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Project FORESIGHT Annual Report, 2021-2022

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Project FORESIGHT Annual Report, 2021-2022

Paul J Speaker, Forensic Science Initiative, John Chambers College of Business & Economics, West Virginia University

FORESIGHT—
Annual Report
(US\$)

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FORESIGHT Benchmark Data 2021-2022

Project FORESIGHT is a business-guided self-evaluation of forensic science laboratories across the globe. The participating laboratories represent local, regional, state, and national agencies. Economics, accounting, finance, and forensic faculty provide assistance, guidance, and analysis. Laboratories participating in Project FORESIGHT have developed standardized definitions for metrics to evaluate work processes, linking financial information to work tasks, and functions. Laboratory managers can then assess resource allocations, efficiencies, and value of services—the mission of Project FORESIGHT is to measure, preserve what works, and change what does not.

The benchmark data for the 2021-2022 performance period includes laboratory submissions for a variety of fiscal year definitions. However, all submissions have December 31, 2021 as part of their fiscal year accounting. The majority of submissions follow a July 1, 2021 through June 30, 2022 convention. Others follow a year that begins as early as January 1, 2021 (ending December 31, 2021) while the other extreme includes laboratories with a fiscal year originating October 1, 2021 and ending September 30, 2022.

Consider the summary statistics for several of the key performance indicators. Because of outliers in several of the investigative areas, the most meaningful comparisons might best be made with respect to median as a representation of “typical” laboratory performance. To lend perspective to the spread of these metrics, each of the quartile metrics are reported along with the specific comparison to the laboratory highlighted in this report.

As of this writing, 200 laboratory or laboratory systems have contributed data to the project for the 2021-2022 period. For most areas of investigation, the submitted data offers a large enough sample to elicit good statistical properties.

For more information on Project FORESIGHT, visit the Project web site at www.be.wvu.edu/forensic/foresight.htm. Questions regarding this report or other matters pertaining to Project FORESIGHT should be directed to the Principal Investigator Paul Speaker (foresightsubmissions@gmail.com).

Characteristics of Submitting Laboratories

Each submission year has seen an increase in the number of participating laboratories. Since the data collection tool, LabRAT, was modified to highlight the minimum data needed (Level I data), there has been an increase in the number of smaller laboratories in FORESIGHT. That is reflected again for the 2021-2022 submissions as the total number of laboratory or laboratory systems submitting data has grown.

Note that any laboratory or laboratory system may voluntarily submit data to the FORESIGHT project. Each submitting laboratory will receive a copy of the annual benchmark data along with the placement of their own data for comparison to the benchmarks. However, the benchmark comparison data only includes the performance from accredited laboratories.

Table 1: Characteristics of Submitting Laboratories

| Characteristics of Submitting Laboratories | |
|---|------------|
| Jurisdiction | |
| National | 6 |
| Regional | 37 |
| State | 53 |
| Metro | 64 |
| Regional/Metro* | 40 |
| *Regional lab with a city exceeding 100K population | |
| Total Accredited (ISO/IEC 17025:2017 or ANAB) | 196 |
| non-accredited | 4 |
| TOTAL SUBMISSIONS | 200 |
| International/Domestic | |
| U.S. | 174 |
| Non-U.S. | 26 |

Table 1 highlights some of the characteristics of the submitting laboratories. Note that the 200 submissions represent some laboratory systems. There are total of 251 separate facilities represented in these accredited submissions.

COVID-19 and 2021-2022 Submissions

Subsequent years will reveal the impact of the pandemic on forensic laboratories. Submitting laboratories reported for a fiscal year that overlapped with the pandemic. Many indicated the departure from a “normal” year with limitations on laboratory time and the necessity of remote work. As we begin to receive crime data during the pandemic, we expect to see additional departures on the collection of evidence for submission to crime laboratories. For all reporting laboratories, we anticipate similar disruptions will be revealed in the 2021-2022 FORESIGHT submissions.

There are a few observations to note. Case submissions continued to fall in several investigative categories during this reporting year. Most notably, the median number of cases per 100,000 population (highlighted in Table 2) were drops in blood alcohol analysis, crime scene investigation, digital evidence analysis, and marks & impressions. With the drop in case submissions, there was a subsequent increase in the average cost in most of these same areas as diseconomies of scale resulted from the decline in demand for these services.

Additional changes of note were the increased submissions for DNA casework, Firearms & Ballistics, Toxicology antemortem, and Toxicology postmortem. There has been a shift in

resource allocations that are related to the opioid crisis, submission of previously unsubmitted sexual assault kits, and COVID19. Additionally, there appears to be the initial impact from the inflationary pressures of 2022-2023.

Future review of the data should reveal the impact of each of these outside stimuli on forensic laboratories.

FORESIGHT Maximus Awards



Started in FY2009 by a cooperative agreement between the West Virginia University College of Business and Economics and the National Institute of Justice, the Foresight program is a business-guided, self-evaluation of forensic science laboratories, which began with local, regional, state, and national agencies in North America. Over the years, the program has expanded to include several laboratories in Europe. Economics, accounting, finance, and forensic faculty from WVU provide assistance, guidance, and analysis. The process involves standardizing definitions for metrics to evaluate work processes, linking financial information to work tasks, and functions. The program has grown over time and its success had led to numerous journal publications, countless laboratory efficiency improvements across the U.S. and a supplementary program with funding by the Laura and John Arnold foundation to examine the interface between Foresight metrics and Laboratory Information Management Systems. Based on the success of the program and the gains seen by forensic laboratories, ASCLD has sought to begin recognizing peak performing laboratories at its Annual Symposium.

The FORESIGHT Maximus awards are presented to participant laboratories operating at 90% or better of peak efficiency.

Maximus Award Winners 2023

- Arkansas State Crime Laboratory, Little Rock, AR
- Bexar County Criminal Investigation Laboratory, San Antonio, TX
- Chandler Police Department Forensic Service Section, Chandler, AZ
- Charlotte Mecklenburg Police Department Crime Lab, Charlotte, NC
- City of Tulsa Police Department Forensic Laboratory, Tulsa, OK
- Denver Police Department Crime Laboratory, Denver, CO

- Forensic Science Department, Organismo de Investigación Judicial, San Joaquín de Flores, Heredia, Costa Rica
- Franklin County Coroner's Office, Forensic Toxicology Laboratory, Columbus, OH
- Idaho State Police, Meridian, ID
- Indiana State Department of Toxicology, Indianapolis, IN
- Midwest Regional Forensic Laboratory, Andover, MN
- Montana Forensic Science Division, Missoula, MT
- Nebraska State Patrol Crime Lab, Lincoln, NE
- North Louisiana Criminalistics Laboratory, Shreveport, LA
- Pinellas County Forensic Lab, Largo, FL

FORESIGHT 20/20

The American Society of Crime Laboratory Directors (ASCLD) was successful in securing a grant from the Laura and John Arnold Foundation (LJAF) to assist laboratories in the extraction of data from their Laboratory Information Management Systems (LIMS), including data for submission to Project FORESIGHT. The executive summary of FORESIGHT 20/20 project follows.

FORESIGHT 20/20 Executive Summary

The proliferation of television shows featuring CSI titles has both glamorized and cursed crime laboratories in America as expectations of laboratory performance have dramatically increased the demand for forensic science services. This increase in demand, coupled with laboratory funding cuts from the Great Recession, has created a bottleneck in the justice system as laboratory backlogs have risen, slowing down the entire system. The National Institute of Justice (NIJ) recognized this problem and funded a solution via two grants for Project FORESIGHT for the years 2009 through 2015. The Project FORESIGHT team was tasked with studying the forensic science industry and developing business metrics for forensic laboratories that would enable them to gain efficiencies and become more cost effective, thus addressing the bottleneck in the justice system. While Project FORESIGHT has had a pronounced effect on the participating laboratories, less than 20% of U.S. laboratories submit data to the project. The main reason for the lack of participation has been the difficulty in extracting the necessary data on laboratory casework and coupling that information with laboratory expenditures and personnel detail, which come from separate information management systems.

This proposal seeks funding to overcome this participation hurdle through the creation of software that provides the interface between the testing and casework information maintained in a Laboratory Information Management System (LIMS) and the separate financial and personnel systems. This software will be developed under ASCLD's leadership to connect the NIJ's FORESIGHT measurement standards with laboratories nationwide to permit broader forensic science industry perspectives and to enhance the business metrics available to

individual laboratory directors for daily decision-making. Organizing software development through the four major LIMS providers offers a permanent software solution to all crime laboratories for access to business metrics and does so at no cost to the individual laboratories. For laboratories participating in FORESIGHT, these business metrics have permitted dramatic increases in efficiency and saved hundreds of millions of dollars. Extending participation fivefold is expected to have similarly magnified gains. Once initiated across the leading LIMS providers, this offers a permanent, broad-based system for monitoring performance of the individual laboratory and details on the performance across all forensic science.

PROJECT DESCRIPTION

The American Society of Crime Laboratory Directors (ASCLD) is a nonprofit professional society of crime laboratory directors and forensic science managers dedicated to providing excellence in forensic science through leadership and innovation. The purpose of the organization is to foster professional interests, assist the development of laboratory management principles and techniques; acquire, preserve and disseminate forensic based information; maintain and improve communications among crime laboratory directors; and to promote, encourage and maintain the highest standards of practice in the field. With this mandate, ASCLD proposed to the Laura and John Arnold Foundation an investment to dramatically increase the efficiency and effectiveness of crime laboratories nationwide through the creation of financial intelligence software.

With ever increasing demands for services and shrinking budgets, a crime laboratory must have a thorough understanding of their operations from a business perspective and a means to compare that performance to the standards of the “forensic science industry.” The National Institute of Justice (NIJ) has led efforts to improve laboratory business practices through the creation of Project FORESIGHT. Project FORESIGHT is a performance benchmarking model that enables crime laboratories to perform an internal business assessment and external comparison by standardizing terminology and performance metrics across local, state, and federal laboratories.

The FORESIGHT Project began as a funding award from the National Institute of Justice to the West Virginia University Forensic Science Initiative to develop a system that would enable laboratories to understand and assess the relationship between their casework, personnel, and budgetary expenditures. Forensic laboratory managers use these functions to assess resource allocations, human capital development, drive efficiencies, and evaluate the value of services—the mission is to measure, preserve what works, and change what does not. FORESIGHT is intended to support significant and enduring systematic reforms in accountability and decision-making in public forensic laboratories.

Participation in FORESIGHT is free, voluntary, and open to forensic science laboratories worldwide. FORESIGHT has led to significant improvement at the individual laboratory level and for the forensic industry. Evaluation of efficiency and effectiveness of a crime laboratory was virtually impossible without a common industry language and corresponding performance benchmarks. Individual annual reports to contributing laboratories detail the laboratory’s

metrics with emphasis on productivity, risk management, analytical process, and economic market forces. These annual evaluations are equivalent to a consultant's report, highlighting performance over time and across the industry. Even though participation is costless, less than 20% of U.S. laboratories enroll in the project. This low participation is not a comment on value of the project; rather a product of the difficulty of data extraction from multiple computer systems. Casework data is extracted from the LIMS, while personnel data and expenditures are extracted from one or more computer systems of the laboratory's parent organization (generally, a policing organization). To bridge the firewalls protecting the data in each system, laboratory management must manually extract data from these multiple systems to report their performance to project FORESIGHT. For many laboratories, the cost in time and resources is deemed too high to participate. NIJ recognizes this burden and their Forensic Science Technology Working Group Operation Requirements highlight the need for increased IT knowledge and software for management to improve productivity.

FORESIGHT has led to a macro view of the provision of forensic science services. The common measurements have permitted a review of fundamental economic hypotheses and the delivery of crime laboratory services for economic regions. The results have shown that individual laboratories are highly efficient in the provision of services, but rarely cost effective because of the reliance on political jurisdictions, rather than economic markets, for the provision of services.

Although many laboratories have adopted this program to guide their operations, a major obstacle for implementation has been the "hands on" time required by laboratory staff to manually gather and input the required data. This data is composed of both laboratory and financial metrics, each of which is stored in separate locations or in systems that do not communicate. This then requires significant time dedicated to downloading this information and transferring it to the FORESIGHT program. The FORESIGHT program is not integrated with any of the existing vendor LIMS systems. As the LIMS systems have evolved, their capabilities have advanced to allow a more detailed monitoring of evidence samples as they move through the laboratory system. The crime laboratory user can detect problems and/or issues with samples before a report is issued and provides for a greater transparency to the criminal justice system as to the analysis history and quality assurance of that item of evidence.

The development of such freeware then permits simple extraction and submission of FORESIGHT data. That allows 100% participation for all U.S. laboratories. Such a census, rather than the current voluntary sample, will benefit both the new participants as well as those laboratories currently in the program as a more complete picture of the forensic industry emerges. With the combination of casework, expenditures, and personnel data in a single database, the freeware will also permit easier reporting for federal grant purposes. For laboratory leadership, the freeware also permits the construction of a manager's data dashboard with up-to-the-minute productivity metrics.

The American Society of Crime Laboratory Directors is requesting funding to support the development of freeware software, FORESIGHT 20/20, enabling the seamless data collection of core business metrics from Laboratory Information Management Systems (LIMS) commonly employed by laboratories. Once implemented into the major LIMS providers, this legacy program requires no expenditures for individual laboratories beyond the normal updating of their LIMS.

Workforce Calculator

A 2019 National Institute of Justice report estimated that state and local forensic laboratories were understaffed by more than 900 positions.¹ In response to that shortfall, the Forensic Technology Center of Excellence at RTI International (FTCoE) commissioned the creation of a workforce calculator to assist forensic laboratories with an independent, objective determination of staffing needs.² The workforce calculator may be accessed from the FTCoE website (<https://forensiccoe.org/workforce-calculator-project/>) and is free to use. Users input details on the annual caseload for each area of investigation and the calculator provides an immediate response with the corresponding number of operational, administration and support staff to efficiently process that caseload.

The econometric estimates were developed from the performance of [FORESIGHT Maximus award](#) winning laboratories. Additional factors in the estimates include the state level violent and property crime rates, populations served, and the type of the jurisdiction covered by the laboratory. Additional output offers the corresponding annual investment in capital expenditures to support the optimal personnel.

Users are encouraged to share their results with Project FORESIGHT to assist in the continual updating of the tool. Greater detail about the project are available via the open-access publication in *Forensic Science International: Synergy*.³

FORESIGHT Digital Evidence

Since the initial efforts to collect data via Project FORESIGHT, receiving responses from forensic laboratories that examine digital evidence has been difficult. A small percentage of forensic laboratories reported areas of investigation for computer analysis or analysis of multimedia audio and video. Additionally, it appeared that the type of digital evidence activity differed widely between state-level laboratories and the analysis performed in metropolitan jurisdictions. Questions emerged regarding changes necessary to increase the number of reporting digital evidence laboratories.

In 2018 the National Institute of Justice created the Forensic Laboratory Needs Technology Working Group ([FLN-TWG](#)). “The FLN-TWG explores new ways to increase casework efficiencies and implement forensic technology innovations that will advance system-based

¹ U.S. Department of Justice, Office of Justice Programs. (2019). *Report to Congress: Needs Assessment of Forensic Laboratories and Medical Examiner/Coroner Offices*. Washington, DC: National Institute of Justice. <https://www.ncjrs.gov/pdffiles1/nij/253626.pdf>.

² This project was supported by Award No. 2016-MU-BX-K110, awarded by the National Institute of Justice, Office of Justice Programs, U.S. Department of Justice. The opinions, findings, and conclusions or recommendations expressed in this publication are those of the author and do not necessarily reflect those of the Department of Justice.

³ Speaker, P. J. (2021). An Independent Evaluation of Laboratory Staffing Needs: Launching the Forensic Laboratory Workforce Calculator. *Forensic Science International: Synergy*, 3(1). <https://doi.org/10.1016/j.fsisyn.2021.100137>.

strategies and lead to a stronger justice system and safer communities.” Among the initial efforts of FLN-TWG was the development of a white paper with suggestions to improve data collection for analysis of digital evidence. The white paper identified additional organizations beyond ASCLD to identify and contact digital evidence laboratories for participation in Project FORESIGHT. FLN-TWG offered some data categorization models to better recognize evolving technologies.

