

DNA backlog reduction strategy: Law enforcement agency partnerships for a successful biological screening laboratory



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ABSTRACT

In 2009, the Palm Beach County Sheriff's Office Forensic Biology Unit developed an innovative DNA backlog strategy to construct and operate a centralized biological processing laboratory (BPL) within a law enforcement agency, the Boca Raton Police Services Department. The BPL became fully operational in 2012 and obtained accreditation in 2017. This coordinated, multi-agency agreement resulted in a streamlined process exemplifying several benefits such as communicating timely testing results, decreasing the case turnaround time, and decreasing the DNA case backlog. This paper provides a summary of the necessary considerations of location, construction, personnel, and services when constructing a BPL, as well as, provides a comparison of initial completion dates and ultimate completion dates over a three-year period from 2016 to 2018. Three LEAs submitted 613 cases to the BPL commensurate with jurisdictional population. Performance metrics such as types and number of criminal cases screened; the number of samples forwarded for PBSO DNA testing; the turnaround time to handle, screen, or analyze a forensic sample; evidentiary samples; and the number of profiles entered into the Combined DNA Index System (CODIS) database are reported. For example, prior to this DNA backlog reduction strategy, the FBU was taking an average of 153 days to handle, screen, or analyze a forensic sample from submission to final report and there was a backlog of 679 cases. From 2016 to 2018, the total average turnaround time for BPL decreased from 30.5 to 19.6 days, (35.8% decrease); and the FBU Request turnaround time decreased from 153 to 80 days (35% decrease). Monitoring laboratory metrics demonstrate the efficacy of the DNA backlog reduction strategy.

There are several takeaway lessons from this experience, including (1) engaging legal counsel early to outline necessary legal procedures and the timeline; (2) bringing all stakeholders "to the table" early to discuss expectations, as well as legal and operational responsibilities; and (3) creating a realistic timeline as well as establishing a comprehensive memorandum of understanding by which all parties understand their roles and responsibilities. Understanding laboratory and non-laboratory policy issues is critical to implementation success and the efficacy of a BPL as a DNA backlog reduction strategy.

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1. Introduction

Implementing DNA technology in crime laboratories has led to the intensification of backlogged cases and a concomitant pressure to implement backlog reduction strategies. This report distills the challenges and long-term results of a Palm Beach County Sheriff's

Office (PBSO) 2009 National Institute of Justice grant-funded DNA backlog strategy to construct a centralized biological processing laboratory (BPL) at the Boca Raton Police Services Department (BRPSD) and is still used today with some enhancements [1,2]. The BPL strategy had three goals:

1. Provide expedient serological screening results to the three largest, southern-most Palm Beach County law enforcement agencies (LEAs), including the Boynton Beach Police Department (BBPD), Delray Beach Police Department (DBPD), and BRPSD.

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2. Prioritize prescreened crime scene evidence for DNA analysis by providing the evidence to the PBSO Forensic Biology Unit (FBU).
3. Demonstrate a sustainable approach to reduce DNA backlogs by creating a model for other jurisdictions.

DNA testing of crime scene evidence is essentially divided into two phases. The first phase often referred to as screening or serology includes identifying and collecting biological materials, which are frequently the most extensive and labor-intensive parts of the entire DNA process. The second phase involves generating DNA profiles from the biological samples. Phase 1 testing by the BPL includes conducting presumptive and confirmatory tests for blood and semen and swabbing items for touch evidence. After pre-screening evidence, the BPL subsequently submits biological samples to the PBSO FBU for the second phase. Each laboratory is responsible for testing procedures, writing and reviewing reports, and testifying to test results. This coordinated, streamlined process has several benefits—including communicating timely testing results to LEAs, decreasing the FBU case turnaround time (TAT), and decreasing the DNA case backlog.

The path to the successful implementation of the BPL was not without challenges, and the lessons learned will provide a model for other law enforcement jurisdictions interested in increasing the efficiency of DNA testing. The purpose of this report is to show the unforeseen challenges during both the implementation phase and the laboratory analysis phase predominantly due to a lack of understanding of specific statutory and internal policies of four different LEAs. Comprehensive details describing the BPL may be found in the final *Efficiency Improvement Program 2009* grant report [3] and the *Forensic Technology Center of Excellence: Process and Outcome Evaluation of Forensic DNA Unit Efficiency Improvement Program* report [4]. The Forensic Technology Center of Excellence (FTCoE) report defines the tasks and outcomes of the BPL experience from the announcement of the grant award in 2009 until the year of accreditation in 2017. Since the completion of the FTCoE report, additional data from 2018 have been documented. This paper provides a summary of the necessary considerations when constructing a BPL. The considerations are concentrated into four components: location, construction, personnel, and services to include a comparison of initial completion dates and ultimate completion dates for each item within a component.

