI should not be funded via the BCA Agreements but funded centrally. Some contract provinces indicated however that if this index was to be funded through BCA Agreements, they would have to be separate agreements than the current ones.

#### C2) Forensic Costs

As stated previously, there have been general expectations that the average cost per case for DNA analysis might significantly drop in the near future due to technological developments such

as robotics. The FLS indicated that the introduction of robotics did achieve some economies that enabled them to increase their capacity to approximately 2,400 cases per year.

Interviews with the management of the NDDDB and forensic laboratories indicated that other factors have contributed to costs remaining high. For example, the bulk of the costs relate more to the human side of operations, with technological improvements having little impact in total costs. As well, the costs of collection kits required by both the NDDDB and the forensic labs to prepare blood samples for DNA analysis have increased substantially in recent years (i.e. 40%). Each kit now costs approximately \$4,500.

The Quebec Lab indicated that although they received increased contributions through the current BCA Agreements, their unit costs did not change and they simply processed more cases.

### C3) Technological Development

The Quebec lab indicated that there is new technology on the horizon and should Canadian labs adopt this new technology, they would incur significant investment costs. They would like to see a coordinated approach to transitioning to any new technology.

### C4) Continuing Relevance of BCA Agreements

BCA Agreements are a source of essential funding for the provinces of Ontario and Quebec. As for the contract provinces and territories there were varying opinions as to whether BCA Agreements could be folded into the Contracting Policing Agreements. Although some believed it is a natural and logical fit, others felt that it would be too complex to integrate the two. Some also felt that there are still many issues to resolve regarding DNA Biology Casework Analysis and they were uncomfortable with losing the little control they feel they have with the current BCA Agreement structure. Others had never considered this possibility and therefore had no opinions to offer.

### C5) Grey Data Banks

In general, interviewees felt that the growth of grey data banks had no impact on the effectiveness of the NDDDB. For the time being, these do not draw on the same resources and therefore are not hampering the operations of the NDDDB in any way. Interviewees had differing opinions as to whether grey data banks could help the NDDDB because of very different, and sometimes opposing, purposes as well because of legal, ethical and privacy issues. Interviewees cautioned against the adoption of additional national data banks that would draw on the same resources which could then seriously hamper the effectiveness of the NDDDB as it stands today.

## Appendix D – Research

### Second Evaluation of National DNA Data Bank Program and Biology Casework Analysis Agreements

#### Documents Attached

- (1) Summary of findings from research undertaken of international websites
- (2) Summary of Report “USA: Advancing Justice through DNA Technology (full report at [www.usdoj.gov/ag/dnapolicybooktoc.htm](http://www.usdoj.gov/ag/dnapolicybooktoc.htm))

#### U.K. Websites

- Postnote: (Overview of) The National DNA Database, February 2006 Number 258: at [www.forensic.gov.uk/forensic\\_t/inside/news/docs/postpn258.pdf](http://www.forensic.gov.uk/forensic_t/inside/news/docs/postpn258.pdf)
- Forensic Science Service: [www.forensic.gov.uk](http://www.forensic.gov.uk)
  - Annual Report and Accounts
- Parliamentary Office of Science and Technology: [www.parliament.uk/parliamentary\\_offices/post/pubs2006.cfm](http://www.parliament.uk/parliamentary_offices/post/pubs2006.cfm)
- Home Office Crime Reduction Website: : [www.crimereduction.gov.uk](http://www.crimereduction.gov.uk)
  - Home Office Strategic Plan
  - DNA Expansion Programme 2000-2005: Reporting Achievement (October 2005)
  - The National DNA Database Annual Report(s)

(Appendix D Document 1.)

## DNA Data Banks – Experiences of other countries

### The New York State DNA Databank:

<http://www.criminaljustice.state.ny.us/forensic/dnabrochure.htm>

[https://www.troopers.state.ny.us/Forensic\\_Science/DNA/How\\_the\\_Databank\\_Works/](https://www.troopers.state.ny.us/Forensic_Science/DNA/How_the_Databank_Works/)

The New York State DNA Databank is a computerized collection of DNA descriptions or 'profiles' derived from DNA samples of designated convicted offenders and DNA crime scene evidence from unsolved cases. Under New York State law, all convicted violent felony offenders are required to provide DNA samples for inclusion in the New York State DNA Databank. The DNA Databank is maintained at the New York State Police Forensic Investigation Center in Albany. The NYS DNA Databank became fully operational in April 2000.

The New York State DNA Databank uses computer software supplied by the Federal Bureau of Investigation (FBI). Known as *CODIS* for COMbined DNA Index System, this service, used in more than 160 laboratories across the country, allows New York's DNA to upload their state DNA data to the FBI's National DNA Index System.

With CODIS, DNA profiles of individuals convicted of designated offenses under our state law, such as rapes and homicides are compiled into a Convicted Offender Index.

Since January 1, 1996, the law in New York State has required offenders convicted of certain felonies to submit biological samples (formerly blood and more recently buccal samples swabbed from the inside of the cheek) for DNA profiling through laboratory analysis.

DNA profiles developed from crime scene evidence are maintained in a separate Forensic Index, which is routinely compared against the Convicted Offender Index to identify suspects in unsolved cases. Profiles in the Forensic Index also are regularly compared against each other to link serial crimes that may have otherwise gone undetected, and to connect solved cases with unsolved ones.

Access to the State DNA Databank is made through an accredited local or state DNA Databank crime laboratory. When a law enforcement agency submits biological evidence to the laboratory for analysis, the lab uploads DNA profiles into the State DNA Databank, compares its test results with data from the Convicted Offender and Forensic Indexes, and reports the results to the submitting agency. DNA profiles from the New York State DNA Databank are uploaded to the National Index, where the data are searched against DNA profiles submitted by other participating states.