In 2021, the Forensic Technology Center of Excellence (FTCoE) funded a project, FORESIGHT Digital Evidence – Creation & Data Gathering (Award 2016-DN-BX-K110), to improve Project FORESIGHT. The funding led to the creation of the Laboratory Reporting and Analysis Tool for Digital Evidence (LabRAT DE), designed to capture the suggestions from FLN-TWG. LabRAT DE simplifies the reporting of financial data (Figure 1) and updates the data collected on casework (Figure 2).

Figure 1: FORESIGHT DE Expenditures

| Expenditure Information: | | |
|---|-----|---|
| Currency of Expenditure data | | |
| Personnel Expenditures (salary, benefits, & overtime) | | |
| Capital Expenditures | | |
| Consumable Expenditures | | |
| Other Expenditures (Overhead, etc.) | | |
| Total Expenditures | \$0 | Automatically sums the categories above |
| Do Total Expenditures include a charge for: | | |
| utilities | 0 | enter 1 for yes; 0 for no |
| telecommunications | 0 | enter 1 for yes; 0 for no |

Figure 2: FORESIGHT DE Casework & FTE Allocation

| Digital Evidence Category: | Mobile | Computer | Video | Mass Storage | Other (drones, watches, Internet of Things, etc.) |
|--|---|----------|-------|--------------|---|
| Operational FTE | | | | | |
| Administration & Support FTE | | | | | |
| Cases | | | | | |
| items | | | | | |
| items outsourced | | | | | |
| Items examined internally | | | | | |
| reports | | | | | |
| Gigabytes examined | | | | | |
| Median (days) turn around time (TAT) | | | | | |
| open cases at end of year | | | | | |
| Year end open cases older than 30 days | | | | | |
| If your laboratory assists outside agencies, please complete the following: | | | | | |
| Cases assisted for outside agencies | | | | | |
| Items examined for outside agencies | | | | | |
| Median TAT for assisted cases (days) | | | | | |
| Personnel Time Allocation | Provide an estimate of the percentage of time spent in each activity for operational FTE. | | | | |
| Casework | | | | | |
| Technical Review | | | | | |
| Testimony & Testimony Preparation | | | | | |
| Training | | | | | |
| Continuing Education | | | | | |
| Non-Digital Evidence Duties | | | | | |
| Other | | | | | |

The trial data collection efforts proved to be successful with an additional 49 digital evidence data submissions using the FORESIGHT DE data collection tool in FY2021, rising to 54 digital evidence data submissions from digital-only operations in FY2022.

Relative Volume & Activity Metrics

The use of the forensic crime laboratory differs across jurisdictions. The FBI's National Incident-Based Reporting System (NIBRS) offers some indication of the volume of crime. FORESIGHT offers additional indication of the role of the forensic crime laboratory in the processing of evidence for the population served by the laboratory.

Cases per 100,000 Population Served

A **case** in an investigative area refers to a request from a crime laboratory customer that includes forensic investigation in that investigative area. Note that a customer request may lead to a case in multiple investigative areas.

Table 2: Cases per 100,000 Population Served

| Cases per 100,000 population | | | |
|---|-----------------|--------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 44.07 | 86.53 | 173.40 |
| Crime Scene Investigation | 1.40 | 5.53 | 16.59 |
| Digital evidence | 3.05 | 7.80 | 23.40 |
| DNA Casework | 40.66 | 79.03 | 125.11 |
| DNA Database | 42.50 | 145.09 | 248.03 |
| Document Examination | 0.60 | 0.83 | 1.15 |
| Drugs - Controlled Substances | 176.52 | 235.54 | 360.22 |
| Evidence Screening & Processing | 35.86 | 64.39 | 576.89 |
| Explosives | 0.11 | 0.12 | 0.12 |
| Fingerprints | 26.24 | 36.69 | 64.58 |
| Fingerprints Database (including IAFIS) | 14.89 | 23.16 | 67.84 |
| Fire analysis | 2.05 | 2.52 | 5.65 |
| Firearms and Ballistics | 10.23 | 19.90 | 37.84 |
| Firearms Database (including NIBIN) | 31.68 | 115.46 | 247.44 |
| Forensic Pathology | 57.62 | 58.58 | 63.70 |
| Gun Shot Residue (GSR) | 2.28 | 5.07 | 8.19 |
| Marks and Impressions | 0.20 | 0.40 | 0.70 |
| Serology/Biology | 20.57 | 38.88 | 57.15 |
| Toxicology ante mortem (excluding BAC) | 40.34 | 65.03 | 98.37 |
| Toxicology post mortem (excluding BAC) | 51.85 | 70.90 | 142.46 |
| Trace Evidence | 0.86 | 1.29 | 2.15 |

Items Processed Internally per 100,000 Population Served

An **item** refers to a single object for examination submitted to the laboratory. Note that one item may be investigated and counted in several investigation areas.

Table 3: Items Processed Internally per 100,000 Population Served

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 52.52 | 76.59 | 101.35 |
| Crime Scene Investigation | 6.77 | 420.77 | 485.47 |
| Digital evidence | 4.73 | 10.47 | 26.66 |
| DNA Casework | 151.36 | 240.65 | 583.72 |
| DNA Database | 121.83 | 173.15 | 241.32 |
| Document Examination | 2.14 | 3.87 | 6.32 |
| Drugs - Controlled Substances | 477.55 | 649.69 | 1,014.37 |
| Evidence Screening & Processing | 37.87 | 65.38 | 92.88 |
| Explosives | 0.32 | 0.34 | 0.36 |
| Fingerprints | 55.41 | 163.83 | 332.10 |
| Fingerprints Database (including IAFIS) | 32.45 | 49.54 | 74.15 |
| Fire analysis | 5.68 | 8.64 | 11.78 |
| Firearms and Ballistics | 61.57 | 113.23 | 144.42 |
| Firearms Database (including NIBIN) | 66.05 | 157.47 | 797.22 |
| Forensic Pathology | 54.38 | 55.61 | 56.83 |
| Gun Shot Residue (GSR) | 3.74 | 6.68 | 21.69 |
| Marks and Impressions | 0.78 | 0.80 | 5.38 |
| Serology/Biology | 33.20 | 154.38 | 241.04 |
| Toxicology ante mortem (excluding BAC) | 40.36 | 53.08 | 69.91 |
| Toxicology post mortem (excluding BAC) | 68.67 | 93.39 | 105.89 |
| Trace Evidence | 3.61 | 4.45 | 8.96 |

Samples per 100,000 Population Served

A **sample** refers to an item of evidence or a portion of an item of evidence that generates a reported result.

Table 4: Samples Examined per 100,000 Population Served

| Samples Examined per 100,000 population | | | |
|---|-----------------|--------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 47.36 | 109.95 | 150.22 |
| Crime Scene Investigation | 49,718 | | |
| Digital evidence | 12,980 | | |
| DNA Casework | 265.12 | 387.27 | 719.61 |
| DNA Database | 219.77 | 288.37 | 320.02 |
| Document Examination | 5.55 | 8.99 | 9.45 |
| Drugs - Controlled Substances | 523.75 | 721.19 | 946.80 |
| Evidence Screening & Processing | 58.36 | 79.44 | 100.53 |
| Explosives | 1.06 | 1.14 | 1.22 |
| Fingerprints | 96.45 | 184.48 | 443.24 |
| Fingerprints Database (including IAFIS) | 53.76 | 88.26 | 488.82 |
| Fire analysis | 7.05 | 12.17 | 25.28 |
| Firearms and Ballistics | 109.80 | 123.16 | 150.88 |
| Firearms Database (including NIBIN) | 676.31 | 938.19 | 1,133.06 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | 5.22 | 27.66 | 53.87 |
| Marks and Impressions | 40.63 | 80.78 | 120.93 |
| Serology/Biology | 236.97 | 245.58 | 285.12 |
| Toxicology ante mortem (excluding BAC) | 61.30 | 80.45 | 85.11 |
| Toxicology post mortem (excluding BAC) | 68.97 | 130.37 | 197.38 |
| Trace Evidence | 8.30 | 13.29 | 17.68 |

Tests per 100,000 Population Served

A **test** refers to an analytical process, including but not limited to visual examination, instrumental analysis, presumptive evaluations, enhancement techniques, extractions, quantifications, microscopic techniques, and comparative examinations. This does not include technical or administrative reviews.

Table 5: Tests Performed per 100,000 Population Served

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|----------|-----------------|
| Blood Alcohol | 101.08 | 158.80 | 234.17 |
| Crime Scene Investigation | 440.54 | 455.84 | 471.14 |
| Digital evidence | 17.99 | 38.09 | 73.61 |
| DNA Casework | 653.20 | 705.21 | 1,000.91 |
| DNA Database | 283.02 | 309.30 | 1,253.85 |
| Document Examination | 4.35 | 4.35 | 4.35 |
| Drugs - Controlled Substances | 1,226.30 | 1,594.69 | 2,683.82 |
| Evidence Screening & Processing | 294.99 | 423.18 | 551.36 |
| Explosives | 2.61 | 4.01 | 5.40 |
| Fingerprints | 307.64 | 416.73 | 1,212.52 |
| Fingerprints Database (including IAFIS) | 131.26 | 209.71 | 288.16 |
| Fire analysis | 10.05 | 11.24 | 24.70 |
| Firearms and Ballistics | 107.73 | 144.50 | 175.95 |
| Firearms Database (including NIBIN) | 239.98 | 278.70 | 317.42 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | 4.86 | 48.67 | 62.59 |
| Marks and Impressions | 2.00 | 3.13 | 4.25 |
| Serology/Biology | 223.79 | 368.60 | 444.96 |
| Toxicology ante mortem (excluding BAC) | 94.26 | 181.83 | 236.99 |
| Toxicology post mortem (excluding BAC) | 154.83 | 264.01 | 618.92 |
| Trace Evidence | 22.98 | 38.28 | 81.10 |

Reports per 100,000 Population Served

A **report** refers to a formal statement of the results of an investigation, or of any matter on which definite information is required, made by some person or body instructed or required to do so.

Table 6: Reports per 100,000 Population Served

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 43.49 | 71.42 | 137.99 |
| Crime Scene Investigation | 5.96 | 8.44 | 105.34 |
| Digital evidence | 2.52 | 7.55 | 37.88 |
| DNA Casework | 45.51 | 81.98 | 134.73 |
| DNA Database | 20.11 | 57.19 | 136.75 |
| Document Examination | 0.62 | 0.97 | 1.19 |
| Drugs - Controlled Substances | 199.05 | 267.92 | 469.48 |
| Evidence Screening & Processing | 39.78 | 39.78 | 39.78 |
| Explosives | 0.12 | 0.13 | 0.13 |
| Fingerprints | 28.05 | 35.69 | 72.30 |
| Fingerprints Database (including IAFIS) | 14.85 | 22.67 | 73.15 |
| Fire analysis | 1.97 | 2.42 | 5.48 |
| Firearms and Ballistics | 14.86 | 17.11 | 39.29 |
| Firearms Database (including NIBIN) | 31.56 | 131.96 | 410.16 |
| Forensic Pathology | 55.06 | 56.47 | 57.89 |
| Gun Shot Residue (GSR) | 2.24 | 4.35 | 8.42 |
| Marks and Impressions | 0.17 | 0.47 | 0.99 |
| Serology/Biology | 8.85 | 32.69 | 46.81 |
| Toxicology ante mortem (excluding BAC) | 39.16 | 56.14 | 76.70 |
| Toxicology post mortem (excluding BAC) | 50.45 | 68.15 | 88.88 |
| Trace Evidence | 0.87 | 1.38 | 1.73 |

Cost Metrics

Cost per Case

The **cost** includes allocations for capital, wages & salary, benefits, overtime & temporary hires, chemicals, reagents, consumables, gases, travel, quality assurance and accreditation, subcontracting, service of instruments, advertisements, non-instrument repairs and maintenance, equipment leasing, utilities, telecommunications, overhead, and other expenses.

A **case** in an investigative area refers to a request from a crime laboratory customer that includes forensic investigation in that investigative area. Note that a customer request may lead to a case in multiple investigative areas.

Table 7: Cost per Case by Investigative Area

| Cost per Case by Investigative Area | | | |
|---|-----------------|----------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | \$126 | \$220 | \$336 |
| Crime Scene Investigation | \$1,518 | \$3,981 | \$7,432 |
| Digital evidence | \$1,536 | \$2,714 | \$5,301 |
| DNA Casework | \$1,154 | \$1,482 | \$2,333 |
| DNA Database | \$47 | \$79 | \$134 |
| Document Examination | \$5,842 | \$6,935 | \$10,661 |
| Drugs - Controlled Substances | \$288 | \$407 | \$502 |
| Evidence Screening & Processing | \$603 | \$949 | \$1,163 |
| Explosives | \$10,115 | \$18,048 | \$23,330 |
| Fingerprints | \$790 | \$1,077 | \$1,460 |
| Fingerprints Database (including IAFIS) | \$226 | \$532 | \$947 |
| Fire analysis | \$1,972 | \$3,064 | \$5,013 |
| Firearms and Ballistics | \$1,423 | \$2,405 | \$3,549 |
| Firearms Database (including NIBIN) | \$81 | \$223 | \$611 |
| Forensic Pathology | \$1,992 | \$2,098 | \$2,278 |
| Gun Shot Residue (GSR) | \$2,309 | \$3,424 | \$4,764 |
| Marks and Impressions | \$5,804 | \$6,902 | \$9,523 |
| Serology/Biology | \$840 | \$1,172 | \$1,946 |
| Toxicology ante mortem (excluding BAC) | \$589 | \$798 | \$997 |
| Toxicology post mortem (excluding BAC) | \$636 | \$899 | \$1,017 |
| Trace Evidence | \$4,364 | \$5,782 | \$9,820 |

Real Cost per Case

Project FORESIGHT submissions have increased annually. Although laboratory participation is voluntary, the summary statistics have been relatively consistent across time, particularly for areas of investigation that have large numbers of submissions. For those areas with fewer observations, there has been a fair amount of fluctuation, indicative of the smaller sample and the voluntary nature of the submissions. To illustrate the time series behaviour of the median performance, the following table provides a comparison of the cost/case over time after correcting for inflation. These measures are termed “real cost/case” where real refers to inflation-adjusted measures. We converted prior year’s metrics to 2021-2022 prices.

Table 8: Real* Cost per Case across Time

| Real Cost per Case over time (2021.12 = 100) | | | | | |
|--|-------------|-------------|-------------|-------------|-------------|
| Area of Investigation | 2017 - 2018 | 2018 - 2019 | 2019 - 2020 | 2020 - 2021 | 2021 - 2022 |
| Blood Alcohol | \$161 | \$167 | \$170 | \$256 | \$220 |
| Crime Scene Investigation | \$1,788 | \$2,635 | \$2,166 | \$4,195 | \$3,981 |
| Digital evidence | \$4,903 | \$4,760 | \$4,141 | \$4,009 | \$2,714 |
| DNA Casework | \$1,429 | \$1,520 | \$1,552 | \$1,614 | \$1,482 |
| DNA Database | \$65 | \$62 | \$69 | \$85 | \$79 |
| Document Examination | \$5,282 | \$4,491 | \$5,720 | \$6,274 | \$6,935 |
| Drugs - Controlled Substances | \$394 | \$354 | \$402 | \$438 | \$407 |
| Evidence Screening & Processing | \$724 | \$853 | \$927 | \$797 | \$949 |
| Explosives | \$19,904 | \$18,660 | \$19,647 | \$20,056 | \$18,048 |
| Fingerprints | \$896 | \$901 | \$1,034 | \$1,071 | \$1,077 |
| Fingerprints Database (including IAFIS) | | | \$867 | \$578 | \$532 |
| Fire analysis | \$2,402 | \$2,671 | \$2,591 | \$2,710 | \$3,064 |
| Firearms and Ballistics | \$2,051 | \$1,875 | \$2,118 | \$2,464 | \$2,405 |
| Firearms Database (including NIBIN) | | | \$219 | \$237 | \$223 |
| Forensic Pathology | \$1,958 | \$2,812 | \$2,343 | \$2,296 | \$2,098 |
| Gun Shot Residue (GSR) | \$3,497 | \$3,191 | \$3,521 | \$3,595 | \$3,424 |
| Marks and Impressions | \$7,646 | \$6,864 | \$8,755 | \$9,604 | \$6,902 |
| Serology/Biology | \$1,040 | \$1,048 | \$1,138 | \$1,208 | \$1,172 |
| Toxicology ante mortem (excluding BAC) | \$970 | \$802 | \$898 | \$881 | \$798 |
| Toxicology post mortem (excluding BAC) | \$986 | \$1,016 | \$1,054 | \$1,006 | \$899 |
| Trace Evidence | \$5,021 | \$7,009 | \$5,052 | \$5,355 | \$5,782 |

Cost per Item

Differences in case detail and differences in case complexity across laboratories (and across time) suggest that other relative cost measures may offer more meaningful comparison. FORESIGHT data collection includes measures for items, samples, and tests in each investigative area.