Understanding laboratory and non-laboratory policy issues within the four components is critical to implementation success and the efficacy of a BPL as a DNA backlog reduction strategy.

2. Consideration 1: location

Before the BPL concept was formalized, a commitment by a LEA to provide laboratory space was imperative. It was estimated that a minimum of 1800 square feet in a structure amenable to monitored secure access was necessary to construct a BPL. If the BPL will be entering into a cooperative agreement to conduct pre-biological screening for criminal cases from other LEAs, then BPL accessibility should be considered. The BPL had a commitment from the BRPSD. Several on-site and telephonic assessments were conducted to verify the existence and/or installation of secure walls and ceilings, as well as access to plumbing and electrical wiring. Information technology and telecommunication systems were also involved in the location assessment. It was imperative that secure evidence vaults were included in the blueprints. Fig. 1 shows the space the BRPSD ultimately dedicated to the BPL.

3. Consideration 2: construction

There must be a clear understanding of the BPL resident LEA



Fig. 1. Space dedicated by the Boca Raton Police Services Department for the construction of the Biological Processing Laboratory, 2009.

construction policies, including awarding the construction contract and requirements for building the laboratory. Fig. 2 shows the BRPSD BPL diagram originally submitted with the 2009 Efficiency Improvement Program grant application. Blueprints should reflect separate areas for receiving, documenting, and storing evidence from LEAs in order to maintain chain of custody. An office area should be designed to accommodate the approved staff with suitable room for report writing and administrative tasks. The laboratory proper should include forensic workstations to conduct the screening and photo documentation of large and small items with the appropriate tools or instruments—including a fume hood, microscopes, centrifuges, vortexes and sinks, refrigerators for evidence, and other laboratory articles. A secured key-access screening room is essential to prescreen evidence using an alternative light source to locate stains such as semen and saliva. Reagent preparation and storage rooms are used to stock all laboratory testing

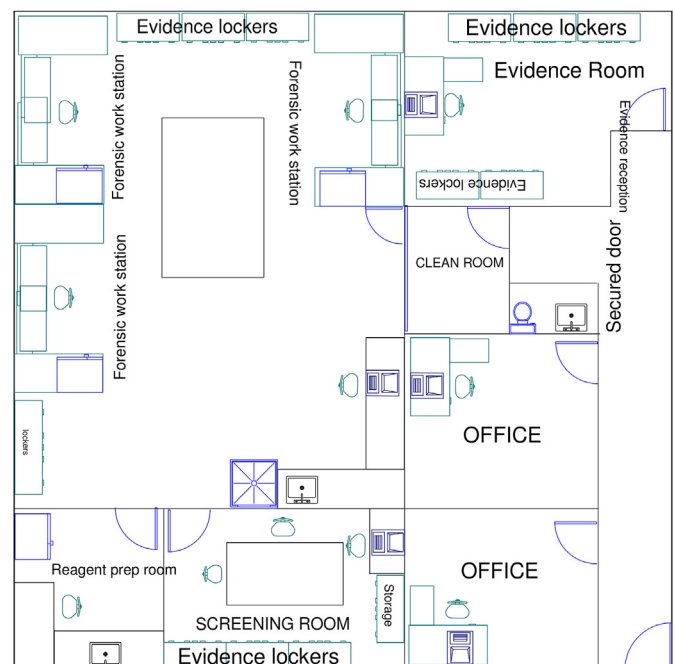


Fig. 2. Original Biological Processing Laboratory blueprint submitted under the Efficiency Improvement Program grant, 2009.

reagents at the appropriate temperatures and must include a sink, deionized water system, cabinets for consumables, glassware, and safety equipment. An area for receiving attorneys, LEA officers, accreditation staff, and other individuals is desirable.

4. Consideration 3: personnel

The original proposal stated that three individuals would be trained as competent laboratory analysts capable of conducting testing on casework. One of the analysts should be more experienced and serve in a supervisory role to ensure testing continuity. The existing BRPSD Latent Print/Crime Scene Unit Manager was promoted to BPL Crime Laboratory Director and was to be trained in biological prescreening methods.

Two individuals were eventually selected for the BRPSD BPL and met the same minimum requirements as the PBSO laboratory analyst position, including a bachelor's degree in a basic natural science and were ultimately trained in the PBSO laboratory using the same methods and technologies. Training modules included evidence handling, evidence documentation, barcoding, use of a laboratory information management system (LIMS), serological examination protocols, court testimony, ethics and integrity, and the judicial system. Competency testing involved a written comprehensive examination, a laboratory bench practical, and a mock trial. This collaborative training strategy is strongly advised.