### DNA Databank Statistics (last updated 7/10/2006)

<b>Total Number of Offender Samples Collected and Approved for Analysis</b>	<b>181,650</b>
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Subject Index Samples collected and approved for analysis	13,910
Designated Offender samples collected and approved for analysis	167,740
<b>Total Number of Offender Samples Analyzed</b>	<b>163,806</b>
Subject Index Samples Analyzed	4,370
Designated Offender Samples analyzed	159,436
Number of Forensic Samples (crime scene) in State DNA Index System (SDIS)	18,051
<b>Total Number of Offender Hits</b>	<b>2,532</b>
Subject Index Hits	25
Designated Offender Hits	2,507
Number of Forensic Case to Case Hits (State)	135
Number of National Hits: (Offender and Forensic)	533
Number of International Hits	

**DNA Database Using CODIS Software<sup>6</sup>**

The Federal Bureau of Investigation introduced a new tool for fighting violent crime: the National DNA Index System (NDIS), in October 1999. NDIS is a collaborative effort among federal, state, and local law enforcement agencies. NDIS enables public forensic laboratories throughout the United States to exchange and compare DNA profiles electronically, thereby linking unsolved serial violent crimes to each other and to known sex offenders. As of June 1998, all fifty states have passed legislation requiring convicted offenders to provide samples for DNA data basing. These states have collected over 700,000 DNA samples and analyzed more than 300,000. All fifty states have been invited to participate in NDIS and it is expected that all states will contribute both their convicted offender and forensic DNA profiles to NDIS.

As of September 1999, 18 states and one Federal laboratory have completed all procedures to participate in NDIS and these are: California, Connecticut, the FBI, Florida, Georgia, Illinois, Kentucky, Maine, Maryland, Minnesota, Missouri, North Carolina, Oregon, Pennsylvania, South Carolina, Texas, Utah, Virginia and Wisconsin. An additional 17 states and one additional Federal laboratory (the U.S. Army Crime Laboratory) have initiated paperwork to participate in NDIS.

The FBI Laboratory's Combined DNA Index System (CODIS), which began as a pilot project in 1990, serving fourteen state and local DNA laboratories, blends forensic science and computer technology into an effective tool for solving violent crimes. CODIS uses two indexes to generate investigative leads in crimes where biological evidence is recovered from the crime scene. The Convicted Offender Index contains DNA profiles of individuals convicted of felony sex offences (and other violent crimes). The Forensic Index contains DNA profiles developed

<sup>6</sup> <http://www.interpol.int/public/Forensic/dna/conference/DNADb01.asp>

from crime scene evidence, such as semen stains or blood. CODIS utilizes computer software to automatically search these indexes for matching DNA profiles.

As of September 1999, CODIS is installed in over 100 criminal justice laboratories in forty-four states and the District of Columbia. Approximately four hundred forensic examiners representing 80 laboratories throughout the US have received CODIS training. The FBI provides CODIS software, together with installation, training, and user support, free of charge to any state and local law enforcement laboratories performing DNA analysis. In addition, the FBI continues to fund new software development initiatives thereby enhancing CODIS software capabilities. A new version of CODIS is currently under development and is scheduled for release in mid-2000.

Ultimately, the number of crimes it helps to solve will measure the success of the CODIS program and the calibre of assistance it provides to law enforcement and laboratory personnel. CODIS's primary metric, the "Investigation Aided," is defined as a case/investigation that CODIS assisted through a "hit" (a match produced by CODIS that identifies a potential suspect or links violent crimes together which would not otherwise have been developed). To date, CODIS has produced more than 400 hits that have aided hundreds of investigations.

**Forensic Science Service (FSS) - UK:**

<http://www.forensic.gov.uk/>

The Forensic Science Service (FSS) enjoys a reputation as one of the world's leading providers of forensic science, based on impartiality and quality.

The purpose of the FSS is to serve the administration of justice principally by providing scientific support in the investigation of crime and expert evidence to the courts. It aims to do so with efficiency, effectiveness and economy.

The FSS provides a national service to the 43 police forces in England and Wales, other police forces such as the Ministry of Defense Police and British Transport Police, as well as the Crown Prosecution Service, and Customs and Excise. In addition, it also offers services to private, public and overseas customers. The FSS continues to work in partnership with its customers to ensure the contribution of forensic science to the prevention and detection of crime is maximized. This partnership continues to strengthen.

It operates from six laboratories across the country - Birmingham, Chepstow, Chorley, Huntingdon, London and Wetherby - and employs around 1800 staff. The FSS maintains its quality accreditation (UKAS NAMAS M10 and BS EN ISO 9000 series) and continues to extend it to new scientific areas.

For the past 30 years it has run a research facility which has been responsible for many significant forensic science breakthroughs and innovations - particularly in the application of DNA technology.

The FSS pioneered the use of DNA profiling in forensic science and set up the world's first national criminal intelligence DNA Database - launched in April 1995. The Database matches DNA samples from scenes of crime and matches them with individuals or other crimes. There are around **700** matches per week from the Database, with more than a 40 percent chance of a stain found at a crime being matched to a name.

As the first organisation in the world to develop a national criminal DNA database, the FSS can share its experience and knowledge with other countries looking to do the same and through a range of DNA software and consultancy.

*Predictive capacity*<sup>7</sup>

The recent UK *Police Science & Technology Strategy 2003-2008* asserts the commitment to develop the capacity for 'identifying offender characteristics from DNA'. The FSS have been investigating the possibility of predicting physical characteristics of individuals for some time. They have created a 'Red Hair database' which claims to identify '84% of redheads', and they now offer the police an 'ethnic inference service' which claims the capacity to discern - with unknown degrees of certainty - ethnic origin from DNA profiles. The FSS are currently researching the identification of a range of other phenotypical traits, such as facial characteristics, height and eye

<sup>7</sup> <http://www.dur.ac.uk/p.j.johnson/eu.html>

colour. These ambitions are also becoming linked to another important, and quickly expanding, way of ascertaining identifying characteristics from DNA afforded by 'haplotype mapping' – for example, in the Y-STR database which is concerned to make an 'assessment of male population stratification among European and world-wide populations'. All of these technological developments involving the interrogation of the 'coding regions' of the human genome raise new policy and ethical issues for those involved in the use of genetic information for crime investigation.