An **item** refers to a single object for examination submitted to the laboratory. Note that one item may be investigated and counted in several investigation areas. As noted above, the **cost** includes allocations for capital, wages & salary, benefits, overtime & temporary hires, chemicals, reagents, consumables, gases, travel, quality assurance and accreditation, subcontracting, service of instruments, advertisements, non-instrument repairs and maintenance, equipment leasing, utilities, telecommunications, overhead, and other expenses.

Table 9: Cost per Item Processed by Investigative Area

| Cost per Item Examined Internally by Investigative Area | | | |
|---|-----------------|---------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | \$140 | \$221 | \$317 |
| Crime Scene Investigation | \$317 | \$674 | \$1,449 |
| Digital evidence | \$1,015 | \$1,693 | \$2,922 |
| DNA Casework | \$386 | \$496 | \$755 |
| DNA Database | \$45 | \$68 | \$105 |
| Document Examination | \$1,434 | \$1,551 | \$2,136 |
| Drugs - Controlled Substances | \$162 | \$227 | \$282 |
| Evidence Screening & Processing | \$293 | \$452 | \$481 |
| Explosives | \$3,768 | \$4,618 | \$6,256 |
| Fingerprints | \$296 | \$398 | \$568 |
| Fingerprints Database (including IAFIS) | \$55 | \$162 | \$231 |
| Fire analysis | \$792 | \$1,204 | \$2,051 |
| Firearms and Ballistics | \$409 | \$798 | \$1,187 |
| Firearms Database (including NIBIN) | \$38 | \$90 | \$157 |
| Forensic Pathology | \$1,982 | \$2,012 | \$2,043 |
| Gun Shot Residue (GSR) | \$1,247 | \$1,744 | \$2,543 |
| Marks and Impressions | \$2,156 | \$2,314 | \$3,251 |
| Serology/Biology | \$245 | \$336 | \$573 |
| Toxicology ante mortem (excluding BAC) | \$557 | \$685 | \$877 |
| Toxicology post mortem (excluding BAC) | \$340 | \$413 | \$513 |
| Trace Evidence | \$473 | \$674 | \$939 |

Cost per Sample

A **sample** refers to an item of evidence or a portion of an item of evidence that generates a reported result.

As noted above, the **cost** includes allocations for capital, wages & salary, benefits, overtime & temporary hires, chemicals, reagents, consumables, gases, travel, quality assurance and accreditation, subcontracting, service of instruments, advertisements, non-instrument repairs and maintenance, equipment leasing, utilities, telecommunications, overhead, and other expenses.

The sample offers a consistently applied metric across laboratories and suggests an average cost measure that is intuitively comparable in cross sectional commentary.

Table 10: Cost per Sample by Investigative Area

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|---------|-----------------|
| Blood Alcohol | \$137 | \$226 | \$299 |
| Crime Scene Investigation | \$190 | \$446 | \$715 |
| Digital evidence | \$845 | \$1,614 | \$2,200 |
| DNA Casework | \$242 | \$342 | \$487 |
| DNA Database | \$44 | \$63 | \$102 |
| Document Examination | \$891 | \$926 | \$1,402 |
| Drugs - Controlled Substances | \$113 | \$142 | \$171 |
| Evidence Screening & Processing | \$308 | \$467 | \$496 |
| Explosives | \$1,319 | \$1,787 | \$2,265 |
| Fingerprints | \$203 | \$260 | \$359 |
| Fingerprints Database (including IAFIS) | \$69 | \$99 | \$166 |
| Fire analysis | \$395 | \$599 | \$882 |
| Firearms and Ballistics | \$329 | \$541 | \$720 |
| Firearms Database (including NIBIN) | \$77 | \$92 | \$218 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | \$756 | \$904 | \$1,181 |
| Marks and Impressions | \$650 | \$779 | \$1,074 |
| Serology/Biology | \$56 | \$83 | \$135 |
| Toxicology ante mortem (excluding BAC) | \$570 | \$756 | \$923 |
| Toxicology post mortem (excluding BAC) | \$200 | \$230 | \$299 |
| Trace Evidence | \$265 | \$377 | \$476 |

Cost per Test

A **test** refers to an analytical process, including but not limited to visual examination, instrumental analysis, presumptive evaluations, enhancement techniques, extractions, quantifications, microscopic techniques, and comparative examinations. This does not include technical or administrative reviews.

As noted above, the **cost** includes allocations for capital, wages & salary, benefits, overtime & temporary hires, chemicals, reagents, consumables, gases, travel, quality assurance and accreditation, subcontracting, service of instruments, advertisements, non-instrument repairs and maintenance, equipment leasing, utilities, telecommunications, overhead, and other expenses.

Table 11: Cost per Test by Investigative Area

| Cost per Test by Investigative Area | | | |
|---|-----------------|--------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | \$73 | \$124 | \$168 |
| Crime Scene Investigation | \$11 | \$11 | \$272 |
| Digital evidence | \$236 | \$423 | \$782 |
| DNA Casework | \$59 | \$82 | \$120 |
| DNA Database | \$41 | \$62 | \$102 |
| Document Examination | \$340 | \$449 | \$911 |
| Drugs - Controlled Substances | \$51 | \$63 | \$77 |
| Evidence Screening & Processing | \$80 | \$110 | \$139 |
| Explosives | \$327 | \$416 | \$537 |
| Fingerprints | \$84 | \$113 | \$171 |
| Fingerprints Database (including IAFIS) | \$196 | \$295 | \$393 |
| Fire analysis | \$251 | \$378 | \$602 |
| Firearms and Ballistics | \$239 | \$447 | \$599 |
| Firearms Database (including NIBIN) | \$119 | \$145 | \$171 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | \$451 | \$598 | \$892 |
| Marks and Impressions | \$486 | \$549 | \$701 |
| Serology/Biology | \$49 | \$65 | \$107 |
| Toxicology ante mortem (excluding BAC) | \$91 | \$112 | \$157 |
| Toxicology post mortem (excluding BAC) | \$79 | \$93 | \$122 |
| Trace Evidence | \$118 | \$184 | \$252 |

Cost per Report

A **report** refers to a formal statement of the results of an investigation, or of any matter on which definite information is required, made by some person or body instructed or required to do so.

As noted above, the **cost** includes allocations for capital, wages & salary, benefits, overtime & temporary hires, chemicals, reagents, consumables, gases, travel, quality assurance and accreditation, subcontracting, service of instruments, advertisements, non-instrument repairs and maintenance, equipment leasing, utilities, telecommunications, overhead, and other expenses.

Table 12: Cost per Report by Investigative Area

| Cost per Report by Investigative Area | | | |
|---|-----------------|----------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | \$142 | \$227 | \$322 |
| Crime Scene Investigation | \$1,078 | \$3,261 | \$5,315 |
| Digital evidence | \$1,564 | \$3,252 | \$6,838 |
| DNA Casework | \$1,172 | \$1,595 | \$2,357 |
| DNA Database | \$42 | \$66 | \$108 |
| Document Examination | \$5,945 | \$6,262 | \$8,695 |
| Drugs - Controlled Substances | \$298 | \$423 | \$505 |
| Evidence Screening & Processing | | \$869 | |
| Explosives | \$12,430 | \$17,971 | \$20,449 |
| Fingerprints | \$789 | \$1,019 | \$1,466 |
| Fingerprints Database (including IAFIS) | \$206 | \$239 | \$905 |
| Fire analysis | \$2,148 | \$3,177 | \$5,257 |
| Firearms and Ballistics | \$1,417 | \$2,166 | \$3,413 |
| Firearms Database (including NIBIN) | \$138 | \$219 | \$601 |
| Forensic Pathology | \$1,957 | \$1,981 | \$2,006 |
| Gun Shot Residue (GSR) | \$2,600 | \$3,860 | \$4,949 |
| Marks and Impressions | \$6,073 | \$6,663 | \$9,348 |
| Serology/Biology | \$902 | \$1,261 | \$2,159 |
| Toxicology ante mortem (excluding BAC) | \$633 | \$841 | \$1,080 |
| Toxicology post mortem (excluding BAC) | \$671 | \$891 | \$1,037 |
| Trace Evidence | \$3,890 | \$5,750 | \$7,863 |

Metric Interpretation

The various unit cost metrics may be interpreted using the technique highlighted in [The Decomposition of Return on Investment for Forensic Laboratories](#) (Speaker, 2009). Consider the Cost/Case metric which may be decomposed into:

$$\frac{\text{Cost}}{\text{Case}} = \frac{\text{Average Compensation} \times \text{Testing Intensity}}{\text{Personnel Productivity} \times \text{Personnel Expense Ratio}}$$

From the decomposition expression for the Cost/Case, an increase in the numerator components, Average Compensation or Testing (or Sampling) Intensity, will increase the cost per case. Similarly, a decrease in denominator component will increase the cost per case. This may occur from either a drop in productivity, as measured by cases processed per FTE, or from an increase in capital investment for future productivity but financed via a drop in personnel expenses relative to total expenses.

Although the metric breakdown illustrated above offers a decomposition of the Cost/Case metric, a similar procedure may be applied to other cost metrics. Likewise, the Testing Intensity metric may be replaced by a Sampling Intensity metric (e.g., Samples/Case) or similar decomposition which offers the most meaning to the individual laboratory.

Market Metrics

A substantial portion of the cost to the laboratory comes through personal services budget for salary and benefits. (The section below on Analytical Process Metrics highlights the percentage of total costs attributable to personnel expenditures.) Laboratories across the globe and across a particular country face very different labor markets and cost of living conditions. As such, accounting for the salary and benefit pressures in each market is beyond the direct control of the individual laboratory and is subject to the market forces in a laboratory's political jurisdiction.

It may be helpful for a laboratory to replace their specific average compensation with that of the reported sample median to gain insight into how they compare to other laboratories once market forces have been neutralized.

Average Compensation

Note that **compensation** includes all personnel expenditures. This includes wages, salary, and benefits operating staff, support staff, and administrative staff. Centrally assigned compensation is apportioned to each investigative area according to the percentage of full-time equivalent employees assigned to a particular investigative area.

The values reported in this table and other tables with budgetary metrics have been converted to the currency of the reporting laboratory using the exchange rate for December 31 of the measured year as reported at www.xe.com.

Table 13: Average Compensation by Investigative Area

| Average Compensation by Investigative Area | | | |
|--|-----------------|-----------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | \$75,473 | \$90,521 | \$107,254 |
| Crime Scene Investigation | \$94,460 | \$110,535 | \$121,777 |
| Digital evidence | \$82,053 | \$107,845 | \$121,857 |
| DNA Casework | \$108,614 | \$127,810 | \$140,473 |
| DNA Database | \$93,439 | \$103,200 | \$121,594 |
| Document Examination | \$110,890 | \$116,196 | \$138,811 |
| Drugs - Controlled Substances | \$101,091 | \$115,455 | \$127,503 |
| Evidence Screening & Processing | \$77,764 | \$97,373 | \$104,348 |
| Explosives | \$95,834 | \$110,615 | \$131,331 |
| Fingerprints | \$98,641 | \$105,813 | \$117,890 |
| Fingerprints Database (including IAFIS) | \$94,350 | \$108,290 | \$149,757 |
| Fire analysis | \$102,254 | \$114,586 | \$124,984 |
| Firearms and Ballistics | \$104,644 | \$114,610 | \$127,673 |
| Firearms Database (including NIBIN) | \$64,558 | \$91,960 | \$149,202 |
| Forensic Pathology | \$192,423 | \$275,030 | \$363,491 |
| Gun Shot Residue (GSR) | \$98,493 | \$104,998 | \$118,930 |
| Marks and Impressions | \$97,754 | \$115,051 | \$146,216 |
| Serology/Biology | \$90,580 | \$102,152 | \$113,666 |
| Toxicology ante mortem (excluding BAC) | \$95,066 | \$105,011 | \$116,727 |
| Toxicology post mortem (excluding BAC) | \$98,248 | \$105,816 | \$113,229 |
| Trace Evidence | \$100,588 | \$125,579 | \$173,785 |

Risk Management Metrics

There are a variety of metrics that may be used in the decomposition of average cost to suggest quality and/or risk. Three of these metrics follow to highlight the level of testing, sampling, and items examined internally per case.

Items per Case

An **item** refers to a single object for examination submitted to the laboratory. Note that one item may be investigated and counted in several investigation areas.

A **case** in an investigative area refers to a request from a crime laboratory customer that includes forensic investigation in that investigative area. Note that a customer request may lead to a case in multiple investigative areas.

Table 14: Items per Case by Investigative Area

| Items per Case by Investigative Area | | | |
|---|-----------------|--------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 1.01 | 1.05 | 1.09 |
| Crime Scene Investigation | 4.32 | 4.83 | 5.11 |
| Digital evidence | 1.43 | 2.48 | 2.90 |
| DNA Casework | 2.88 | 3.05 | 3.27 |
| DNA Database | 0.97 | 1.00 | 1.03 |
| Document Examination | 3.96 | 4.10 | 4.69 |
| Drugs - Controlled Substances | 1.69 | 1.79 | 1.94 |
| Evidence Screening & Processing | 2.42 | 2.46 | 2.50 |
| Explosives | 3.00 | 3.64 | 3.78 |
| Fingerprints | 2.18 | 2.34 | 2.50 |
| Fingerprints Database (including IAFIS) | 1.76 | 2.91 | 3.91 |
| Fire analysis | 2.46 | 2.55 | 2.74 |
| Firearms and Ballistics | 2.73 | 2.86 | 3.08 |
| Firearms Database (including NIBIN) | 1.03 | 1.39 | 1.59 |
| Forensic Pathology | 0.94 | 0.97 | 1.00 |
| Gun Shot Residue (GSR) | 1.99 | 2.09 | 2.19 |
| Marks and Impressions | 2.64 | 2.80 | 3.11 |
| Serology/Biology | 3.54 | 3.67 | 3.85 |
| Toxicology ante mortem (excluding BAC) | 1.11 | 1.19 | 1.25 |
| Toxicology post mortem (excluding BAC) | 1.61 | 2.23 | 2.35 |
| Trace Evidence | 7.26 | 7.90 | 8.31 |

Samples per Case

A **sample** refers to an item of evidence or a portion of an item of evidence that generates a reported result.

A **case** in an investigative area refers to a request from a crime laboratory customer that includes forensic investigation in that investigative area. Note that a customer request may lead to a case in multiple investigative areas.

Table 15: Samples per Case by Investigative Area

| Samples per Case by Investigative Area | | | |
|---|-----------------|--------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 1.05 | 1.08 | 1.13 |
| Crime Scene Investigation | 7.77 | 7.96 | 8.50 |
| Digital evidence | 3.82 | 4.10 | 4.24 |
| DNA Casework | 4.70 | 4.97 | 5.23 |
| DNA Database | 0.97 | 1.01 | 1.06 |
| Document Examination | 6.39 | 6.55 | 7.71 |
| Drugs - Controlled Substances | 2.78 | 3.01 | 3.14 |
| Evidence Screening & Processing | 2.30 | 2.37 | 2.41 |
| Explosives | 9.60 | 9.86 | 10.09 |
| Fingerprints | 3.62 | 3.85 | 4.05 |
| Fingerprints Database (including IAFIS) | 1.76 | 2.51 | 3.78 |
| Fire analysis | 5.43 | 5.93 | 6.30 |
| Firearms and Ballistics | 4.47 | 4.80 | 5.01 |
| Firearms Database (including NIBIN) | 1.42 | 1.64 | 2.21 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | 3.90 | 4.15 | 4.33 |
| Marks and Impressions | 8.77 | 8.93 | 9.44 |
| Serology/Biology | 16.61 | 17.40 | 18.03 |
| Toxicology ante mortem (excluding BAC) | 1.07 | 1.12 | 1.17 |
| Toxicology post mortem (excluding BAC) | 3.27 | 3.94 | 4.09 |
| Trace Evidence | 13.48 | 14.02 | 14.54 |

Tests per Case

A **test** refers to an analytical process, including but not limited to visual examination, instrumental analysis, presumptive evaluations, enhancement techniques, extractions, quantifications, microscopic techniques, and comparative examinations. This does not include technical or administrative reviews.