The Crime Laboratory Director did not complete the training, which left the laboratory without an individual who was able to consult on casework procedures and to help with casework review when the second analyst was on medical leave. Having minimum of three laboratory-competent individuals, two Laboratory Analysts and a Supervisor, should be seriously considered in order to provide quality assurance support for laboratory accreditation standards compliance. All three of the staff members should be trained with all duties, knowledge and responsibilities associated with laboratory testing. In addition, the designated Supervisor should also have responsibility for Quality Assurance and Quality Control procedures and policies as well as attainment and maintenance of laboratory accreditation. Three competent individuals allows for continued testing and review of casework during staff absences and also provides increased help when troubleshooting testing issues and preventing protocol drift.

An important personnel learning experience was that the assigned BRPSD Crime Laboratory Director's duties were more varied and complex than originally predicted, making biological training difficult. In addition, the administrative duties necessary to not only seek and maintain accreditation but also to adhere to internal policies are extensive and the Crime Laboratory Director found these added responsibilities burdensome. Ultimately, the Quality Assurance Manager's duties were delegated to a Laboratory Analyst; this action streamlined laboratory processes and allowed for a successful accreditation, including surveillance visits.

5. Consideration 4: services

The BPL is a fee-for-service laboratory; therefore, memoranda of understanding (MOU) had to be drafted and signed by the Legal department staff for each LEA involved. Although PBSO is a partner in the grant award and performs subsequent DNA processing of BPL prescreened samples, the PBSO is not a fee-for-service laboratory and was not involved in this MOU process. Cooperative agreements among three different legal and procurement entities representing three different cities involving three different internal policies took nearly a year to complete; the time needed to complete these activities was not originally considered. Each party's policies, roles, and responsibilities took over a year to delineate—affecting

BRPSD's ability to hire a contractor, begin construction, and pay for training and laboratory materials. The legal aspects of implementing a project of this size and scope could have been more thoroughly examined before the grant was submitted so that the timeline for completion was more realistic. To ensure that evidence screening efforts would be coordinated among agencies, each agency was required to submit an MOU outlining the expectations. In addition to those stipulations listed in the MOU, mentioning the level of guidance that PBSO would provide—including quality assurance, manual setup, management meetings, and internal audits—would have been advantageous to include in the MOU. These were the legal tasks that took nearly 12 months to complete, and these tasks delayed the hiring of BPL staff and awarding the construction contract. All stakeholders should have a clear understanding of roles and responsibilities before committing to establishing a prescreening laboratory. The tasks associated with the legal procedures should be completed by the LEAs' legal department attorneys.

In addition, the types and distribution of laboratory services must be well defined. This includes evidence submission policies, maintenance and documentation of chain-of-custody records, calibration and maintenance of laboratory instruments, serological testing procedures—including interpretation guidelines, uniform language for reports, peer-review processes, notification of results to LEA, and court testimony requirements. Ideally, a LIMS must be in place to control the laboratory's operations in order to maintain and track chain of custody, case assignments, sample management, reports, court-issued documents—such as discovery notices and subpoenas—and other laboratory-regulated environments. Although the original concept was for the BPL to purchase and incorporate a JusticeTrax LIMS program, (currently used at the PBSO) for seamless document control interactions between the laboratories, the BRPSD already had a department-wide information management system with an evidence management module. The decision was made by the BRPSD not to purchase a redundant JusticeTrax system and to use the existing in-house LIMS. Regardless, the BPL-specific modules had to be designed and implemented, which also took time.

The PBSO and BRPSD personnel met prior to the 2009 grant submission and discussed procurement procedures related to a grantee-subgrantee relationship. Internal procedures and policies and the differences were discussed; as a result, each LEA provided guidance for a streamlined process. However, upon approval of the grant monies, several new issues arose that complicated the procurement process. Not only did PBSO's and BRPSD's procurement policies differ, but the grantee-subgrantee relationship added a layer of complexity to the process. One challenge was BRPSD's policy of using purchasing cards to purchase grant supplies, which ultimately led to issues of delayed reimbursement because billing for the purchasing cards lagged for up to 2 months after the purchase date. There were also instances of delayed payments because several purchases exceeded a cost-ceiling whereby the purchase required approval of city management and elected officials per city regulations, even though the purchases had been approved upon grant acceptance. Procurement confusion was restricted to the first year of the grant; however, this may not occur if a BPL implementation does not involve grant monies. Regardless, interagency agreements for a BPL and all participating agencies should have a clear understanding of partnership procurement policies.