**The New Zealand National DNA Databank:**

<http://www.esr.cri.nz/competencies/forensicscience/dna/DNAatabank.htm>

In 1995, a joint venture project involving the New Zealand Police and ESR was undertaken to create a National DNA Databank.

This involved the collection of DNA profiles from convicted offenders and volunteers onto a central database to be administered by ESR on behalf of the New Zealand Police. The database is matched against DNA profiles obtained from unsolved crimes in an attempt to identify any individual that could be linked to an offence through biological material left at the crime scene.

New Zealand was only the second country in the world to create a National DNA Database, and this proactive approach to crime has resulted in a high success rate in producing valuable leads for unsolved cases.

For the DNA Databank to be created existing legislation was amended and the Criminal Investigations (Blood Samples) Act 1995 was passed.

### **The CI(BS) Act**

The Criminal Investigations (Blood Samples) Act 1995 was formulated after considering opinions from members of the Police, legal and scientific communities. The Act was amended in 2003, largely to accommodate the progress that had been made in forensic DNA technology in the intervening eight years. The revised Act is titled the Criminal Investigations (Bodily Samples) Act 1995 and it allows DNA samples gained from buccal, or mouth, swabs to be included on the Databank, where previously only blood samples were permitted.

The Act was designed with a strong focus on the rights of the individual and places rigorous requirements on the police as investigators and collectors of samples and on ESR as custodians of the Databank. The original act took effect on 12 August 1996 and covers in detail the submission of reference blood samples from the following people:

- suspects in any criminal investigation who volunteer a DNA sample for comparison with that particular investigation and/or inclusion on the DNA Databank;
- all persons convicted of a relevant offence for which a Databank request is made;
- any individual who volunteers a DNA sample to be included on the Databank;
- suspect and/or Databank samples that are obtained by compulsion.

Individuals who submit blood samples to the DNA Databank are asked to voluntarily provide detailed ethnic information that indicates ancestry over a period of four generations. This

provision has been included in the Act to enable ESR to compile accurate sub-population data for statistical use within New Zealand.

Issues such as security, confidentiality, disclosure, sample storage, and destruction and deletion of samples are addressed in detail in the Act.

ESR and the New Zealand Police comply with all requirements of the CI(BS) Act in full in order to maintain the integrity of the DNA Databank as a forensic investigative tool.

### **The DNA Databank as a Crime-Solving Tool**

Since the operational beginning of the DNA Databank in 1996, over **62,640** individual profiles have been completed to the National DNA Database (NDD). This figure is currently increasing at a rate of approximately **800-1000** samples per month.

The analysis of unsolved crimes, for comparison with the NDD, began in June 1998. Since then, over **13,900** crime sample profiles from unsolved cases have been completed to the Crime Sample Database (CSD) at the rate of approximately 200 profiles per month.

Of all DNA profiles loaded from unsolved cases, approximately **58%** match an individual present on the NDD. In addition, approximately **34%** of unsolved crimes loaded match other crimes present on the CSD. The DNA Database has provided intelligence links to the New Zealand Police for over **5,000** previously unsolved cases. These figures are among the highest in the world and demonstrate the effectiveness of the DNA Databank as a crime-solving tool.

The concept of the DNA Databank as a crime-solving tool was strategically directed at a number of areas of criminal activity. A primary aim of the intelligence information generated by the DNA Databank is to significantly reduce volume crimes (such as burglary). Of the total number of reported links, approximately 75-80% have originated from burglaries.

A significant reason for targeting volume crime was the well-documented observation that many rapists are also burglars. In addition to this, a major feature of the Databank is its ability to link not only crimes to individuals but also crimes to other crimes that might have been previously thought to be unrelated. This can greatly assist Police in their investigation of crime. One Databank link connected a male individual to a burglary, an aggravated robbery, and a rape. The individual was apprehended and subsequently charged in connection with seven separate incidents, to which he pleaded guilty. Several other successful links have involved homicide and rape cases.

Another aim of the DNA Databank as a crime-fighting tool was to assist in the investigation of historic cases which had remained unsolved for many years. Many of these cases were originally analysed using techniques that lack the sensitivity of modern DNA profiling methods, or, depending on their age, were not analysed for DNA at all. This often meant that vital evidence was not detected and not used in the case.

The development of the DNA Databank has been a complex process which has included:

- the formulation of detailed legislation;
- the customisation and ongoing modification of specific database software; and
- the development of streamlined administrative and laboratory practices.

The *Criminal Investigations (Blood Samples) Act 1991* (NZ) permits the taking of blood samples for DNA profiling from suspects and certain convicted offenders, by consent or court order. A sample may be taken from a person suspected of an indictable offence by informed consent. If consent is withheld, a court may order the taking of a blood sample is satisfied of specified matters, including that a crime scene sample is available for matching and, in all the circumstances, it is reasonable to make the order. In addition, persons convicted of specified offences may be subject to a court order to provide a blood sample for the database.<sup>8</sup>

The Institute of Environmental Science and Research (ESR) administers the national DNA databank on behalf of the New Zealand police. The databank contains suspects and offenders profiles, which are matched against a crime sample database.