A **case** in an investigative area refers to a request from a crime laboratory customer that includes forensic investigation in that investigative area. Note that a customer request may lead to a case in multiple investigative areas.

Table 16: Tests per Case by Investigative Area

| Tests per Case by Investigative Area | | | |
|---|-----------------|--------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 1.78 | 1.90 | 2.00 |
| Crime Scene Investigation | 12.55 | 13.35 | 13.59 |
| Digital evidence | 15.55 | 16.76 | 17.79 |
| DNA Casework | 19.72 | 20.93 | 21.74 |
| DNA Database | 0.98 | 1.01 | 1.05 |
| Document Examination | 13.07 | 17.41 | 17.96 |
| Drugs - Controlled Substances | 6.25 | 6.68 | 7.02 |
| Evidence Screening & Processing | 10.74 | 11.84 | 12.93 |
| Explosives | 37.78 | 42.00 | 45.00 |
| Fingerprints | 8.27 | 8.76 | 9.30 |
| Fingerprints Database (including IAFIS) | 2.27 | 2.47 | 2.66 |
| Fire analysis | 8.80 | 9.23 | 9.81 |
| Firearms and Ballistics | 5.54 | 5.75 | 6.20 |
| Firearms Database (including NIBIN) | 1.36 | 1.91 | 2.46 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | 6.13 | 6.44 | 6.70 |
| Marks and Impressions | 12.57 | 12.98 | 13.36 |
| Serology/Biology | 19.06 | 20.02 | 20.89 |
| Toxicology ante mortem (excluding BAC) | 7.50 | 7.98 | 8.44 |
| Toxicology post mortem (excluding BAC) | 7.65 | 10.54 | 10.80 |
| Trace Evidence | 26.60 | 28.31 | 29.17 |

Reports per Case

A **report** refers to a formal statement of the results of an investigation, or of any matter on which definite information is required, made by some person or body instructed or required to do so.

A **case** in an investigative area refers to a request from a crime laboratory customer that includes forensic investigation in that investigative area. Note that a customer request may lead to a case in multiple investigative areas.

Table 17: Reports per Case by Investigative Area

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 0.95 | 0.99 | 1.02 |
| Crime Scene Investigation | 0.99 | 1.02 | 1.12 |
| Digital evidence | 0.89 | 1.01 | 1.06 |
| DNA Casework | 0.96 | 1.01 | 1.05 |
| DNA Database | 0.96 | 0.99 | 1.04 |
| Document Examination | 0.97 | 1.00 | 1.08 |
| Drugs - Controlled Substances | 0.96 | 1.00 | 1.02 |
| Evidence Screening & Processing | 0.56 | 0.56 | 0.56 |
| Explosives | 1.00 | 1.00 | 1.14 |
| Fingerprints | 0.94 | 0.98 | 1.03 |
| Fingerprints Database (including IAFIS) | 0.97 | 1.00 | 1.01 |
| Fire analysis | 0.94 | 1.00 | 1.00 |
| Firearms and Ballistics | 0.95 | 1.00 | 1.04 |
| Firearms Database (including NIBIN) | 0.74 | 1.00 | 1.00 |
| Forensic Pathology | 0.96 | 0.99 | 1.02 |
| Gun Shot Residue (GSR) | 0.93 | 1.00 | 1.04 |
| Marks and Impressions | 0.97 | 1.00 | 1.07 |
| Serology/Biology | 0.93 | 0.98 | 1.01 |
| Toxicology ante mortem (excluding BAC) | 0.94 | 1.00 | 1.03 |
| Toxicology post mortem (excluding BAC) | 0.97 | 1.00 | 1.04 |
| Trace Evidence | 0.87 | 0.90 | 0.96 |

Samples per Item

A **sample** refers to an item of evidence or a portion of an item of evidence that generates a reported result.

An **item** refers to a single object for examination submitted to the laboratory. Note that one item may be investigated and counted in several investigation areas.

Table 18: Samples per Item examined internally by Investigative Area

| Samples per Item Examined Internally by Investigative Area | | | |
|--|-----------------|--------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 1.00 | 1.03 | 1.08 |
| Crime Scene Investigation | 1.58 | 1.65 | 1.78 |
| Digital evidence | 1.36 | 1.46 | 1.54 |
| DNA Casework | 1.54 | 1.60 | 1.74 |
| DNA Database | 0.96 | 1.01 | 1.06 |
| Document Examination | 1.44 | 1.64 | 1.76 |
| Drugs - Controlled Substances | 1.54 | 1.64 | 1.76 |
| Evidence Screening & Processing | 0.94 | 0.98 | 1.01 |
| Explosives | 2.61 | 2.68 | 2.85 |
| Fingerprints | 1.53 | 1.68 | 1.76 |
| Fingerprints Database (including IAFIS) | 1.00 | 1.00 | 1.00 |
| Fire analysis | 2.11 | 2.28 | 2.40 |
| Firearms and Ballistics | 1.51 | 1.65 | 1.75 |
| Firearms Database (including NIBIN) | 1.00 | 1.01 | 1.04 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | 1.82 | 1.99 | 2.07 |
| Marks and Impressions | 2.98 | 3.13 | 3.50 |
| Serology/Biology | 4.42 | 4.69 | 4.93 |
| Toxicology ante mortem (excluding BAC) | 0.89 | 0.93 | 0.99 |
| Toxicology post mortem (excluding BAC) | 1.60 | 1.72 | 1.85 |
| Trace Evidence | 1.62 | 1.75 | 1.82 |

Tests per Item

A **test** refers to an analytical process, including but not limited to visual examination, instrumental analysis, presumptive evaluations, enhancement techniques, extractions, quantifications, microscopic techniques, and comparative examinations. This does not include technical or administrative reviews.

An **item** refers to a single object for examination submitted to the laboratory. Note that one item may be investigated and counted in several investigation areas.

Table 19: Tests per Item examined internally by Investigative Area

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 1.69 | 1.80 | 1.91 |
| Crime Scene Investigation | 1.01 | 1.01 | 1.02 |
| Digital evidence | 5.52 | 5.99 | 6.32 |
| DNA Casework | 6.45 | 6.81 | 7.29 |
| DNA Database | 0.98 | 1.02 | 1.06 |
| Document Examination | 4.03 | 4.23 | 4.60 |
| Drugs - Controlled Substances | 3.38 | 3.68 | 4.01 |
| Evidence Screening & Processing | 8.26 | 10.87 | 13.48 |
| Explosives | 10.74 | 11.72 | 11.96 |
| Fingerprints | 3.54 | 3.83 | 3.99 |
| Fingerprints Database (including IAFIS) | 0.78 | 1.15 | 1.52 |
| Fire analysis | 3.35 | 3.59 | 3.69 |
| Firearms and Ballistics | 1.85 | 2.02 | 2.17 |
| Firearms Database (including NIBIN) | 1.00 | 1.67 | 2.33 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | 2.88 | 3.08 | 3.21 |
| Marks and Impressions | 4.38 | 4.56 | 4.89 |
| Serology/Biology | 5.23 | 5.43 | 5.61 |
| Toxicology ante mortem (excluding BAC) | 6.00 | 6.65 | 6.93 |
| Toxicology post mortem (excluding BAC) | 4.30 | 4.70 | 4.98 |
| Trace Evidence | 3.33 | 3.49 | 3.74 |

Reports per Item

A **report** refers to a formal statement of the results of an investigation, or of any matter on which definite information is required, made by some person or body instructed or required to do so.

An **item** refers to a single object for examination submitted to the laboratory. Note that one item may be investigated and counted in several investigation areas.

Table 20: Reports per Item examined internally by Investigative Area

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 0.90 | 0.95 | 1.00 |
| Crime Scene Investigation | 0.20 | 0.21 | 0.24 |
| Digital evidence | 0.36 | 0.41 | 0.70 |
| DNA Casework | 0.30 | 0.33 | 0.35 |
| DNA Database | 0.94 | 0.99 | 1.04 |
| Document Examination | 0.23 | 0.25 | 0.27 |
| Drugs - Controlled Substances | 0.50 | 0.54 | 0.57 |
| Evidence Screening & Processing | 0.33 | 0.33 | 0.33 |
| Explosives | 0.26 | 0.27 | 0.33 |
| Fingerprints | 0.39 | 0.42 | 0.44 |
| Fingerprints Database (including IAFIS) | 0.23 | 0.40 | 0.63 |
| Fire analysis | 0.36 | 0.38 | 0.41 |
| Firearms and Ballistics | 0.32 | 0.36 | 0.37 |
| Firearms Database (including NIBIN) | 0.10 | 0.43 | 0.88 |
| Forensic Pathology | 1.01 | 1.02 | 1.02 |
| Gun Shot Residue (GSR) | 0.44 | 0.47 | 0.52 |
| Marks and Impressions | 0.32 | 0.35 | 0.38 |
| Serology/Biology | 0.24 | 0.26 | 0.27 |
| Toxicology ante mortem (excluding BAC) | 0.78 | 0.83 | 0.92 |
| Toxicology post mortem (excluding BAC) | 0.43 | 0.46 | 0.56 |
| Trace Evidence | 0.11 | 0.11 | 0.12 |

Tests per Sample

A **test** refers to an analytical process, including but not limited to visual examination, instrumental analysis, presumptive evaluations, enhancement techniques, extractions, quantifications, microscopic techniques, and comparative examinations. This does not include technical or administrative reviews.

A **sample** refers to an item of evidence or a portion of an item of evidence that generates a reported result.

Table 21: Tests per Sample by Investigative Area

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 1.65 | 1.75 | 1.83 |
| Crime Scene Investigation | | | |
| Digital evidence | 4.13 | 4.31 | 4.48 |
| DNA Casework | 4.01 | 4.17 | 4.37 |
| DNA Database | 0.97 | 1.00 | 1.04 |
| Document Examination | 1.88 | 2.66 | 2.76 |
| Drugs - Controlled Substances | 2.11 | 2.21 | 2.35 |
| Evidence Screening & Processing | 4.75 | 5.03 | 5.31 |
| Explosives | 4.10 | 4.28 | 4.44 |
| Fingerprints | 2.13 | 2.30 | 2.49 |
| Fingerprints Database (including IAFIS) | 0.41 | 0.41 | 0.41 |
| Fire analysis | 1.48 | 1.54 | 1.64 |
| Firearms and Ballistics | 1.16 | 1.21 | 1.29 |
| Firearms Database (including NIBIN) | 3.00 | 3.00 | 3.00 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | 1.42 | 1.54 | 1.62 |
| Marks and Impressions | 1.42 | 1.47 | 1.50 |
| Serology/Biology | 1.11 | 1.16 | 1.20 |
| Toxicology ante mortem (excluding BAC) | 6.54 | 7.05 | 7.50 |
| Toxicology post mortem (excluding BAC) | 2.50 | 2.65 | 2.86 |
| Trace Evidence | 1.91 | 2.04 | 2.18 |

Reports per Sample

A **report** refers to a formal statement of the results of an investigation, or of any matter on which definite information is required, made by some person or body instructed or required to do so.

A **sample** refers to an item of evidence or a portion of an item of evidence that generates a reported result.

Table 22: Reports per Sample by Investigative Area

| Reports per Sample by Investigative Area | | | |
|--|-----------------|--------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 0.87 | 0.92 | 0.96 |
| Crime Scene Investigation | 0.13 | 0.13 | 0.13 |
| Digital evidence | 0.24 | 0.27 | 0.28 |
| DNA Casework | 0.19 | 0.20 | 0.22 |
| DNA Database | 0.95 | 0.99 | 1.04 |
| Document Examination | 0.14 | 0.15 | 0.16 |
| Drugs - Controlled Substances | 0.31 | 0.33 | 0.36 |
| Evidence Screening & Processing | 0.33 | 0.33 | 0.33 |
| Explosives | 0.10 | 0.10 | 0.11 |
| Fingerprints | 0.23 | 0.26 | 0.27 |
| Fingerprints Database (including IAFIS) | 0.30 | 0.40 | 0.70 |
| Fire analysis | 0.16 | 0.17 | 0.19 |
| Firearms and Ballistics | 0.20 | 0.21 | 0.22 |
| Firearms Database (including NIBIN) | 0.51 | 0.68 | 0.83 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | 0.22 | 0.24 | 0.26 |
| Marks and Impressions | 0.10 | 0.11 | 0.11 |
| Serology/Biology | 0.05 | 0.06 | 0.06 |
| Toxicology ante mortem (excluding BAC) | 0.81 | 0.89 | 0.94 |
| Toxicology post mortem (excluding BAC) | 0.24 | 0.26 | 0.32 |
| Trace Evidence | 0.06 | 0.06 | 0.07 |

Productivity Metrics

Return to the decomposition measure for the cost/case. The denominator terms have the opposite effect on average cost. That is, as ***labor productivity*** or the ***labor expense ratio*** increase, average costs will fall. This confirms that, as a representative scientist is able to process more cases per year, then the effect will be a decrease in the average cost as fixed expenditures are averaged over a higher volume of processed cases. Similarly, if a greater portion of the budget is devoted to personnel expenditures (as opposed to capital investment) *ceteris paribus*, more cases will be processed for the same expenditure at the opportunity cost of delaying investment in capital equipment for future returns.

The next five tables contain the LabRAT summary statistics for alternative personnel productivity ratio measures.

Cases per FTE

This measure is simply the number of Cases completed for each full-time equivalent (FTE) employee (the work input of a full-time employee working for one full year) retained by the laboratory. It gives an indication of the level of productivity within the average laboratory by investigative area.

Table 23: Cases per FTE by Investigative Area

| Cases per FTE by Investigative Area | | | |
|---|-----------------|---------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 318.8 | 605.4 | 983.4 |
| Crime Scene Investigation | 15.7 | 45.6 | 75.7 |
| Digital evidence | 26.2 | 42.7 | 87.5 |
| DNA Casework | 78.3 | 101.0 | 133.6 |
| DNA Database | 1,204.9 | 2,515.7 | 3,702.9 |
| Document Examination | 16.5 | 21.0 | 26.6 |
| Drugs - Controlled Substances | 300.3 | 360.5 | 481.5 |
| Evidence Screening & Processing | 105.5 | 144.9 | 174.1 |
| Explosives | 5.6 | 7.6 | 11.2 |
| Fingerprints | 94.4 | 133.0 | 162.2 |
| Fingerprints Database (including IAFIS) | 216.7 | 327.2 | 549.6 |
| Fire analysis | 26.4 | 43.4 | 70.4 |
| Firearms and Ballistics | 45.0 | 63.8 | 112.4 |
| Firearms Database (including NIBIN) | 336.7 | 684.4 | 1,092.2 |
| Forensic Pathology | 104.4 | 155.5 | 207.1 |
| Gun Shot Residue (GSR) | 26.5 | 34.1 | 57.8 |
| Marks and Impressions | 14.2 | 19.1 | 27.2 |
| Serology/Biology | 58.5 | 112.7 | 144.9 |
| Toxicology ante mortem (excluding BAC) | 139.9 | 185.5 | 266.8 |
| Toxicology post mortem (excluding BAC) | 138.4 | 169.1 | 202.6 |
| Trace Evidence | 29.8 | 33.7 | 38.5 |

Items per FTE

This measure is the number of Items examined internally for each full-time equivalent (FTE) employee (the work input of a full-time employee working for one full year) retained by the laboratory. It gives an indication of the level of productivity within the average laboratory by investigative area.