6. BPL and PBSO FBU metrics

The original 2009 grant-funded solicitation required a current TAT at which time for the PBSO FBU it was taking 153 days to handle, screen, or analyze a forensic sample from submission to

final report. Each FBU analyst was analyzing 47 samples per month and there was a backlog of 679 cases. Because the three partnership agencies accounted for 30% of the cases at the FBU, it was estimated that there would be a commensurate decrease in the FBU backlog upon BPL implementation. The grant period encompassed 2 years, 2009 to 2011, but ultimately was extended to 2012 due to unexpected logistical circumstances. Unforeseen events pushed back completion dates for nearly every milestone in the BPL project, which also pushed back the testing of casework evidence. Fig. 3 shows a brief overview of each milestone and the predicted versus actual completion dates. The proposed completion date and the final completion date are listed for each task. With the exception of the designation of the BPL's location, expected completion dates were not met for BPL personnel hiring and training, laboratory construction and build out, inter-local agreements (i.e., MOU), laboratory standard operating procedures, initiation of casework, implementation of a procurement policy, and achievement of laboratory accreditation. However, since achieving accreditation in January 2017, the laboratory successfully passed a surveillance visit in December 2017 and two surveillance online assessments (March 2018 and February 2019).

Performance metrics were collected from 2012 through 2018; these metrics included the types and number of criminal cases screened; the number of samples forwarded for PBSO FBU DNA testing; the turnaround time to handle, screen, or analyze a forensic sample; evidentiary samples; and the number of profiles entered into the Combined DNA Index System (CODIS) database. CODIS was established by Congress to assist in providing investigative leads for law enforcement in cases where no suspect has yet been identified; therefore, a CODIS hit provides new investigative information on these cases. BPL hits included property crime and violent cases. Additionally, these metrics demonstrate the efficacy of the DNA backlog reduction strategy. Upon completing the BPL and awarding a certificate of occupancy, serious implementation and testing challenges occurred through 2015—including staff turnover and testing issues, which are outlined in the RTI *Efficiency Improvement Program* report. As a result, annual direct comparisons between the metrics during these testing years could not be made. However, 3 complete years of comparable metrics, 2016–2018, have established the importance and impact of the BPL regarding a more efficient DNA testing program.

6.1. BPL metrics

Over this 3-year period, the three LEAs submitted 613 cases to

the BPL (Fig. 4). The interagency cooperation was successful because each LEA had equal access to BPL testing services and the number of cases per agency was commensurate with jurisdictional populations: BRPSD (28%), BBPD (38%), and DBPD (34%).

The BPL does not restrict the type of case that can be submitted for testing. Fig. 5 shows the number and criminal classification of 613 cases that BPL staff had tested for the respective LEAs (see Figure Legend). The case type list is extensive—with Breaking and Entering of auto, business, and residential accounting for 28% of all cases tested. Sexual Battery accounts for approximately 19% (117) of BPL-submitted cases. Robbery includes armed and strong-armed robberies and home invasions.

During the 2016–2018 period, two BPL Laboratory Analysts prescreened 2866 items of evidence (Fig. 6). All three LEAs have Crime Scene Units, which explains why 40% of submitted items from each year are swabs of evidentiary items. It is also important to consider that there were 117 sexual assault cases categorized as a single item, but there are several types of evidentiary swabs with possible biological material within the sexual assault kit—such as

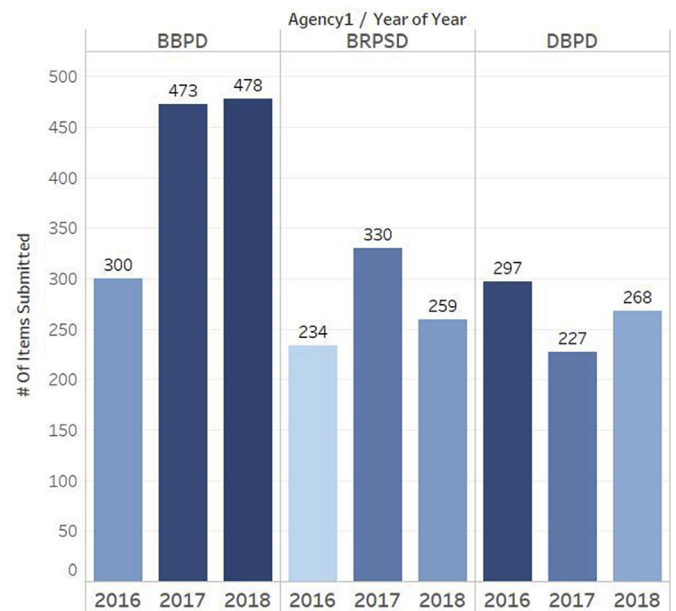


Fig. 4. Number of cases submitted to the Biological Processing Laboratory per year per Agency from 2016-2018, (n=613).