**Israel - Forensic Biology Laboratory:** [http://www.police.gov.il/english/AboutUs/Structure/01\\_mazap\\_rep2000.asp](http://www.police.gov.il/english/AboutUs/Structure/01_mazap_rep2000.asp)

The Forensic Biology laboratory employs its expertise on items of evidence contaminated by a variety of biological materials. The bulk of material tested in the lab results from blood and semen stains, but saliva, hair samples and botanical specimens are also analyzed.

The laboratory first identifies the source of material found on items of evidence to be tested. If the source is of human origin, an analysis is then performed to determine a genetic profile. This profile helps define the sample's unique characteristics, enabling a further comparison to be carried out with reference samples from the involved parties.

The 2000 Annual Report reflects the routine activities carried out in the laboratory, in addition to topics of research and development. The report is divided into chapters which summarize the day-to-day procedures upon receiving material from the field of investigations, the assistance given to detectives and the prosecution, and other varied activities pertaining to work in the lab.

During this year, the laboratory underwent major renovations. The outcome justified the hardship of carrying out work under such difficult conditions. In addition to a physical renovation, they incorporated new, up-to-date methods of analysis. These new tests increase the weight of evidentiary proof provided to the detectives and prosecutors handling the cases<sup>9</sup>.

### **Statistics Regarding Cases**

#### **General Statistics:**

**585** cases were received during the year 2000.

An average of **49** cases was received per month.

Diagram 1 represents the number of cases received in the laboratory over the last four years. Commencing from the middle of 1999, cases containing Cannabis seeds were no longer routinely analyzed. This resulted in a loss of 1/5 to 1/4 of the number of cases registered to our laboratory

<sup>8</sup> <http://www.austlii.edu.au/au/other/alrc/publications/dp/66/34ForensicUseofGeneticInformation.rtf>

<sup>9</sup> Idem

**Diagram 1 - Cases registered in the Biology Lab for the period 1997-2000.**

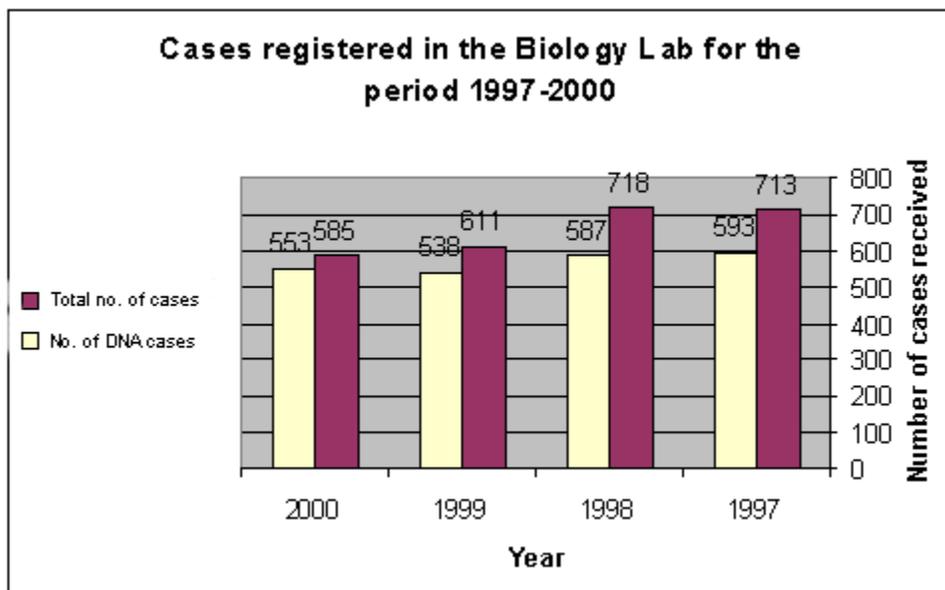


Table 1 describes the distribution of cases according to the type of crime committed (defined by the detective's accompanying letter). It is important to note that the relative percentage of cases registered in the lab, regarding a specific type of crime, does not necessarily reflect the percentage of these crimes registered in the Israeli Police. The table reflects only those cases where items of evidence were received by the lab. As seen in the table, sexual assault cases constitute the bulk of cases.

**Table 1 - Distribution of cases according to type of Crime.**

Crime	No. of cases	%
Murder and attempted murder	15	2.6
Sexual crimes	297	50.8
Assault and Battery Crimes	164	28.0
Property Crimes	73	12.5
Drug Crimes	32	5.5
Attacks on Live stock	1	0.2
Proficiency testing	3	0.5
Total	585	100.1

Table 2 shows the distribution of required examinations as defined by the detective's accompanying letters. As seen from the table, requests for blood and semen examinations comprise 85% of the total. Of the two examinations, semen analysis was required more than blood analysis. The number of yearly examinations requested exceeds the number of cases registered in the lab, because each case may require more than one type of examination.

**Table 2 - Distribution of Required Examinations.**

Required examination	No. of exam.	Percentage
Blood	212	35.9

Semen	288	48.8
Saliva	56	9.5
Hair	2	0.3
Plants	31	5.3
DNA	1	0.2
Total	590	100.0

**Australian Federal Police (AFP):** <http://www.afp.gov.au/services/operational/forensics>

The Australian Federal Police (AFP) was established in 1979 as an amalgamation of the then Commonwealth Police and the Australian Capital Territory Police. The AFP is the principal law enforcement agency through which the Commonwealth of Australia pursues its law enforcement interests. The AFP is unique in Australian law enforcement in that its functions relate both to community policing in the Australian Capital Territory (ACT) and to investigations of offences against the Commonwealth both in Australia and overseas. The AFP has a national head office in Canberra and six regional offices - Adelaide (Central Region), Brisbane (Northern Region), Canberra (ACT Region), Melbourne (Southern Region), Perth (Western Region) and Sydney (Eastern Region). Liaison officers are located in 13 countries and a representative is attached to Interpol in France. The AFP's mission is 'To provide dynamic and effective law enforcement to the people of Australia'.