Table 24: Items examined internally per FTE by Investigative Area

| Items Examined Internally per FTE by Investigative Area | | | |
|---|-----------------|---------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 330.0 | 564.9 | 1,067.5 |
| Crime Scene Investigation | 88.2 | 258.8 | 365.9 |
| Digital evidence | 53.2 | 79.7 | 129.1 |
| DNA Casework | 228.4 | 319.6 | 403.6 |
| DNA Database | 1,972.7 | 2,923.7 | 3,805.2 |
| Document Examination | 67.9 | 90.3 | 101.8 |
| Drugs - Controlled Substances | 533.1 | 664.7 | 894.6 |
| Evidence Screening & Processing | 242.8 | 337.8 | 406.3 |
| Explosives | 21.1 | 27.8 | 34.1 |
| Fingerprints | 244.8 | 328.5 | 425.2 |
| Fingerprints Database (including IAFIS) | 562.5 | 742.1 | 2,017.0 |
| Fire analysis | 65.0 | 102.5 | 164.5 |
| Firearms and Ballistics | 128.3 | 198.6 | 356.5 |
| Firearms Database (including NIBIN) | 1,098.9 | 1,298.7 | 2,943.0 |
| Forensic Pathology | 205.3 | 206.1 | 206.9 |
| Gun Shot Residue (GSR) | 52.9 | 66.5 | 100.6 |
| Marks and Impressions | 34.0 | 51.8 | 69.7 |
| Serology/Biology | 173.8 | 366.4 | 503.8 |
| Toxicology ante mortem (excluding BAC) | 167.8 | 207.9 | 255.3 |
| Toxicology post mortem (excluding BAC) | 273.3 | 323.3 | 407.3 |
| Trace Evidence | 235.8 | 271.4 | 313.3 |

Samples per FTE

This measure is the number of samples from Items examined internally for each full-time equivalent (FTE) employee (the work input of a full-time employee working for one full year) retained by the laboratory. It gives an indication of the level of productivity within the average laboratory by investigative area.

Table 25: Samples per FTE by Investigative Area

| Samples per FTE by Investigative Area | | | |
|---|-----------------|---------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 346.7 | 581.0 | 1,025.8 |
| Crime Scene Investigation | 211.4 | 459.2 | 644.0 |
| Digital evidence | 79.2 | 93.8 | 198.9 |
| DNA Casework | 346.6 | 489.4 | 645.4 |
| DNA Database | 2,382.3 | 3,126.2 | 3,892.3 |
| Document Examination | 112.5 | 134.4 | 169.9 |
| Drugs - Controlled Substances | 898.8 | 1,071.6 | 1,220.0 |
| Evidence Screening & Processing | 239.2 | 331.2 | 364.1 |
| Explosives | 54.2 | 76.1 | 104.6 |
| Fingerprints | 367.3 | 499.5 | 610.9 |
| Fingerprints Database (including IAFIS) | 742.1 | 877.6 | 1,797.8 |
| Fire analysis | 114.6 | 189.2 | 338.2 |
| Firearms and Ballistics | 212.3 | 280.9 | 492.6 |
| Firearms Database (including NIBIN) | 810.6 | 1,153.0 | 2,726.4 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | 97.2 | 128.4 | 193.3 |
| Marks and Impressions | 98.7 | 161.2 | 194.2 |
| Serology/Biology | 780.0 | 1,414.3 | 2,251.3 |
| Toxicology ante mortem (excluding BAC) | 158.0 | 187.4 | 252.2 |
| Toxicology post mortem (excluding BAC) | 463.2 | 594.9 | 685.1 |
| Trace Evidence | 437.9 | 486.5 | 529.8 |

Tests per FTE

This measure is the number of tests performed on samples for each full-time equivalent (FTE) employee (the work input of a full-time employee working for one full year) retained by the laboratory. It gives an indication of the level of productivity within the average laboratory by investigative area.

Table 26: Tests per FTE by Investigative Area

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 567 | 1,042 | 1,819 |
| Crime Scene Investigation | 313 | 334 | 334 |
| Digital evidence | 222 | 395 | 725 |
| DNA Casework | 1,487 | 2,042 | 2,681 |
| DNA Database | 2,481 | 3,276 | 4,066 |
| Document Examination | 156 | 383 | 428 |
| Drugs - Controlled Substances | 1,961 | 2,253 | 2,915 |
| Evidence Screening & Processing | 1,116 | 1,244 | 1,372 |
| Explosives | 191 | 261 | 364 |
| Fingerprints | 818 | 1,102 | 1,473 |
| Fingerprints Database (including IAFIS) | 444 | 669 | 895 |
| Fire analysis | 223 | 308 | 508 |
| Firearms and Ballistics | 261 | 341 | 622 |
| Firearms Database (including NIBIN) | 875 | 970 | 1,065 |
| Forensic Pathology | | | |
| Gun Shot Residue (GSR) | 148 | 203 | 287 |
| Marks and Impressions | 138 | 218 | 258 |
| Serology/Biology | 980 | 1,853 | 2,624 |
| Toxicology ante mortem (excluding BAC) | 1,014 | 1,235 | 1,599 |
| Toxicology post mortem (excluding BAC) | 1,202 | 1,548 | 1,802 |
| Trace Evidence | 867 | 989 | 1,124 |

Reports per FTE

This measure is the number of reports filed per full-time equivalent (FTE) employees (the work input of a full-time employee working for one full year) retained by the laboratory. It gives an indication of the level of productivity within the average laboratory by investigative area.

Table 27: Reports per FTE by Investigative Area

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|---------|-----------------|
| Blood Alcohol | 339.4 | 548.8 | 982.9 |
| Crime Scene Investigation | 21.2 | 50.4 | 82.4 |
| Digital evidence | 23.1 | 39.0 | 86.0 |
| DNA Casework | 76.9 | 99.9 | 132.6 |
| DNA Database | 1,838.8 | 2,954.5 | 3,884.6 |
| Document Examination | 18.5 | 20.8 | 25.2 |
| Drugs - Controlled Substances | 290.9 | 355.1 | 476.7 |
| Evidence Screening & Processing | | 87.8 | |
| Explosives | 5.4 | 7.0 | 11.4 |
| Fingerprints | 96.2 | 123.2 | 159.0 |
| Fingerprints Database (including IAFIS) | 263.5 | 453.9 | 556.5 |
| Fire analysis | 24.4 | 38.6 | 61.1 |
| Firearms and Ballistics | 45.5 | 65.0 | 101.2 |
| Firearms Database (including NIBIN) | 318.8 | 476.4 | 838.6 |
| Forensic Pathology | 207.9 | 209.3 | 210.8 |
| Gun Shot Residue (GSR) | 25.2 | 32.7 | 47.0 |
| Marks and Impressions | 15.3 | 18.4 | 31.9 |
| Serology/Biology | 46.5 | 95.5 | 132.7 |
| Toxicology ante mortem (excluding BAC) | 135.4 | 168.4 | 247.2 |
| Toxicology post mortem (excluding BAC) | 133.8 | 156.8 | 191.7 |
| Trace Evidence | 26.8 | 31.2 | 34.6 |

Analytical Process Metrics

The next decomposition measure, **Personnel Expense/Total Expense**, serves as a proxy for the level of analytical technology chosen. This measure has a significant negative correlation with **Capital Expense/Total Expense** and serves as simpler decomposition term for the return on investment.

Below, the cost structure is detailed with a breakdown of expenses in capital, labor, consumables, versus other costs. Investigative areas that are highly automated, such as evidenced by the DNA database processing line, should show a lower Personnel Expense/Total Expense.

Personnel Expense as a proportion of Total Expense

Note that **compensation** includes all personnel expenditures. This includes wages, salary, and benefits operating staff, support staff, and administrative staff. Centrally assigned compensation is apportioned to each investigative area according to the percentage of full-time equivalent employees assigned to a particular investigative area.

Table 28: Personnel Expenditures/Total Expenditures by Investigative Area

| Personnel Expenditures/Total Expenditures | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Area of Investigation | | | |
| Blood Alcohol | 66.47% | 75.02% | 83.09% |
| Crime Scene Investigation | 68.09% | 77.41% | 89.10% |
| Digital evidence | 65.62% | 76.70% | 91.98% |
| DNA Casework | 68.50% | 76.51% | 83.43% |
| DNA Database | 49.56% | 58.65% | 69.17% |
| Document Examination | 73.83% | 87.12% | 92.85% |
| Drugs - Controlled Substances | 73.93% | 81.06% | 85.57% |
| Evidence Screening & Processing | 69.60% | 80.00% | 85.32% |
| Explosives | 83.54% | 85.72% | 94.76% |
| Fingerprints | 75.58% | 83.89% | 85.36% |
| Fingerprints Database (including IAFIS) | 75.48% | 79.93% | 88.36% |
| Fire analysis | 74.47% | 83.68% | 85.62% |
| Firearms and Ballistics | 71.97% | 76.71% | 82.27% |
| Firearms Database (including NIBIN) | 65.60% | 73.69% | 83.65% |
| Forensic Pathology | 80.72% | 84.88% | 89.27% |
| Gun Shot Residue (GSR) | 77.65% | 83.97% | 86.66% |
| Marks and Impressions | 83.13% | 90.73% | 91.53% |
| Serology/Biology | 83.22% | 87.87% | 90.18% |
| Toxicology ante mortem (excluding BAC) | 65.11% | 71.67% | 75.90% |
| Toxicology post mortem (excluding BAC) | 65.48% | 77.19% | 83.18% |
| Trace Evidence | 76.01% | 81.35% | 83.85% |

Capital Expense as a proportion of Total Expense

Capital expenditures reference those purchases by the laboratory for assets whose use extends across time periods. Since depreciation classifications place laboratory equipment into a five-year depreciation class, the capital expenditures over a five-year period are averaged in the determination of this portion of a laboratory's expenditures.

Table 29: Capital Expenditures/Total Expenditures by Investigative Area

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 2.98% | 5.58% | 9.66% |
| Crime Scene Investigation | 1.64% | 5.75% | 10.87% |
| Digital evidence | 2.82% | 6.98% | 16.04% |
| DNA Casework | 4.05% | 6.33% | 9.05% |
| DNA Database | 4.78% | 8.82% | 20.70% |
| Document Examination | 0.30% | 1.44% | 4.23% |
| Drugs - Controlled Substances | 3.53% | 5.16% | 7.30% |
| Evidence Screening & Processing | 3.27% | 5.07% | 7.26% |
| Explosives | 1.59% | 2.08% | 5.90% |
| Fingerprints | 3.36% | 4.09% | 5.90% |
| Fingerprints Database (including IAFIS) | 2.47% | 4.24% | 6.06% |
| Fire analysis | 2.89% | 3.43% | 4.98% |
| Firearms and Ballistics | 3.30% | 4.81% | 7.39% |
| Firearms Database (including NIBIN) | 4.80% | 6.09% | 9.73% |
| Forensic Pathology | 2.00% | 2.15% | 3.38% |
| Gun Shot Residue (GSR) | 2.67% | 4.40% | 5.77% |
| Marks and Impressions | 1.55% | 1.66% | 3.69% |
| Serology/Biology | 0.99% | 1.70% | 3.33% |
| Toxicology ante mortem (excluding BAC) | 5.53% | 9.01% | 12.83% |
| Toxicology post mortem (excluding BAC) | 3.00% | 5.25% | 7.90% |
| Trace Evidence | 4.98% | 6.15% | 8.33% |

Consumables Expense as a proportion of Total Expense

This category includes a variety of variable cost components including chemicals, reagents, consumables, and gases.

Table 30: Consumables Expenditures/Total Expenditures by Investigative Area

| Consumable Expenditures/Total Expenditures by Investigative Area | | | |
|--|-----------------|--------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 3.35% | 5.89% | 10.91% |
| Crime Scene Investigation | 0.22% | 0.77% | 6.41% |
| Digital evidence | 0.00% | 0.81% | 3.46% |
| DNA Casework | 4.21% | 6.75% | 12.51% |
| DNA Database | 1.97% | 5.11% | 9.85% |
| Document Examination | 0.44% | 1.20% | 3.70% |
| Drugs - Controlled Substances | 2.73% | 4.06% | 8.14% |
| Evidence Screening & Processing | 2.21% | 3.49% | 5.11% |
| Explosives | 1.63% | 2.12% | 5.21% |
| Fingerprints | 1.27% | 1.66% | 5.97% |
| Fingerprints Database (including IAFIS) | 0.72% | 3.28% | 8.45% |
| Fire analysis | 2.60% | 3.23% | 6.07% |
| Firearms and Ballistics | 3.07% | 5.40% | 7.82% |
| Firearms Database (including NIBIN) | 0.87% | 6.72% | 15.47% |
| Forensic Pathology | 3.10% | 3.63% | 5.96% |
| Gun Shot Residue (GSR) | 1.52% | 2.21% | 2.93% |
| Marks and Impressions | 1.01% | 1.24% | 2.20% |
| Serology/Biology | 2.50% | 3.08% | 5.09% |
| Toxicology ante mortem (excluding BAC) | 6.03% | 7.59% | 11.05% |
| Toxicology post mortem (excluding BAC) | 4.41% | 6.27% | 8.94% |
| Trace Evidence | 2.06% | 2.53% | 3.17% |

Other Expenses as a proportion of Total Expense

This category includes all other cost components not accounted for above in personnel, capital, and consumables expenses.

Table 31: Other Expenses as a Percentage of Total Expenses

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 4.95% | 7.89% | 12.37% |
| Crime Scene Investigation | 5.21% | 7.87% | 13.75% |
| Digital evidence | 3.09% | 6.62% | 15.07% |
| DNA Casework | 4.66% | 7.03% | 11.10% |
| DNA Database | 11.66% | 17.86% | 24.93% |
| Document Examination | 5.13% | 8.73% | 11.80% |
| Drugs - Controlled Substances | 5.59% | 7.95% | 10.26% |
| Evidence Screening & Processing | 6.65% | 10.61% | 17.81% |
| Explosives | 2.01% | 4.60% | 6.15% |
| Fingerprints | 7.15% | 9.32% | 10.44% |
| Fingerprints Database (including IAFIS) | 4.19% | 5.93% | 10.39% |
| Fire analysis | 6.65% | 9.12% | 9.99% |
| Firearms and Ballistics | 6.35% | 11.19% | 14.68% |
| Firearms Database (including NIBIN) | 4.95% | 6.24% | 13.12% |
| Forensic Pathology | 5.64% | 6.86% | 7.45% |
| Gun Shot Residue (GSR) | 6.64% | 7.87% | 10.14% |
| Marks and Impressions | 5.02% | 5.80% | 6.38% |
| Serology/Biology | 5.18% | 6.62% | 7.84% |
| Toxicology ante mortem (excluding BAC) | 7.12% | 10.23% | 12.93% |
| Toxicology post mortem (excluding BAC) | 6.41% | 9.19% | 12.49% |
| Trace Evidence | 7.08% | 9.14% | 10.71% |

Turn-around Time

Turn-around time is offered in two forms. The first is a measure that begins when the last item of evidence in an investigative area has been submitted to the laboratory. The second measure begins the turn-around time count with the submission of the first piece of evidence in an investigative area. Because most laboratories only record one or the other of these measures, there is some seeming inconsistency which is attributed to the limited sample. The metric has been slightly altered from previous years to correspond to recommendations from Project FORESIGHT participants. The change in the metric reflects the time from each request for analysis to issuance of a report. As such, a case in one investigative area may have multiple turn-around times that correspond to separate requests.

Turn-around Time (Days from last submission of evidence to Report submission)

Table 32: Turnaround Time from Last Item Received by Investigative Area

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 8 | 13 | 25 |
| Crime Scene Investigation | 14 | 14 | 14 |
| Digital evidence | 4 | 8 | 11 |
| DNA Casework | 16 | 34 | 101 |
| DNA Database | 7 | 7 | 7 |
| Document Examination | 46 | 46 | 46 |
| Drugs - Controlled Substances | 8 | 21 | 47 |
| Evidence Screening & Processing | | | |
| Explosives | 57 | 57 | 57 |
| Fingerprints | 8 | 8 | 35 |
| Fingerprints Database (including IAFIS) | 1 | 2 | 2 |
| Fire analysis | 37 | 54 | 66 |
| Firearms and Ballistics | 10 | 16 | 45 |
| Firearms Database (including NIBIN) | 2 | 11 | 26 |
| Forensic Pathology | 52 | 52 | 52 |
| Gun Shot Residue (GSR) | 51 | 54 | 202 |
| Marks and Impressions | 7 | 13 | 18 |
| Serology/Biology | 15 | 25 | 34 |
| Toxicology ante mortem (excluding BAC) | 25 | 37 | 53 |
| Toxicology post mortem (excluding BAC) | 29 | 35 | 42 |
| Trace Evidence | 14 | 23 | 40 |

Turn-around Time (Days from first submission of evidence to Report submission)

Table 33: Turnaround Time from First Item Received by Investigative Area

| Area of Investigation | 25th percentile | Median | 75th percentile |
|---|-----------------|--------|-----------------|
| Blood Alcohol | 23 | 29 | 38 |
| Crime Scene Investigation | 30 | 41 | 53 |
| Digital evidence | 50 | 113 | 158 |
| DNA Casework | 105 | 134 | 153 |
| DNA Database | 46 | 59 | 71 |
| Document Examination | 39 | 60 | 80 |
| Drugs - Controlled Substances | 57 | 71 | 86 |
| Evidence Screening & Processing | 34 | 42 | 49 |
| Explosives | 125 | 132 | 136 |
| Fingerprints | 54 | 70 | 83 |
| Fingerprints Database (including IAFIS) | 5 | 11 | 20 |
| Fire analysis | 55 | 105 | 130 |
| Firearms and Ballistics | 57 | 73 | 86 |
| Firearms Database (including NIBIN) | 4 | 8 | 21 |
| Forensic Pathology | 62 | 71 | 79 |
| Gun Shot Residue (GSR) | 80 | 91 | 114 |
| Marks and Impressions | 80 | 99 | 114 |
| Serology/Biology | 56 | 67 | 80 |
| Toxicology ante mortem (excluding BAC) | 51 | 66 | 78 |
| Toxicology post mortem (excluding BAC) | 60 | 76 | 86 |
| Trace Evidence | 167 | 203 | 240 |

Backlog

Another area of concern involves the increased demand for laboratory services and the level of backlog. For data collection purposes, the definition of backlog has been defined as open cases at the end of the fiscal year that have been open for more than thirty days. As a relative comparative measure, the ratio of open cases to total cases for the year is presented in the following table.