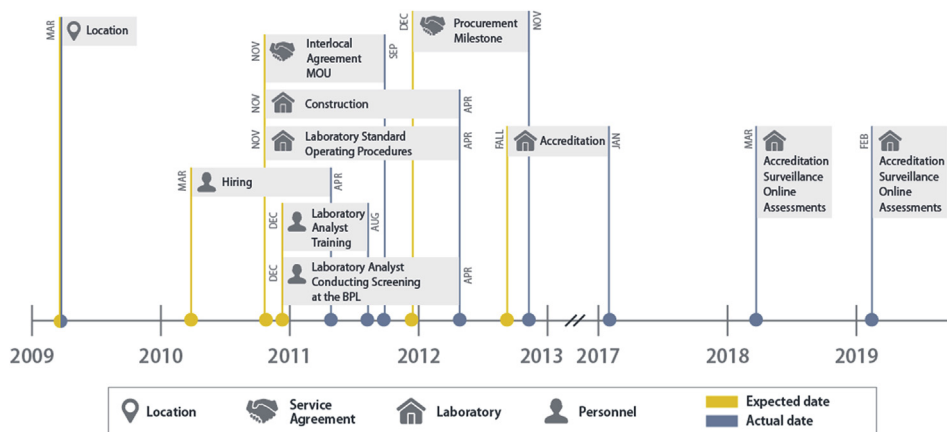


Fig. 3. Biological Processing Laboratory milestones, predicted versus actual completion dates (yellow and blue, respectively).

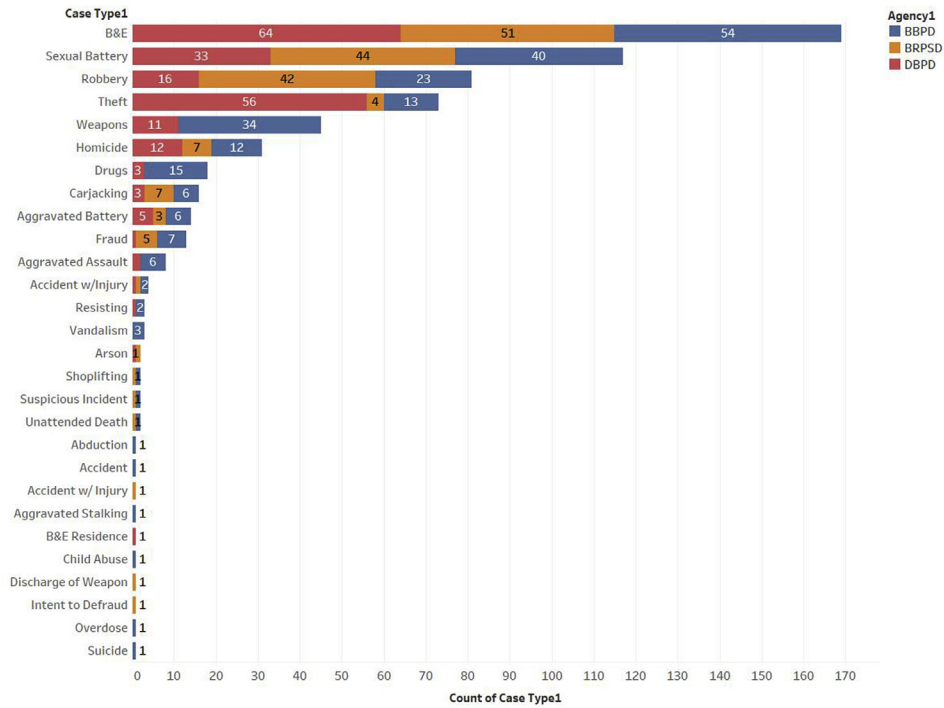


Fig. 5. Number of cases and criminal classification submitted per Agency to the Biological Processing Laboratory from 2016-2018, (n=613).