Forensic Services provides a full range of forensic support to the AFP and to other government agencies in Australia. This support includes crime scene examination, tool marks, firearms and ballistics, fingerprints (detection and identification), biology (serology and DNA), document examination, and criminalistics (fibres, paint, glass, fire debris analysis, explosive residue detection, vehicle examinations, etc.). The main Forensic Services laboratory is located in Canberra, with smaller forensic teams located in each of the AFP's regional offices. Forensic Services obtained laboratory accreditation in 1996 with both the National Association of Testing Authorities (NATA), Australia, and the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB). The Forensic Services' mission is 'to provide services that are fault-free, timely, and independently based on the sound application of scientific method.'

#### **Technology used**

All Australian forensic laboratories regularly involved in criminal casework use a profiling kit known as Profiler Plus. This kit uses the Polymerase Chain Reaction (PCR) method, involving extraction of the DNA from the sample, amplification, and analysis to create the DNA profile. The profile comprises a set of numbers and an indicator of sex. A typical example of a DNA profile looks like 'XY 10,12 18,19 14,14 15,16 25, 28 16,12 11,10 29,30 17,18'. The numbers indicate the number of short tandem repeats (STRs) found at nine sites, or loci, along the DNA molecule. There are two sets of numbers for each loci, one inherited from each parent.<sup>10</sup>

CrimTrac's National Criminal Investigation DNA Database contains profiles from samples collected at crime scenes and from convicted offenders. In some circumstances, profiles from suspects and volunteers may be compared with other profiles on the database. The database provides Australian police and forensic scientists with a powerful investigative tool.

It enables police and forensic scientists to:

- compare DNA profiles from crime scenes with profiles of convicted offenders, so immediately identifying potential suspects where matches occur;
- compare DNA profiles from convicted offenders, and where legislation allows, suspects, with profiles from unsolved crime scenes for which they may not previously have been suspects; and

<sup>10</sup> <http://www.austlii.edu.au/au/other/alrc/publications/dp/66/34ForensicUseofGeneticInformation.rtf>

- match DNA profiles from two or more unsolved crime scenes, thereby linking seemingly unrelated police investigations.

While some States and Territories already have their own DNA databases, CrimTrac's national DNA database allows the fight against crime to be taken Australia-wide<sup>11</sup>.

### *Privacy and legal safeguards*<sup>12</sup>

CrimTrac's DNA database operates in accordance with relevant Commonwealth, State and Territory legislation governing the collection and matching of DNA profiles. Profiles will be removed from the database in accordance with destruction dates notified by the jurisdictions.

The database does not contain the identities of persons who have supplied samples for DNA profiling. Identity fields are removed from records before they are transmitted to the national DNA database. Only State and Territory forensic laboratories supplying the DNA profiles will know the identities of the profiles' providers. So, when a sample profile is matched to a crime scene profile on the database, the CrimTrac Agency will not have access to identity details.

The database incorporates stringent data security measures and audit processes.

**Netherlands Forensic Institute (NFI): <http://www.justitie.nl/english/Organisation/index.asp?link=1>**

The Netherlands Forensic Institute (NFI) is the only forensic science laboratory in the Netherlands. The NFI was founded in 1999, as the result of the merging of the 'Gerechtelijk Laboratorium' (1945) and the 'Laboratorium voor Gerechtelijk Pathologie'- the forensic pathology lab-(1948). The new forensic organization provides a broad range of forensic services: pathology, toxicology, biology (DNA), drugs, chemistry, paint, glass, fibres, soil, fire cause and debris analysis, explosives, firearms, gunshot residues, environmental crime, tool marks and impressions, accident reconstruction (forensic engineering), handwriting, questioned documents, forensic linguistics and acoustics, image analysis and digital technology (digital evidence and computer crime).

The three major tasks are:

1. forensic casework for the police, prosecution and judiciary;
2. research and development to improve in-house expertise but also to provide the police with investigative tools;
3. to provide advice, knowledge and information to the customers, the Ministry of Justice and others.

The Netherlands Forensic Institute was accredited in 1994 (Gerechtelijk Laboratorium) by the 'Raad van Accreditatie' conforming to the criteria of EN45001 and ISO/IEC guide 25 and the relevant criteria of ISO 9001 and ISO 9002.

### *The compulsory sampling of bodily material*<sup>13</sup>

A difference in regard to other countries is the fact that a blood sample, a buccal cell sample or plucked hairs are intimate samples. Therefore the legal regulations are very strict.

According to the law only the investigating judge can require the suspect to give bodily material when he refuses to give a sample voluntarily. However, the compulsory sampling is restricted to crimes liable to a penalty of eight

<sup>11</sup> <http://www.crimtrac.gov.au/dna.htm>

<sup>12</sup> <http://www.crimtrac.gov.au/dna.htm>

<sup>13</sup> <http://www.interpol.int/public/Forensic/dna/conference/DNADb02.asp>

years or more of imprisonment. The warrant can also be given if it concerns specific offences with a maximum punishment of at least six years of imprisonment, such as serious kinds of maltreatment and public violence. It is necessary that facts and circumstances indicate serious charges against the suspect and DNA investigation is necessary in the pursuit of truth.

In the new legislation which will be discussed in parliament next year the condition that DNA investigation is necessary in the pursuit of truth will no longer be a criterium. A point of discussion in parliament will also be the reduction of the maximum penalty from eight years to four years. As it seems now the minister of justice and the members of parliament will be in favour of a reduction. So then it will become much easier to force a suspect to give bodily material when he is refusing to do so.