Cases Open over 30 Days/Annual Caseload

Table 34: Backlog Cases as a Percent of Total Cases by Investigative Area

| Backlog Cases as a Percent of Total Cases | | | |
|---|-----------------|--------|-----------------|
| Area of Investigation | 25th percentile | Median | 75th percentile |
| Blood Alcohol | 0.00% | 1.43% | 1.70% |
| Crime Scene Investigation | 0.00% | 5.02% | 7.49% |
| Digital evidence | 0.86% | 6.92% | 15.53% |
| DNA Casework | 8.04% | 9.10% | 11.19% |
| DNA Database | 0.00% | 10.40% | 11.62% |
| Document Examination | 0.00% | 10.90% | 14.13% |
| Drugs - Controlled Substances | 0.10% | 7.87% | 8.91% |
| Evidence Screening & Processing | 2.98% | 3.77% | 5.53% |
| Explosives | 0.00% | 25.00% | 44.44% |
| Fingerprints | 2.47% | 8.25% | 9.85% |
| Fingerprints Database (including IAFIS) | 0.00% | 0.00% | 0.00% |
| Fire analysis | 0.00% | 13.76% | 18.52% |
| Firearms and Ballistics | 8.85% | 10.70% | 12.11% |
| Firearms Database (including NIBIN) | 0.00% | 0.00% | 0.00% |
| Forensic Pathology | 5.43% | 7.54% | 9.20% |
| Gun Shot Residue (GSR) | 10.55% | 12.98% | 19.05% |
| Marks and Impressions | 12.64% | 17.26% | 27.68% |
| Serology/Biology | 7.08% | 8.15% | 8.99% |
| Toxicology ante mortem (excluding BAC) | 2.02% | 8.77% | 10.09% |
| Toxicology post mortem (excluding BAC) | 0.39% | 8.34% | 9.99% |
| Trace Evidence | 14.29% | 17.65% | 25.00% |

Digital Evidence LabRAT outcomes

The Forensic Laboratory Needs Technology Working Group (FLN-TWG) provided recommendations for data collection for [Digital Evidence analysis](#). The next two tables highlight some of the details that emerged from that special data collection.

Table 35: Digital Evidence Level I Metrics

| Digital Evidence Level I Metrics | | | |
|----------------------------------|-----------------|--------|-----------------|
| Measure | 25th percentile | Median | 75th percentile |
| Cases | | | |
| Total | 77 | 280 | 734 |
| Mobile | 205 | 499 | 696 |
| Computer | 12 | 38 | 99 |
| Video | 23 | 55 | 123 |
| Mass Storage | 0 | 0 | 2 |
| Internet of Things | 0 | 3 | 21 |
| Reports | | | |
| Total | 87 | 197 | 778 |
| Mobile | 230 | 554 | 1,450 |
| Computer | 4 | 31 | 94 |
| Video | 31 | 64 | 141 |
| Mass Storage | 2 | 10 | 37 |
| Internet of Things | 6 | 13 | 55 |
| FTE | | | |
| Total | 2.25 | 4.00 | 7.74 |
| Mobile | 0.67 | 1.01 | 1.24 |
| Computer | 1.00 | 1.23 | 3.00 |
| Video | 1.00 | 2.00 | 3.05 |
| Mass Storage | 0.00 | 0.00 | 0.24 |
| Internet of Things | 0.00 | 0.18 | 1.00 |

Table 36: Digital Evidence Level II Metrics

| Digital Evidence Level II Metrics | | | |
|-----------------------------------|-----------------|--------|-----------------|
| Measure | 25th percentile | Median | 75th percentile |
| Turnaround Time | | | |
| Total | 32 | 81 | 148 |
| Mobile | 3 | 5 | 8 |
| Computer | 36 | 48 | 127 |
| Video | 31 | 45 | 101 |
| Mass Storage | 20 | 24 | 47 |
| Internet of Things | 33 | 36 | 50 |
| Gigabytes Examined | | | |
| Total | 47,626 | 60,208 | 93,685 |
| Mobile | 6,200 | 12,400 | 13,700 |
| Computer | 22,086 | 24,500 | 26,375 |
| Video | 8,750 | 10,000 | 12,267 |
| Mass Storage | 772 | 1,544 | 1,572 |
| Internet of Things | 23 | 45 | 51 |
| Personnel Time Allocation | | | |
| Casework | 59.50% | 65.00% | 71.00% |
| Technical Review | 0.00% | 2.00% | 3.50% |
| Testimony & Testimony Preparation | 4.50% | 5.00% | 7.50% |
| Training | 2.00% | 4.00% | 5.00% |
| Continuing Education | 5.00% | 10.00% | 10.50% |
| Non-Digital Evidence Duties | 2.50% | 5.00% | 13.50% |
| Other | 0.50% | 2.00% | 5.00% |
| Outside Agencies Assisted | 0 | 6 | 13 |

Time Trends

The 2019 National Institute of Justice report noted some worrisome trends as forensic laboratory resources were stressed from increased demands for services outpacing any increase in resources to the laboratories.⁴ The report estimated that state and local forensic laboratories were understaffed by more than 900 positions and those shortfalls resulted in growing backlogs as turnaround times increased. Part of the additional strain on resources could be

⁴ U.S. Department of Justice, Office of Justice Programs. (2019). *Report to Congress: Needs Assessment of Forensic Laboratories and Medical Examiner/Coroner Offices*. Washington, DC: National Institute of Justice. <https://www.ncjrs.gov/pdffiles1/nij/253626.pdf>.

attributed to the attention placed on unsubmitted sexual assault kits (SAKs) and the drive to test the 200,000 to 400,000 outstanding SAKs that had yet to be submitted for laboratory analysis. Another key influence on the increased demand for resources was the growing opioid crisis. The COVID-19 pandemic introduced additional stress on forensic laboratories.

Using the Project FORESIGHT benchmark data from fiscal years 2014-2022, we note some of the trends influenced by these systemic stressors.⁵ The tables illustrate the growth in various metrics over this period. Both the arithmetic mean and the geometric mean are provided. The arithmetic mean provides an average of the year-to-year growth, while the geometric average offers a long-term growth trend. The latter highlights the influence of COVID-19 on forensic laboratories.

⁵ Speaker, P. J. (2022) Project FORESIGHT Annual Report, 2020-2021.
https://researchrepository.wvu.edu/faculty_publications/3093/

Speaker, P. J. (2021). Project FORESIGHT Annual Report, 2019-2020.
https://researchrepository.wvu.edu/faculty_publications/3008/

Speaker, P. J. (2020). Project FORESIGHT Annual Report, 2018-2019.
https://researchrepository.wvu.edu/faculty_publications/2910/

Speaker, P. J. (2019). Project FORESIGHT Annual Report, 2017-2018.
https://researchrepository.wvu.edu/faculty_publications/1139/

Speaker, P. J. (2018). Project FORESIGHT Benchmark Data 2016-2017.
https://researchrepository.wvu.edu/faculty_publications/1140/

Speaker, P. J. (2017). Project FORESIGHT Annual Report, 2015-2016.
https://researchrepository.wvu.edu/faculty_publications/1144/

Speaker, P. J. (2016). Project FORESIGHT Benchmark Data 2014-2015.
https://researchrepository.wvu.edu/faculty_publications/1143/

Speaker, P. J. (2015). Project FORESIGHT Benchmark Data 2013-2014.
https://researchrepository.wvu.edu/faculty_publications/1142/

Table 37: Average Annual Growth in Case Submissions per 100,000 population, 2014-2022

| Growth in Case submissions per 100K population (2014-2022) | | |
|--|--------------------|-------------------|
| Area of Investigation | Arithmetic Average | Geometric Average |
| Blood Alcohol | 2.03% | -1.95% |
| Crime Scene Investigation | 39.23% | -3.24% |
| Digital evidence - Audio & Video | 58.99% | -6.05% |
| DNA Casework | 3.49% | 3.00% |
| DNA Database | -11.10% | -4.71% |
| Document Examination | -29.12% | -24.51% |
| Drugs - Controlled Substances | 8.50% | -1.49% |
| Evidence Screening & Processing | 34.47% | 23.30% |
| Explosives | -15.96% | -10.63% |
| Fingerprints | 1.91% | -9.43% |
| Fingerprints Database (including IAFIS)* | -9.51% | -14.09% |
| Fire analysis | -14.05% | -3.34% |
| Firearms and Ballistics | -9.86% | -1.94% |
| Firearms Database (including NIBIN)* | 17.28% | 10.85% |
| Forensic Pathology | 45.14% | -2.48% |
| Gun Shot Residue (GSR) | -1.23% | -6.37% |
| Marks and Impressions | 10.85% | 4.15% |
| Serology/Biology | -10.46% | -4.19% |
| Toxicology ante mortem (excluding BAC) | -4.72% | 0.26% |
| Toxicology post mortem (excluding BAC) | 4.06% | 3.57% |
| Trace Evidence | -4.76% | -10.05% |

*annual rate 2019-2022

Table 38: Average Annual Growth in TAT, 2014-2022

| Annual Growth in Turnaround time (2014-2022) | | |
|--|--------------------|-------------------|
| Area of Investigation | Arithmetic Average | Geometric Average |
| Blood Alcohol | 4.82% | 2.11% |
| Crime Scene Investigation | 15.31% | -5.96% |
| Digital evidence - Audio & Video | 12.63% | 8.75% |
| DNA Casework | 1.64% | 1.48% |
| DNA Database | -5.56% | -7.40% |
| Document Examination | 1.28% | 0.53% |
| Drugs - Controlled Substances | 0.53% | 0.05% |
| Evidence Screening & Processing | 1.39% | 0.58% |
| Explosives | 1.02% | 3.45% |
| Fingerprints | -1.66% | 8.50% |
| Fingerprints Database (including IAFIS)* | 21.29% | -1.09% |
| Fire analysis | -0.87% | -3.87% |
| Firearms and Ballistics | -3.39% | -1.09% |
| Firearms Database (including NIBIN)* | 12.12% | -6.37% |
| Forensic Pathology | 12.51% | 8.21% |
| Gun Shot Residue (GSR) | 3.96% | 2.99% |
| Marks and Impressions | 4.29% | 1.38% |
| Serology/Biology | 0.59% | 0.28% |
| Toxicology ante mortem (excluding BAC) | 2.08% | 1.11% |
| Toxicology post mortem (excluding BAC) | 4.10% | 3.77% |
| Trace Evidence | 5.83% | 4.39% |

*annual rate 2019-2022

Table 39: Average Annual Growth in Percentage of Backlog Cases, 2014-2022

| Annual Growth in Backlog% (2014-2022) | | |
|---|--------------------|-------------------|
| Area of Investigation | Arithmetic Average | Geometric Average |
| Blood Alcohol | 5.29% | 1.39% |
| Crime Scene Investigation | 74.62% | 23.74% |
| Digital evidence - Audio & Video | 31.21% | 8.69% |
| DNA Casework | 11.33% | 7.40% |
| DNA Database | 28.27% | 6.00% |
| Document Examination | 50.77% | 6.04% |
| Drugs - Controlled Substances | 1.69% | 0.79% |
| Evidence Screening & Processing | 31.89% | 1.55% |
| Explosives | 1.92% | -1.19% |
| Fingerprints | 5.43% | 2.97% |
| Fingerprints Database (including IAFIS) | | |
| Fire analysis | 18.09% | 9.43% |
| Firearms and Ballistics | 1.63% | 1.13% |
| Firearms Database (including NIBIN) | | |
| Forensic Pathology | 42.70% | 5.71% |
| Gun Shot Residue (GSR) | 29.54% | 16.41% |
| Marks and Impressions | 15.55% | 8.26% |
| Serology/Biology | 28.65% | 19.69% |
| Toxicology ante mortem (excluding BAC) | 11.79% | 9.17% |
| Toxicology post mortem (excluding BAC) | 17.98% | 10.08% |
| Trace Evidence | 17.13% | 5.35% |

Table 40: Average Annual Growth in FTE, 2014-2022

| Annual Growth in FTE (2014-2022) | | |
|--|--------------------|-------------------|
| Area of Investigation | Arithmetic Average | Geometric Average |
| Blood Alcohol | -6.24% | -6.46% |
| Crime Scene Investigation | -3.90% | -5.10% |
| Digital evidence - Audio & Video | 3.79% | 3.19% |
| DNA Casework | -3.35% | -3.61% |
| DNA Database | 1.08% | 0.83% |
| Document Examination | -9.40% | -11.56% |
| Drugs - Controlled Substances | -3.31% | -3.57% |
| Evidence Screening & Processing | 3.34% | 3.24% |
| Explosives | -8.15% | -11.11% |
| Fingerprints | -6.15% | -6.57% |
| Fingerprints Database (including IAFIS)* | -31.90% | |
| Fire analysis | -8.73% | -9.41% |
| Firearms and Ballistics | -2.29% | -2.49% |
| Firearms Database (including NIBIN)* | 6.79% | |
| Forensic Pathology | -4.25% | -8.76% |
| Gun Shot Residue (GSR) | -7.38% | -8.06% |
| Marks and Impressions | -7.99% | -8.73% |
| Serology/Biology | -0.49% | -0.66% |
| Toxicology ante mortem (excluding BAC) | -4.56% | -4.98% |
| Toxicology post mortem (excluding BAC) | -1.71% | -2.79% |
| Trace Evidence | -3.32% | -4.02% |

*annual rate 2019-2022

Efficiency and Cost Effectiveness of Forensic Science Services— FORESIGHT 2021-2022 Benchmark Data

The summary statistics offer a one-dimensional view of performance. In this section, that view is expanded through a consideration of cost effectiveness and efficiency. Economic theory indicates that any industry, including forensic science laboratories, will have average costs (Cost/Case) that decline as caseload is increased until reaching a point of perfect economies of scale. Thereafter, diseconomies of scale will be realized and average costs will rise as caseload increases. This behavior is exemplified via U-shaped average cost curves.

For each investigative area, the industry average total cost curve has been estimated by a series of non-linear regressions. When a laboratory performs on or near the curve, it is an indication of efficiency for the corresponding caseload. For an efficient performance that is near the bottom of the U-shaped curve, the laboratory exhibits cost effective performance as it approaches perfect economies of scale.

Each of the average cost curves is illustrated with a corresponding table of values for the cost/case for various caseloads. Also note that productivity in the form of Cases/FTE versus the corresponding caseload exhibits an inverted curve as compared to the average cost. Research to-date suggests that the level of productivity for any caseload is the most critical component in the DuPont breakdown to explain efficiency in the laboratory. That is, a laboratory which exemplifies high productivity for their caseload is likely to be operating near peak efficient average cost for that level of casework.

In addition to this cross-sectional comparison, it is recommended that participants track their average cost and productivity for all past FORESIGHT submissions in real terms. The term “real” indicates that costs have been adjusted for inflation and converted to the most recent year’s price index.