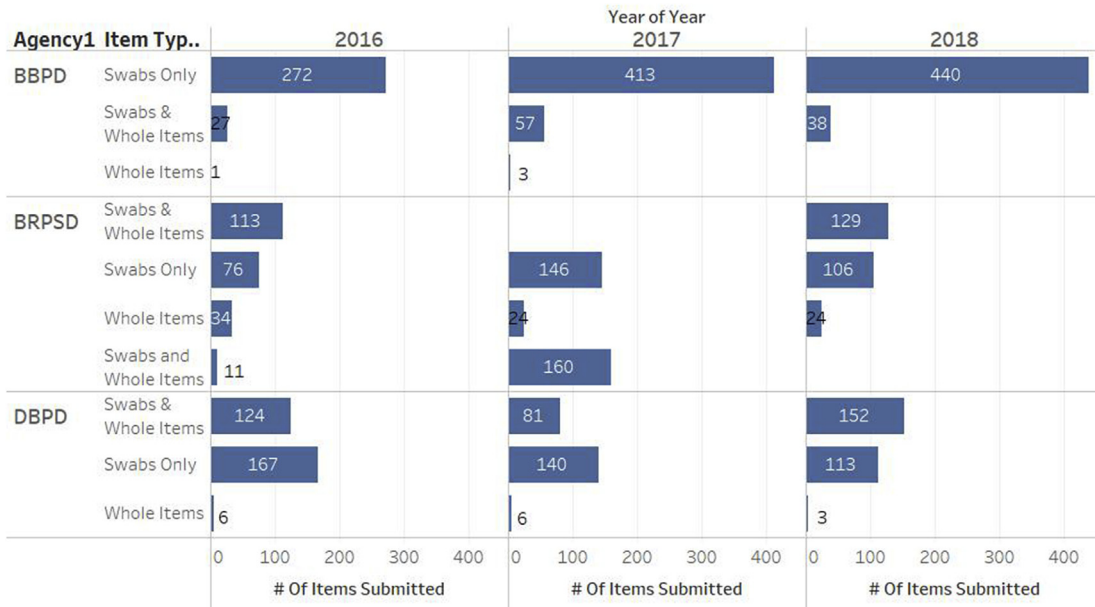


Fig. 6. Number and types of evidentiary items tested at the Biological Processing Laboratory per year per agency from 2016-2018 (n= 2,866).

oral, vaginal, and rectal swabs—as well as known standards from the victim, which are included in the total count of evidentiary items tested. It is not unusual for swabs and entire items from the crime scene to be submitted as well, and the types of evidence submitted stay relatively uniform each year and for each agency. The BBPD has submitted and received results for 1251 items or 44% of all items submitted to the BPL. The BRPSD submitted 823 (29%) of the items tested in 2016–2018 and the DBPD submitted over 25% (729) of the items submitted to the BPL in the 3-year period. The number of items corresponds to the total number of cases

submitted per agency as described in Fig. 5.

Prescreening evidentiary items followed by submitting samples to the FBU in a timely fashion for DNA analysis was integral to the goal of reducing case backlogs. Table 1 shows a consistent decrease in three important steps for efficient turnaround times within the BPL. Pre-screening evidentiary items followed by submission of samples to the FBU in a timely fashion for DNA analysis was integral to the goal of reducing case backlogs. From 2016 to 2018, the total average TAT for BPL decreased from 30.5 to 19.6 days, a 35.8% decrease.

Table 1
Average turnaround times evidentiary samples in days (% decrease).

Year	Request to Intake	Intake to Assignment	Intake to Review	Total Average TAT for BPL
2016	14.3	2.1	14.1	30.5
2017	11.53 (19.1%)	2.07 (2.04%)	12.58 (10.6%)	26.18 (13.20%)
2018	10.52 (8.9%)	1.07 (46.9%)	8 (36.4%)	19.59 (35.8%)

The *Request to Intake* is the average number of days from the time a case is called in by law enforcement until evidence is submitted to the BPL. LEAs are aware of the benefit to submitting the evidence as soon as possible because the testing results will be available in a timely fashion which accounts for the consistent decrease in the number of days it takes for the BPL to receive evidence. For example, in 2018, *Intake to Assignment* of a case was within a day (1.07) (i.e., the case was assigned to a Laboratory Analyst) and within 8 days, the case was completed and counted under the *Intake to Review* statistic which included the evidence submission, processing, testing, and the writing and review of the report. This is a significant improvement over the past 3 years considering that this time includes mandatory training, maintenance of accreditation standards, weekends and holidays, time for judicial responsibilities—such as depositions and court testimony—and staff absences from the laboratory.

Finally, of the 613 cases tested by the BPL during 2016–2018, 329 property crime cases were forwarded to a PBSO-contracted private vendor for DNA analysis, which significantly reduced the FBU's laboratory and administrative workload. All three BPL partners benefited from this program—especially in terms of efficiency in submitting property crime evidence directly to the vendor laboratory, which is not always a priority in some laboratories. In addition, only 12 cases with 75 samples were not forwarded to the FBU for DNA testing for a variety of reasons, including negative test results or an LEA requesting the case not be worked.

6.2. PBSO FBU metrics

The original grant proposal projected that the BPL implementation for prescreening DNA evidence would have the following effects on the FBU: decreased case turnaround times, increased number of cases reported out per year, and decreased DNA case backlog. FBU metrics from 2016 to 2018 are shown in Table 2, which provides the BPL screened cases submitted to the FBU for in-house DNA analysis. Note that this data represents BPL violent case requests only, as property crimes in Palm Beach County are outsourced to a private vendor laboratory for DNA analysis. The number of cases submitted and the time-analysis metrics for several steps in the process are shown.