**Sweden - SKL (Statens Kriminaltekniska Laboratorium)**

**National Laboratory of Forensic Science:**

<http://www.polisen.se/inter/nodeid=1784&pageversion=1.html> – Swedish Website

SKL, the National Laboratory of Forensic Science in Sweden is part of the Swedish Police but is an authority of its own when dealing with forensic casework. The National Police Board, under the Ministry of Justice, finances the major part of the laboratory budget, but the laboratory has also other sources of income from other government authorities, insurance companies and private companies and persons.

SKL was from the start a part of the National Institute for Criminalistics that was founded in 1939. In 1964, when the Swedish Police Forces were joined into one force, the organization was changed to its present form.

SKL deals with investigations of all Interpol evidence types except toxicology. During the last decades the workload has increased drastically and that has caused an increase of personnel from about 100 in 1990 to the present 175 employees.

SKL is also responsible for the training of scene of crime officers and the development of the scientific support units of the Swedish Police.

*The Laboratory performs laboratory analyses of samples which have been taken from various types of crime scenes. The laboratory has expertise in most science disciplines and uses technology to find and preserve [trace evidence](#) and to establish links between people, places and objects.*

**Germany - DNA Analysis Database**

Bundeskriminalamt (BKA) - <http://www.bka.de/> - German website

The predominant part of the work on the different fields of forensic examinations of evidential materials collected in crime cases in Germany is done by the Forensic Science Institutes that are connected with crime investigation agencies.

In the area of forensic DNA analysis in addition to Forensic Science Institutes many University Institutes of Legal Medicine as well as several private laboratories provide respective services. While Forensic Science Institutes only can be active in crime cases Institutes of Legal Medicine also are performing analyses in civil cases like paternity testings. Private laboratories nearly exclusively are working on paternity cases but, since the DNA database was established they also offer analyses of the samples for database purposes.

As pointed out above, far most of the analytical work performed in crime cases is done in the laboratories of the Forensic Science Institutes. That also applies to DNA analysis. Thus, the description of the situation in the Forensic Science Institutes can be assumed as representative for the situation of DNA analysis in crime cases all over Germany.

Police work is in the responsibility of the 16 states of the Federal Republic of Germany. Each of them has got its own criminal investigation authority centralised in their state criminal investigation offices (Landeskriminalamt).

Associated with the Landeskriminalamt each of the states has established a forensic science service, 15 of them containing even serology sections where DNA analysis is established.

Besides the state criminal investigation offices there is a federal criminal investigation office (Bundeskriminalamt) also having a Forensic Science Institute covering all fields of forensic examinations of evidential materials including a DNA analysis section.

Implementation of DNA analysis in the state laboratories started in 1987 when the heads of the Forensic Science Institutes on a meeting decided to establish a working group to do the evaluation work necessary for the introduction of the methodology into forensic casework. The group was formed by the laboratories of the Forensic Science Institutes of Baden-Württemberg, Berlin and the BKA.

In April 1998 a national DNA database officially has been established in Germany.

The DNA analysis database at the BKA already contains almost 400,000 records, 85 percent of which are for known persons and 15 percent for unknown persons whose samples were taken at crime scenes. Every month, a further 4,000 records are added. In contrast, the current fingerprint records of the police number around 3 million. Should the use of DNA testing become the norm, it means that information on more than 4 percent of the German population would immediately be available to the authorities.

In Germany, DNA samples may be taken from a suspect where there is a justified suspicion that the person from whom the sample is taken has committed an offence of some gravity. DNA samples may also be taken from persons convicted of 'serious crimes'. A court order is generally required if the DNA sample must be obtained by an invasive procedure, but buccal swabs are not considered invasive<sup>14</sup>.

Initially, each of the 16 German states operated their own DNA databases. Germany now operates one national database that contains indexes of suspects, convicted offenders and unknown samples (i.e. crime scenes). Each State provides information directly to the central database<sup>15</sup>.

#### **Austrian National DNA Database<sup>16</sup>**

The Austrian National DNA Database is run by the Department of the Interior. DNA typing for this purpose is outsourced to and performed by the Institute of Legal Medicine, University of Innsbruck (GMI), which is the Austrian Central DNA Laboratory.

The Austrian National DNA Database started as pilot project on October 01, 1997. It was the third to start in Europe after Great Britain (1995) and the Netherlands (1997), followed by Germany (1998). Regarding the entries, the Austrian database (still) is the second largest in Europe.

The legal basis of the project is the *Sicherheitspolizeigesetz* (Security Police Act), which has been revised this summer. Since September 01, 1999, the National DNA Database is based on special legislation, which is embedded in the sections concerning ID-treatment, personal records, fingerprints, photographs etc.

Suspects of severe crimes (the term includes burglary) can now not only be ID-treated, but also mouth swabs or other sources of DNA can be collected as reference samples. In addition, the same applies to persons who have been convicted for crimes in the same category.

The second section of the DNA Database contains the DNA profiles of biological stains. Whenever **no** suspect for a crime can be found during investigations, biological stain material can be typed in the same manner as the mouth

<sup>14</sup> <http://www.austlii.edu.au/au/other/alrc/publications/dp/66/34ForensicUseofGeneticInformation.rtf>

<sup>15</sup> Idem

<sup>16</sup> <http://www.interpol.int/public/Forensic/dna/conference/DNADb05.asp>

swabs of suspects and can then be entered into the National DNA Database (cold hit principle). Moreover, stains that have been typed due to order of a court (because there **was** a suspect) can be included in the database, if they don't match with the persons that have been investigated in this case by court order.

Thus, all matches of the National DNA Database are cold hits (exception: sometimes police investigations are successful prior to the database match). The original intention of the project is prevention on one side and the support in criminal cases by identifying the source of biological evidence on the other side.

The Austrian Central DNA Laboratory receives no personal data, but only two anonymized mouth swabs from each person. Identity is secured by barcodes.