Blood Alcohol Analysis

Figure 3: Efficient Frontier for Blood Alcohol Analysis—Average Total Cost v. Cases Processed

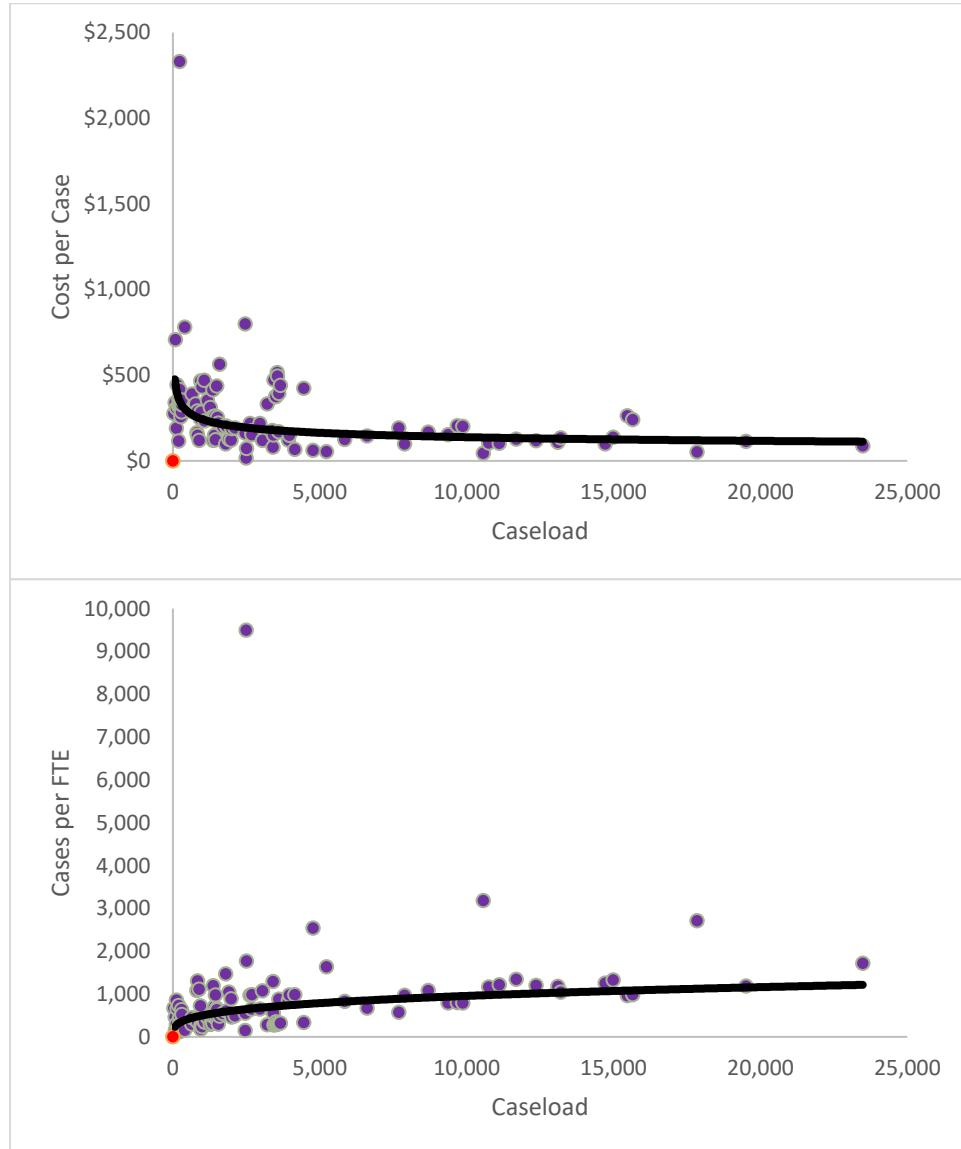


Figure 4: Efficient Frontier for Blood Alcohol Analysis—Cases/FTE v. Cases Processed

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 41: Efficient Frontier for Blood & Breath Alcohol Analysis—Efficient Cost/Case & Cases/FTE for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|--------|---------------------|---------------|
| 100 | \$427 | 263 | 5,000 | \$208 | 957 |
| 200 | \$362 | 320 | 5,500 | \$196 | 995 |
| 300 | \$359 | 358 | 6,000 | \$184 | 1,032 |
| 400 | \$355 | 388 | 6,500 | \$173 | 1,067 |
| 500 | \$351 | 413 | 7,000 | \$163 | 1,101 |
| 600 | \$347 | 435 | 8,000 | \$146 | 1,164 |
| 700 | \$343 | 454 | 9,000 | \$142 | 1,222 |
| 800 | \$340 | 472 | 10,000 | \$138 | 1,274 |
| 900 | \$336 | 487 | 11,000 | \$135 | 1,321 |
| 1,000 | \$332 | 502 | 12,000 | \$132 | 1,363 |
| 1,250 | \$323 | 534 | 13,000 | \$130 | 1,399 |
| 1,500 | \$314 | 562 | 14,000 | \$127 | 1,429 |
| 1,750 | \$305 | 587 | 15,000 | \$125 | 1,454 |
| 2,000 | \$297 | 609 | 16,000 | \$123 | 1,473 |
| 2,250 | \$289 | 639 | 17,000 | \$121 | 1,487 |
| 2,500 | \$280 | 668 | 18,000 | \$120 | 1,495 |
| 2,750 | \$272 | 697 | 19,000 | \$118 | 1,498 |
| 3,000 | \$264 | 726 | 20,000 | \$117 | 1,495 |
| 3,250 | \$257 | 756 | 21,000 | \$115 | 1,487 |
| 3,500 | \$249 | 786 | 22,000 | \$114 | 1,474 |
| 3,750 | \$242 | 818 | 23,000 | \$113 | 1,454 |
| 4,000 | \$235 | 850 | 24,000 | \$112 | 1,430 |
| 4,500 | \$221 | 903 | 25,000 | \$111 | 1,399 |

Crime Scene Investigation

Figure 5: Efficient Frontier for Crime Scene Investigation—Average Total Cost v. Cases Processed

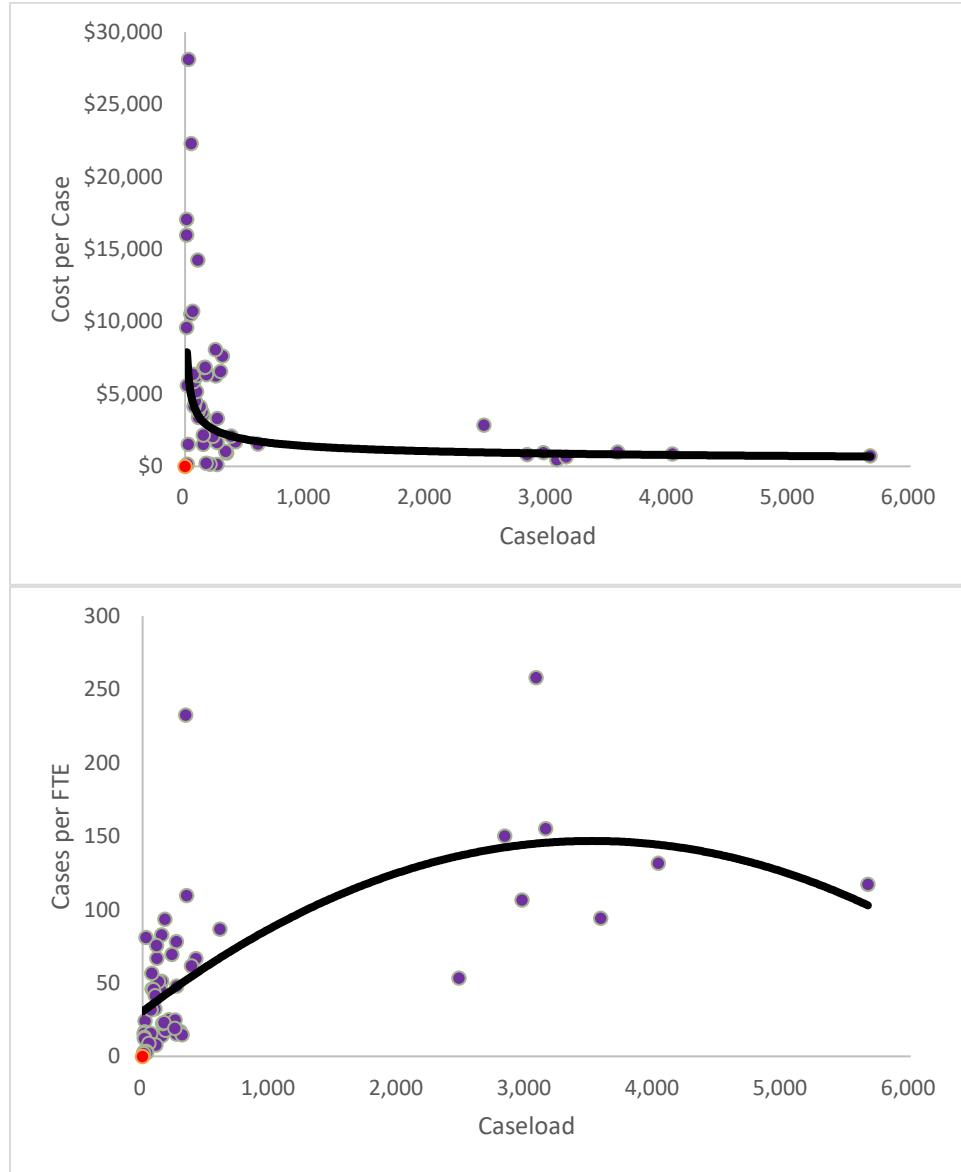


Figure 6: Efficient Frontier Crime Scene Investigation—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 42: Efficient Frontier for Crime Scene Investigation—Efficient Cost/Case & Cases/FTE for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 10 | \$15,310 | 8 | 400 | \$2,107 | 55 |
| 15 | \$12,312 | 10 | 425 | \$2,039 | 57 |
| 25 | \$9,355 | 13 | 450 | \$1,978 | 58 |
| 35 | \$7,807 | 15 | 500 | \$1,869 | 61 |
| 45 | \$6,820 | 17 | 600 | \$1,694 | 67 |
| 55 | \$6,123 | 19 | 700 | \$1,559 | 72 |
| 65 | \$5,597 | 21 | 800 | \$1,451 | 77 |
| 75 | \$5,182 | 22 | 900 | \$1,362 | 82 |
| 85 | \$4,845 | 24 | 1,000 | \$1,287 | 87 |
| 95 | \$4,564 | 25 | 1,250 | \$1,142 | 99 |
| 105 | \$4,325 | 26 | 1,500 | \$1,035 | 109 |
| 115 | \$4,118 | 27 | 1,750 | \$953 | 118 |
| 125 | \$3,938 | 29 | 2,000 | \$887 | 125 |
| 150 | \$3,570 | 31 | 2,250 | \$832 | 132 |
| 175 | \$3,286 | 34 | 2,500 | \$787 | 137 |
| 200 | \$3,058 | 36 | 2,750 | \$747 | 141 |
| 225 | \$2,871 | 39 | 3,000 | \$713 | 144 |
| 250 | \$2,713 | 41 | 3,500 | \$656 | 147 |
| 275 | \$2,577 | 43 | 4,000 | \$611 | 145 |
| 300 | \$2,459 | 45 | 4,500 | \$573 | 138 |
| 325 | \$2,356 | 46 | 5,000 | \$542 | 126 |
| 350 | \$2,264 | 48 | 5,500 | \$515 | 109 |
| 375 | \$2,181 | 50 | 6,000 | \$491 | 88 |

Digital Evidence Analysis

Figure 7: Efficient Frontier for Digital Evidence Analysis—Average Total Cost v. Cases Processed

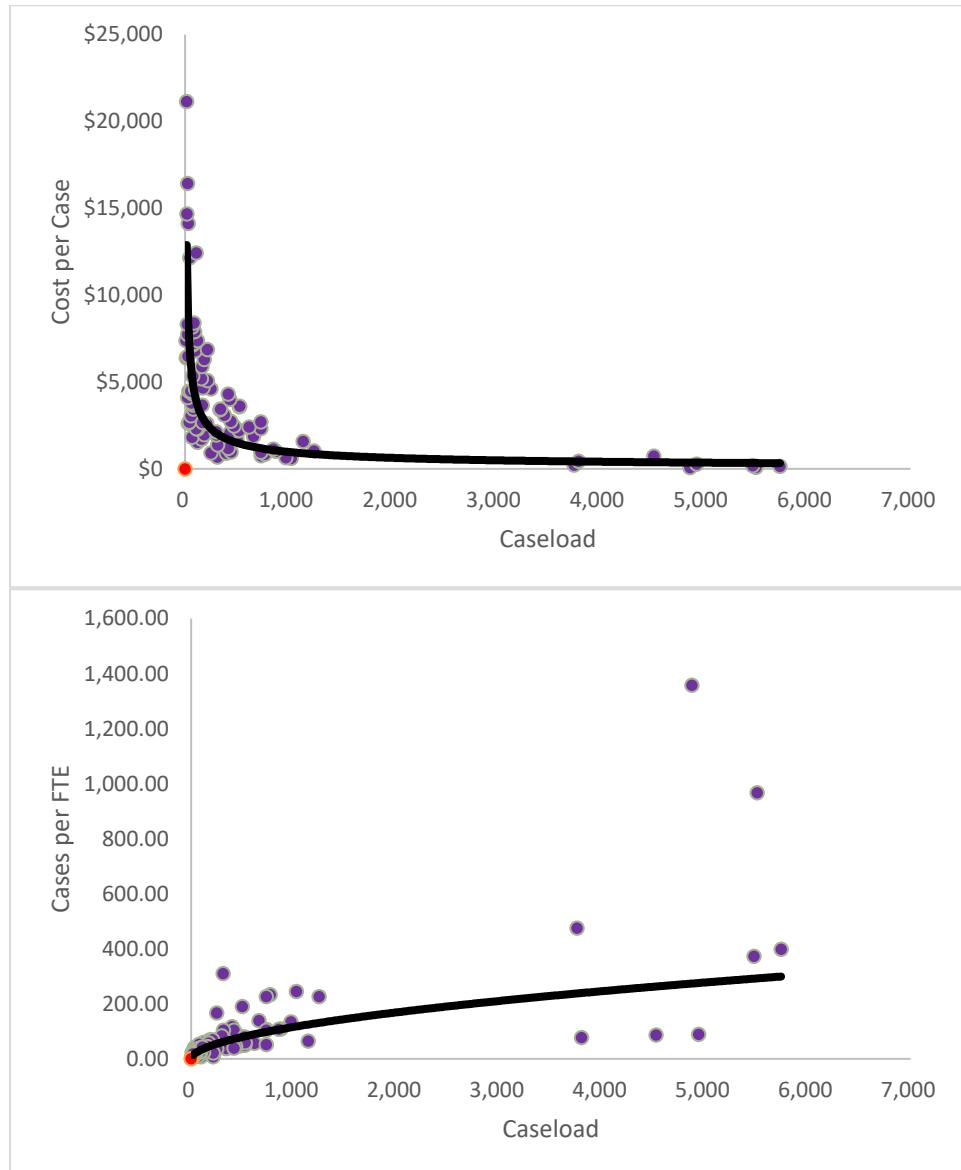


Figure 8: Efficient Frontier Digital Evidence Analysis—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 43: Efficient Frontier for Digital Evidence Analysis—Efficient Cost/Case & Cases/FTE for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 15 | \$14,229 | 12 | 450 | \$1,608 | 75 |
| 25 | \$10,256 | 16 | 500 | \$1,503 | 80 |
| 35 | \$8,266 | 19 | 550 | \$1,414 | 84 |
| 45 | \$7,036 | 22 | 600 | \$1,337 | 88 |
| 55 | \$6,187 | 24 | 650 | \$1,270 | 92 |
| 65 | \$5,558 | 27 | 700 | \$1,211 | 96 |
| 75 | \$5,071 | 29 | 800 | \$1,112 | 103 |
| 85 | \$4,680 | 31 | 900 | \$1,031 | 110 |
| 95 | \$4,358 | 33 | 1,000 | \$964 | 116 |
| 105 | \$4,087 | 34 | 1,250 | \$835 | 131 |
| 115 | \$3,856 | 36 | 1,500 | \$743 | 145 |
| 125 | \$3,655 | 38 | 1,750 | \$673 | 157 |
| 150 | \$3,252 | 42 | 2,000 | \$618 | 169 |
| 175 | \$2,946 | 45 | 2,250 | \$573 | 180 |
| 200 | \$2,704 | 49 | 2,500 | \$536 | 191 |
| 225 | \$2,507 | 52 | 2,750 | \$504 | 201 |
| 250 | \$2,344 | 55 | 3,000 | \$477 | 210 |
| 275 | \$2,205 | 58 | 3,500 | \$432 | 229 |
| 300 | \$2,085 | 61 | 4,000 | \$396 | 246 |
| 325 | \$1,981 | 63 | 4,500 | \$367 | 262 |
| 350 | \$1,889 | 66 | 5,000 | \$343 | 277 |
| 375 | \$1,807 | 68 | 5,500 | \$323 | 292 |
| 400 | \$1,734 | 71 | 6,000 | \$306 | 306 |