Out of 613 cases submitted to the BPL during 2016–2018, 280 cases (46%) were ultimately submitted to the PBSO FBU for DNA testing. FBU Y-STR analysis was necessary in very few BPL cases (4%) as determined through evaluation of BPL and FBU test results. The *Request TAT* is calculated from the time a case is requested for DNA testing by the BPL until a report is completed and sent out. The *Evidence TAT* is the time from when a DNA Analyst at the FBU takes

out the evidence for analysis until a report is completed and sent out. The *Workable TAT* is the time from when all of the evidence is available for testing until a report is completed and sent out to the requesting agency. Over the 3-year period for BPL submissions, over 3300 tests were run on nearly 1500 stains.

In 2017, a FBU Lean Six Sigma (LSS) project, funded through Florida Crime Laboratory Subsidy funds, was conducted to address the case acceptance workflow for all case requests in Palm Beach County—the process by which cases are requested and assigned for testing. As part of this project the FBU readdressed the prioritization of assigning BPL cases for DNA analysis during their Evidence Request Process. The FBU now prioritizes BPL cases based on the screening start date assigned by the BPL. This system “rewards” these prescreened cases by advancing their assignment for DNA analysis. This LSS project began in March 2017 and was implemented by October 2017. Following the implementation of the LSS project, the BPL TAT has decreased by 15 days—that is, cases are assigned more quickly. It should also be noted that BPL submits the evidence 5 days faster (on average) than pre-LSS.

6.3. CODIS

A CODIS hit is a confirmed match that aids an investigation and at least one case involved in the match is unsolved. The metric that tracks the number of cases in which CODIS added value to the investigative process is called *Investigations Aided* [5]. For example, two cases can result in a CODIS hit, but both cases have added value—so two investigations are aided from the one CODIS hit. Offender hits (i.e., the identity of an individual is known) and forensic hits (i.e., forensic DNA profiles from two or more cases are linked and at least one case is unsolved) are both considered CODIS associations.

There were 3489 DNA profiles entered into CODIS from the FBU and BPL during the 2016–2018 period (Fig. 7), which resulted in 1254 CODIS associations and 965 investigations aided. Nearly 14% of these profiles were from BPL cases. During this same period, approximately 16% of all CODIS hits were linked to BPL DNA profiles and included investigations aided and CODIS associations. The procedure for counting hits gives credit to those laboratories involved in analyzing and entering the relevant DNA records into CODIS. The system's hits are tracked as either an offender hit or a forensic hit. These hits are counted at the local, state, and national levels.

The FBU was able to increase its caseload from other Palm Beach County LEAs as a result of the BPL's prescreening testing, which in turn allowed for more efficient CODIS processing that may have been delayed due to the FBU backlog.

Table 2
Average reports and turnaround times in days.

	Total BPL DNA Reports Out	Total Number of BPL Cases Analyzed	Y-STR Reports	Request TAT	Evidence TAT	Workable TAT
2016	89	72	3	123	11	119
2017	127	110	4	115	13	111
2018	116	82	5	80	15	77

*Note: Since the inception of the BPL in 2012, the FBU has undertaken and successfully completed a comprehensive, complex LSS project to diagnose, improve, and design specialized process systems to increase efficiency.

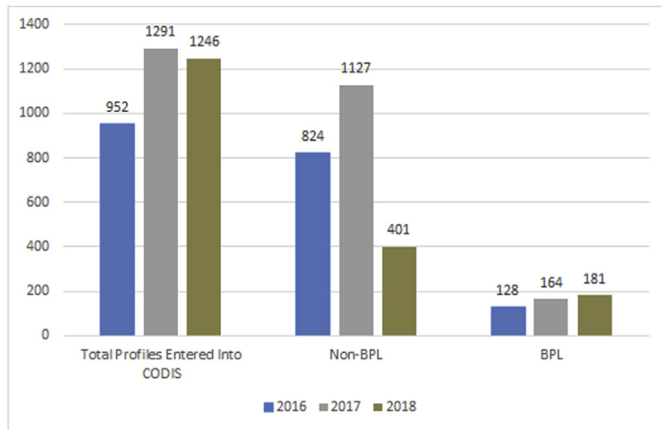


Fig. 7. Number of DNA profiles entered into CODIS by the PBSO during calendar years 2016 through 2018, non-BPL and BPL.