The Department of the Interior receives no biological material, but only personal records and the other information of the ID-treatment and, again, the same barcodes. The DNA profiles are sent from the laboratory to the Department of the Interior, using a protected data line and the barcode as link for identification. The matching procedure is initiated by the Department of the Interior. In this way, a total separation between biological material containing DNA (Austrian Central DNA Laboratory) and personal records (Department of the Interior) is guaranteed.

In case of a match, the second mouth swab of the suspect, which has been stored is typed to confirm the results, before the information is passed on to the responsible police department and, finally, to the criminal court of justice.

Until November 1999, more than 20.000 mouth swabs of suspects and 3.000 biological stains have been investigated. More than 300 suspects could be linked to crime scenes. More than 380 crime scenes could be linked to suspects, including 4 cases of murder, 22 cases of rape and more than 300 cases of burglary.

Although the database still is on a national basis, it can be used via Interpol for international comparison. The unit of the Department of the Interior responsible for the DNA Database is closely connected with the Interpol unit. DNA typing is performed with the Second Generation Plus® from Perkin Elmer, which means, that all PCR-systems recommended by Interpol are included. Even many PCR-systems defined by the FBI as core systems for NDIS/CODIS are identical.

The Institute of Legal Medicine is member of ENFSI, European Network of Forensic Science Institutes. The Department of the Interior and the European Community support the efforts of ENFSI to establish the scientific basis for a European DNA database (political agreement necessary).

The power point lecture will show the work of the Austrian Central DNA Laboratory, beginning with the production of the mouth swab set, its distribution, the laboratory intelligence management system, DNA typing of mouth swabs and crime scene evidence, quality management, the reports sent to the Department of the Interior, and the match reports sent to the police.

## **Belgian DNA Databank<sup>17</sup>**

### **National "Criminalistics" Databases**

On request of the magistrate, DNA profiles from stains have to be forwarded to the National Institute of Criminalistics and Criminology for central recording into the "Criminalistics" database. The DNA profile will be entered together with some administrative data (case number, magistrate name, ...).

Profiles will be deleted on request of the Public Prosecution when they are considered as no more useful.

Unidentified profiles will be deleted 30 years after entry.

Identified profiles will be deleted when the case is closed.

### **National "Convicted Offenders" Database**

<sup>17</sup> <http://www.interpol.int/public/Forensic/dna/conference/DNADb04.asp>

This database, also centrally managed at the National Institute of Criminalistics and Criminology, will contain the DNA profile from the persons convicted of serious crimes (mainly sexual assaults, murders,...the technical list is given in the law) for which they have been sentenced to imprisonment or confinement.

When the profile has not been obtained at the time of the judgement, reference sample will be obtained and DNA analysis will be performed. Consent is not required.

Upon request of a magistrate, profiles from a particular case can be compared to the profiles entered in the "Convicted Offenders" Database.

No names will be entered in the database. Only an identifier will be entered. Only the magistrate may have access to the names of the persons concerned.

Profiles will be deleted 10 years after the death of the person.

### **No Suspects database**

Profiles from suspects will not be entered in any database. Only in case of positive comparison, the reference identifier will be added to the record of the stain profile.

### **Abuse**

One article of the law describes the sentences foreseen in case of abuse of the DNA analysis.

## **DNA technologies used in forensic investigations**

- **Restriction Fragment Length Polymorphism (RFLP)**

RFLP is a technique for analyzing the variable lengths of DNA fragments that result from digesting a DNA sample with a special kind of enzyme. This enzyme, a restriction endonuclease, cuts DNA at a specific sequence pattern known as a restriction endonuclease recognition site. The presence or absence of certain recognition sites in a DNA sample generates variable lengths of DNA fragments, which are separated using gel electrophoresis. They are then hybridized with DNA probes that bind to a complementary DNA sequence in the sample.

RFLP is one of the original applications of DNA analysis to forensic investigation. With the development of newer, more efficient DNA-analysis techniques, RFLP is not used as much as it once was because it requires relatively large amounts of DNA. In addition, samples degraded by environmental factors, such as dirt or mold, do not work well with RFLP.

- **PCR Analysis**

PCR (polymerase chain reaction) is used to make millions of exact copies of DNA from a biological sample. DNA amplification with PCR allows DNA analysis on biological samples as small as a few skin cells. With RFLP, DNA samples would have to be about the size of a quarter. The ability of PCR to amplify such tiny quantities of DNA enables even highly degraded samples to be analyzed. Great care, however, must be taken to prevent contamination with other biological materials during the identifying, collecting, and preserving of a sample.

- **STR Analysis**

Short tandem repeat (STR) technology is used to evaluate specific regions (loci) within nuclear DNA. Variability in STR regions can be used to distinguish one DNA profile from another. The Federal Bureau of Investigation (FBI) uses a standard set of 13 specific STR regions for CODIS. CODIS is a software program that operates local, state, and national databases of DNA profiles from convicted offenders, unsolved crime scene evidence, and missing persons. The odds that two individuals will have the same 13-loci DNA profile is about one in one billion.

- **Mitochondrial DNA Analysis**

Mitochondrial DNA analysis (mtDNA) can be used to examine the DNA from samples that cannot be analyzed by RFLP or STR. Nuclear DNA must be extracted from samples for use in RFLP, PCR, and STR; however, mtDNA analysis uses DNA extracted from another cellular organelle called a mitochondrion. While older biological samples that lack nucleated cellular material, such as hair, bones, and teeth, cannot be analyzed with STR and RFLP, they can be analyzed with mtDNA. In the investigation of cases that have gone unsolved for many years, mtDNA is extremely valuable.

All mothers have the same mitochondrial DNA as their daughters. This is because the mitochondria of each new embryo comes from the mother's egg cell. The father's sperm contributes only nuclear DNA. Comparing the mtDNA profile of unidentified remains with the profile of a potential maternal relative can be an important technique in missing person investigations.

- **Y-Chromosome Analysis**

The Y chromosome is passed directly from father to son, so the analysis of genetic markers on the Y chromosome is especially useful for tracing relationships among males or for analyzing biological evidence involving multiple male contributors.

*Technical global compatibility*<sup>18</sup>

One of the most important developmental issues facing DNA databasing is the potential for systematic information sharing across international jurisdictions. Interpol, for example, has argued for the need for technological standardization and harmonization by its member countries to ensure that DNA profiling can be utilized on a global scale. The Interpol DNA Monitoring Expert Group, using an assessment of the UK system, is committed to the promotion and marketing of DNA databases in all European countries with the aim of linking them to a global international DNA database made up of submissions from member states. Whilst Interpol currently offer a databasing facility which can be searched on request by member states it remains small and essentially problematic because of complex variations in technological procedures across the world. Most notably this is caused by the array of different marker systems which are in use and which hinder the potential for matching of profiles across jurisdictions – in Europe alone six different marker systems are in operation. Global standardization, if successfully organized and implemented, would ensure the creation of systematic information transfer on a global scale.

By 2006 the UK government offered indicative figures about national DNA registration by police agencies<sup>19</sup>

State	Population	DNA Register	%
UK	59.8m	3.130m	5.23
Austria	8.1m	84,379	1.04
USA	298.4m	2.941m	0.99
Switzerland	7.4m	69,019	0.94
Finland	5.2m	32,805	0.63
Estonia	1.5m	7,414	0.49
Germany	82.4m	366,249	0.44
Slovenia	2m	5,782	0.29
Hungary	10.2m	28,278	0.28
Canada	32.3m	75,138	0.23
Croatia	4.6m	10,744	0.23
France	59.3m	119,612	0.20
Norway	4.5m	6,745	0.15
Netherlands	16.1m	14,747	0.09
Belgium	10.4m	4,583	0.04

<sup>18</sup> <http://www.dur.ac.uk/p.j.johnson/eu.html>

<sup>19</sup> <http://www.caslon.com.au/biometricsnote9.htm>

Sweden	9m	6,115	0.07
Denmark	5.5m	4,084	0.07
Spain	40.4m	2,656	0.01

(Appendix D Document 2)

### **USA: Advancing Justice through DNA Technology**

The full report can be found at the following website:  
**<http://www.usdoj.gov/ag/dnapolicybooktoc.htm>**

In March 2003, President Bush committed over \$1 billion dollars over 5 years (\$232.6 million per year) to advance justice through DNA technology. Under this initiative, it is anticipated that the use of DNA in the criminal justice system will be improved by providing funds, training and assistance to ensure that DNA technology reaches its full potential. The initiative promotes:

#### **Using DNA to Solve Crimes:**

More crimes will be solved and persons mistakenly accused or convicted of crimes will be cleared if the criminal justice system is provided with the necessary funding, technology, and assistance it needs to reap the benefits of DNA technology.

#### **Eliminate Backlogs:**

Funding to eliminate, within five years, the current backlogs of unanalyzed DNA samples for the most serious violent offences – rapes, murders, and kidnappings – and for convicted offender samples needing testing

#### **Strengthen Crime Laboratory Capacity:**

Funding to improve the analysis capacity of federal, state, and local crime labs so they can process DNA samples efficiently and cost-effectively and help prevent future backlogs.

#### **Stimulate Research and Development:**

Resources to stimulate innovative research in order to develop, among other things, more rapid and less costly methods of DNA analysis and the ability to analyze smaller and more degraded samples.

#### **Provide Training:**

Training on the collection and use of DNA evidence by a wide variety of professionals involved in using DNA evidence in the criminal justice system – police officers, prosecutors, defence attorneys, judges, forensic scientists, medical personnel, victim service providers, corrections officers, and probation and parole officers.

#### **Using DNA to Protect the Innocent:**

The initiative supports providing access to post-conviction DNA testing in appropriate circumstances for state or federal inmates who may have been wrongly convicted, and establishes a grant program to assist states in providing post-conviction testing.

#### **Using DNA to Identify Missing Person:**

In order to help provide closure for families of missing persons, the President's initiative provides education and outreach to medical examiners, coroners, law enforcement officers, and victims' families on the use of DNA to identify missing persons.

### **Funding Breakdown**

Element of the Initiative	2004 Budget Request (millions of dollars)
<b>USING DNA TO SOLVE CRIMES</b>	
<i>Eliminating Backlogs</i>	<b>\$92.9</b>
State Casework Backlogs	\$76.0
State Convicted Offender Backlogs	\$15.0
Funding the Federal Convicted Offender Program	\$1.9
<i>Strengthening Crime Lab Capacity</i>	<b>\$90.4</b>
Increasing the Analysis Capacity of Public Crime Labs	\$60.0
Funding FBI Forensic Analysis Programs	\$20.5
Funding the Combined DNA Index System	\$9.9
<i>Stimulating Research and Development</i>	<b>\$24.8</b>
Improving DNA Technology	\$10.0
FBI Research and Development	\$9.8
DNA Demonstration Projects	\$4.5
The National Forensic Science Commission	\$0.5
<i>Training the Criminal Justice Community</i>	<b>\$17.5</b>
Law Enforcement	\$3.5
Prosecutors, Defence Attorneys, and Judges	\$2.5
Probation & Parole Officers, Corrections Personnel	\$1.0
Forensic Scientists	\$3.0
Medical Personnel	\$5.0
Victim Service Providers	\$2.5
<b>USING DNA TO PROTECT THE INNOCENT</b>	<b>\$5.0</b>
<b>USING DNA TO IDENTIFY MISSING PERSONS</b>	<b>\$2.0</b>
<b>TOTAL FUNDING</b>	<b>\$232.6</b>