7. Conclusion

The BPL officially opened for casework testing on April 12, 2012. County and city dignitaries and LEA representatives attended the ribbon-cutting ceremony at the 6500 Building in Boca Raton, and the *Palm Beach Post* highlighted the ceremony in an article. The BPL improved timely forensic testing of biological evidence from crime scenes, increased communication, decreased the time it takes to inform local LEAs of results, and provided a model for other LEAs interested in implementing a prescreening facility for their local DNA testing laboratory. Some of the challenges occurred because the grant specifically required a grantee-subgrantee relationship. If a grant will not be providing funding for the construction of a prescreening laboratory, then these issues do not need to be considered.

There are several takeaway lessons from the 2009 Efficiency Improvement Program grant experience, including (1) engaging legal counsel early to outline necessary legal procedures and the timeline; (2) bringing all stakeholders “to the table” early to discuss expectations, as well as legal and operational responsibilities; and (3) creating a realistic timeline as well as establishing a comprehensive MOU by which all parties understand their roles and responsibilities. There should also be open communication with procurement personnel to avoid possible payment delays because of institutional policies and procedures.

A minimum of three trained and competent staff members should be employed in a BPL, including one in a supervisory position capable of conducting testing on casework to assist with all laboratory functions.

One of the benefits of an LEA implementing a BPL was that during the first year of initiating testing on casework evidence, BPL cases were prioritized ahead of other LEA cases. Once the BPL began acting as an independent laboratory, the BPL cases were assimilated into the normal non-BPL FBU workflow. However, the FBU eventually agreed to prioritize BPL cases as part of the permanent workflow process to maintain efficiency in case turnaround time. Decisions about whether to prioritize BPL samples should be agreed upon by the BPL, local DNA laboratory, and LEA partners.

Communication between the laboratory and law enforcement has been dramatically improved as a result of the BPL. The underlying premise of a BPL is that prescreened crime scene evidence is submitted to the local DNA laboratory—which means that even before the DNA testing is completed, the BPL staff may communicate informative test results to LEA partners within days of submitting evidence, potentially providing investigative leads. BPL

Laboratory Analysts provide reports and testify to results in court, allowing the FBU laboratory to spend more time on testing evidence from other agencies. Furthermore, PBSO metrics collected during 2016–2018 clearly demonstrate that the BPL may serve as a template for improving DNA case management efficiency for other law enforcement regions within a jurisdiction and throughout the country.

The hurdles and challenges described eventually led to an improvement in turn-around-time and testing efficiency predominantly because all of the partners in this project were willing to examine challenges as they occurred and took responsibility for correcting issues. For example, the submission and assigning BPL cases flow went much smoother when certain days were dedicated for BPL staff to submit cases in bulk. These cases were immediately identified as BPL cases and were electronically tracked as priority cases throughout the DNA testing procedures. Coordinating the BPL cases within the PBSO LSS program dramatically improved the flow of the BPL DNA testing process. Inter-agency agreements and continued communications, especially when issues arose, encouraged a team approach with accountability.

Finally, the PBSO FBU instituted DNA analysis as a part of a testing regimen in 1994. Over the decades, new DNA technologies and methodologies improved the power of discrimination between individuals, and the number of cases in which DNA testing was requested outgrew the laboratory’s capacity. Palm Beach County LEAs have consistently supported the FBU’s efforts to decrease DNA backlogs and improve turnaround times by increasing staff or space, or through other means. Due to the PBSO and BPL partnership fostered through the Efficiency Improvement Program 2009 grant, there is now an independent, fully functional, accredited laboratory that tests crime scene evidence and submits prescreened evidence to the PBSO FBU for immediate DNA analysis.

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Declaration of competing interest

None.

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References

- [1] U.S. Department of Justice, Office of Justice Programs, Solicitation: forensic DNA unit efficiency improvement, Available at: <https://www.ncjrs.gov/pdffiles1/nij/si000867.pdf>, , 2009.
- [2] National Institute of Justice, Forensic DNA unit efficiency improvement, Available at: <https://www.nij.gov/Documents/nij-dna-program-income-policy.pdf>, 2013.
- [3] J.D. Roper-Miller, K. Barrick, 2009 evaluation of forensic DNA unit efficiency improvement program. National criminal Justice reference service (NCJRS). National Institute of Justice analytic support program. <https://www.ncjrs.gov/>

- pdffiles1/nij/grants/248830.pdf, 2015.
- [4] C. Crouse, C. Daugherty, J. Sikorsky, J.D. Roper-Miller, K. Barrick, Forensic technology center of excellence, in: *Process and Outcome Evaluation of Forensic DNA Unit Efficiency Improvement Program*, U.S. Department of Justice, National Institute of Justice, Office of Investigative and Forensic Sciences, November 2018.
- [5] FBI, *Frequently Asked Questions*. <https://www.fbi.gov/services/laboratory/biometric-analysis/codis/codis-and-ndis-fact-sheet>.