DNA Casework Analysis

Figure 9: Efficient Frontier for DNA Casework Analysis—Average Total Cost v. Cases Processed

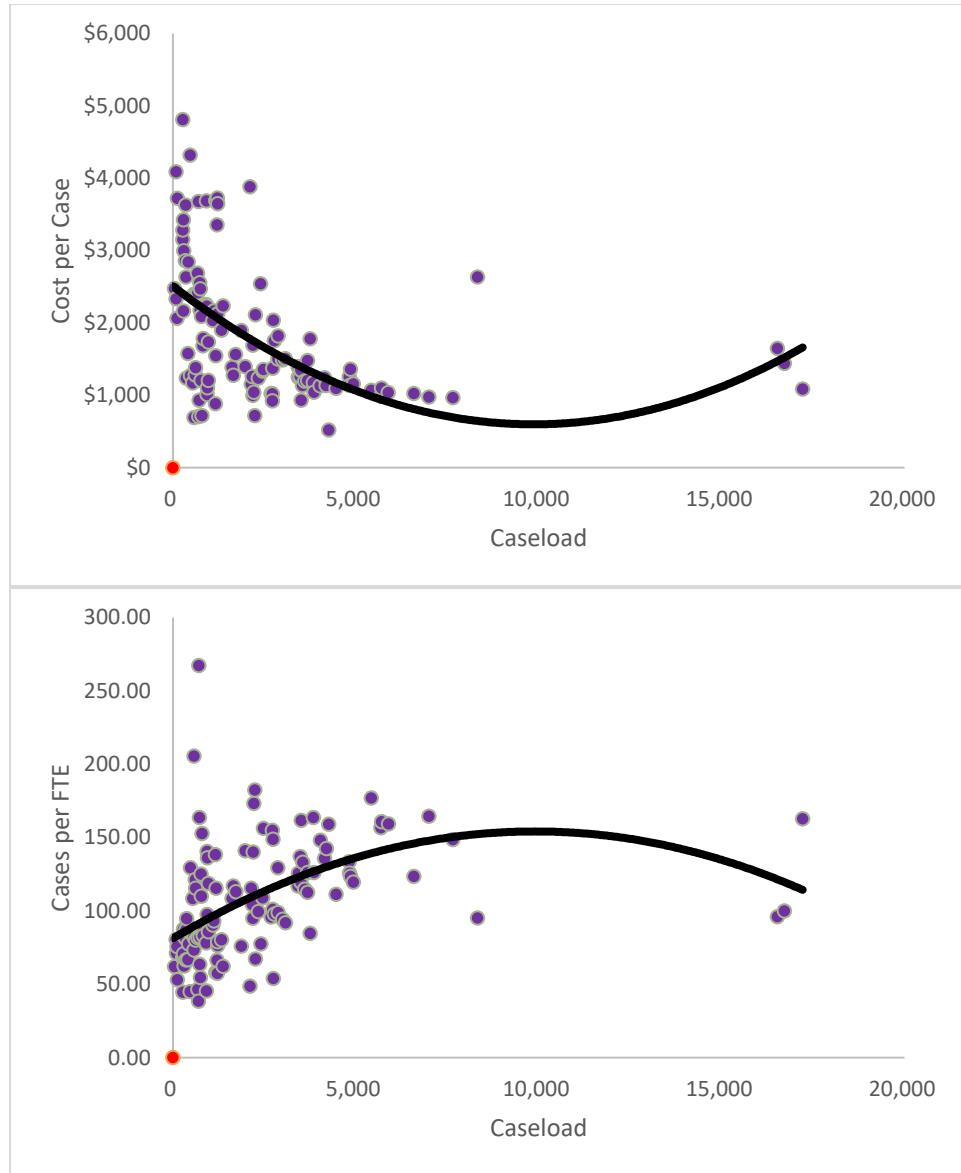


Figure 10: Efficient Frontier DNA Casework Analysis—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 44: Efficient Frontier for DNA Casework Analysis—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|--------|---------------------|---------------|
| 40 | \$3,624 | 55 | 2,250 | \$1,736 | 111 |
| 80 | \$3,107 | 62 | 2,500 | \$1,662 | 113 |
| 125 | \$2,814 | 67 | 2,750 | \$1,591 | 116 |
| 150 | \$2,702 | 69 | 3,000 | \$1,523 | 119 |
| 175 | \$2,611 | 70 | 3,500 | \$1,393 | 124 |
| 200 | \$2,535 | 72 | 4,000 | \$1,273 | 128 |
| 250 | \$2,412 | 75 | 4,500 | \$1,163 | 132 |
| 300 | \$2,393 | 77 | 5,000 | \$1,062 | 136 |
| 350 | \$2,374 | 79 | 5,500 | \$972 | 140 |
| 400 | \$2,355 | 81 | 6,000 | \$891 | 143 |
| 450 | \$2,337 | 82 | 6,500 | \$820 | 146 |
| 500 | \$2,318 | 84 | 7,000 | \$759 | 148 |
| 600 | \$2,282 | 86 | 7,500 | \$708 | 150 |
| 700 | \$2,246 | 89 | 8,000 | \$667 | 151 |
| 800 | \$2,210 | 91 | 9,000 | \$613 | 154 |
| 900 | \$2,175 | 93 | 10,000 | \$599 | 154 |
| 1,000 | \$2,140 | 94 | 11,000 | \$625 | 153 |
| 1,100 | \$2,105 | 96 | 12,000 | \$689 | 151 |
| 1,200 | \$2,071 | 97 | 13,000 | \$793 | 147 |
| 1,300 | \$2,037 | 98 | 14,000 | \$936 | 142 |
| 1,400 | \$2,004 | 100 | 15,000 | \$1,118 | 135 |
| 1,500 | \$1,971 | 102 | 16,000 | \$1,339 | 126 |
| 1,750 | \$1,890 | 105 | 17,000 | \$1,600 | 117 |
| 2,000 | \$1,811 | 108 | 18,000 | \$1,900 | 105 |

DNA Database

Figure 11: Efficient Frontier for DNA Database—Average Total Cost v. Cases Processed

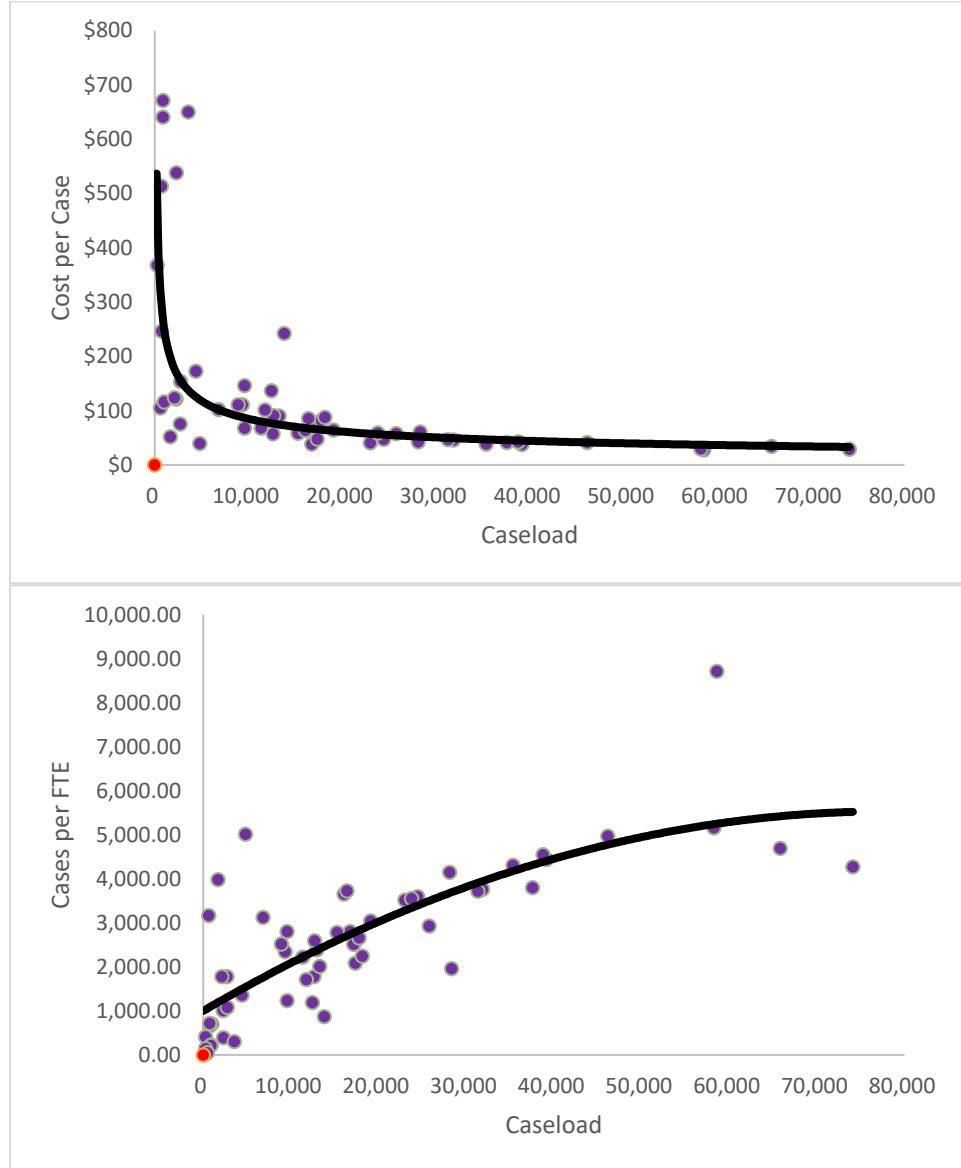


Figure 12: Efficient Frontier DNA Database—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 45: Efficient Frontier for DNA Database—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|--------|---------------------|---------------|--------|---------------------|---------------|
| 500 | \$450 | 405 | 16,000 | \$68 | 2,601 |
| 600 | \$407 | 446 | 18,000 | \$64 | 2,771 |
| 700 | \$375 | 485 | 20,000 | \$61 | 2,932 |
| 800 | \$348 | 521 | 22,000 | \$58 | 3,086 |
| 900 | \$327 | 555 | 24,000 | \$55 | 3,234 |
| 1,000 | \$309 | 587 | 26,000 | \$53 | 3,376 |
| 1,250 | \$273 | 662 | 28,000 | \$50 | 3,513 |
| 1,500 | \$248 | 730 | 30,000 | \$49 | 3,645 |
| 1,750 | \$228 | 793 | 32,000 | \$47 | 3,774 |
| 2,000 | \$212 | 852 | 34,000 | \$45 | 3,899 |
| 2,500 | \$188 | 960 | 36,000 | \$44 | 4,020 |
| 3,000 | \$170 | 1,059 | 38,000 | \$43 | 4,138 |
| 3,500 | \$156 | 1,150 | 40,000 | \$42 | 4,254 |
| 4,000 | \$145 | 1,236 | 42,000 | \$40 | 4,367 |
| 4,500 | \$136 | 1,316 | 44,000 | \$39 | 4,477 |
| 5,000 | \$129 | 1,393 | 46,000 | \$39 | 4,585 |
| 6,000 | \$117 | 1,536 | 48,000 | \$38 | 4,691 |
| 7,000 | \$107 | 1,669 | 50,000 | \$37 | 4,795 |
| 8,000 | \$100 | 1,793 | 52,000 | \$36 | 4,897 |
| 9,000 | \$94 | 1,910 | 54,000 | \$35 | 4,998 |
| 10,000 | \$88 | 2,021 | 56,000 | \$35 | 5,096 |
| 12,000 | \$80 | 2,229 | 58,000 | \$34 | 5,193 |
| 14,000 | \$74 | 2,421 | 60,000 | \$33 | 5,289 |

Document Examination

Figure 13: Efficient Frontier for Document Examination—Average Total Cost v. Cases Processed

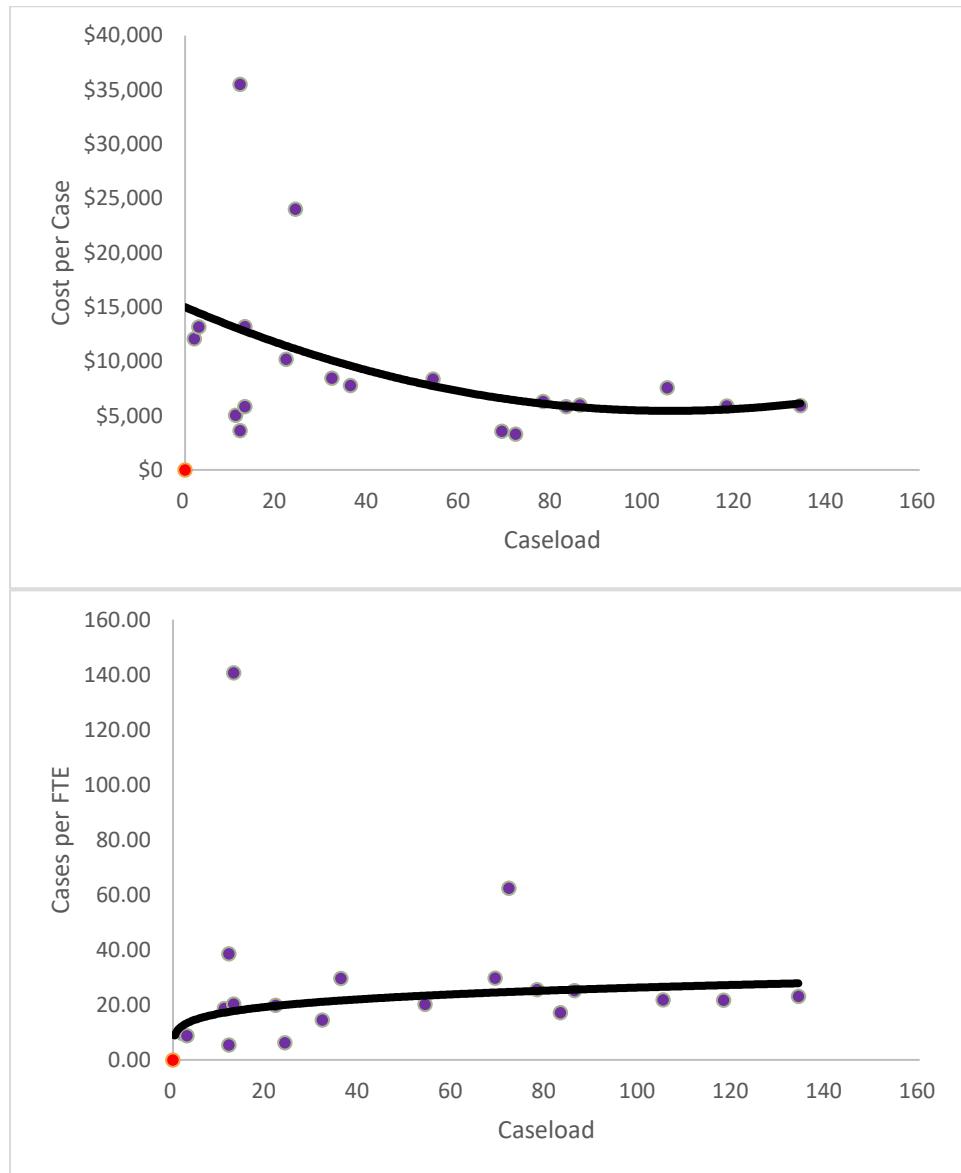


Figure 14: Efficient Frontier Document Examination—Cases/FTE v. Caseload

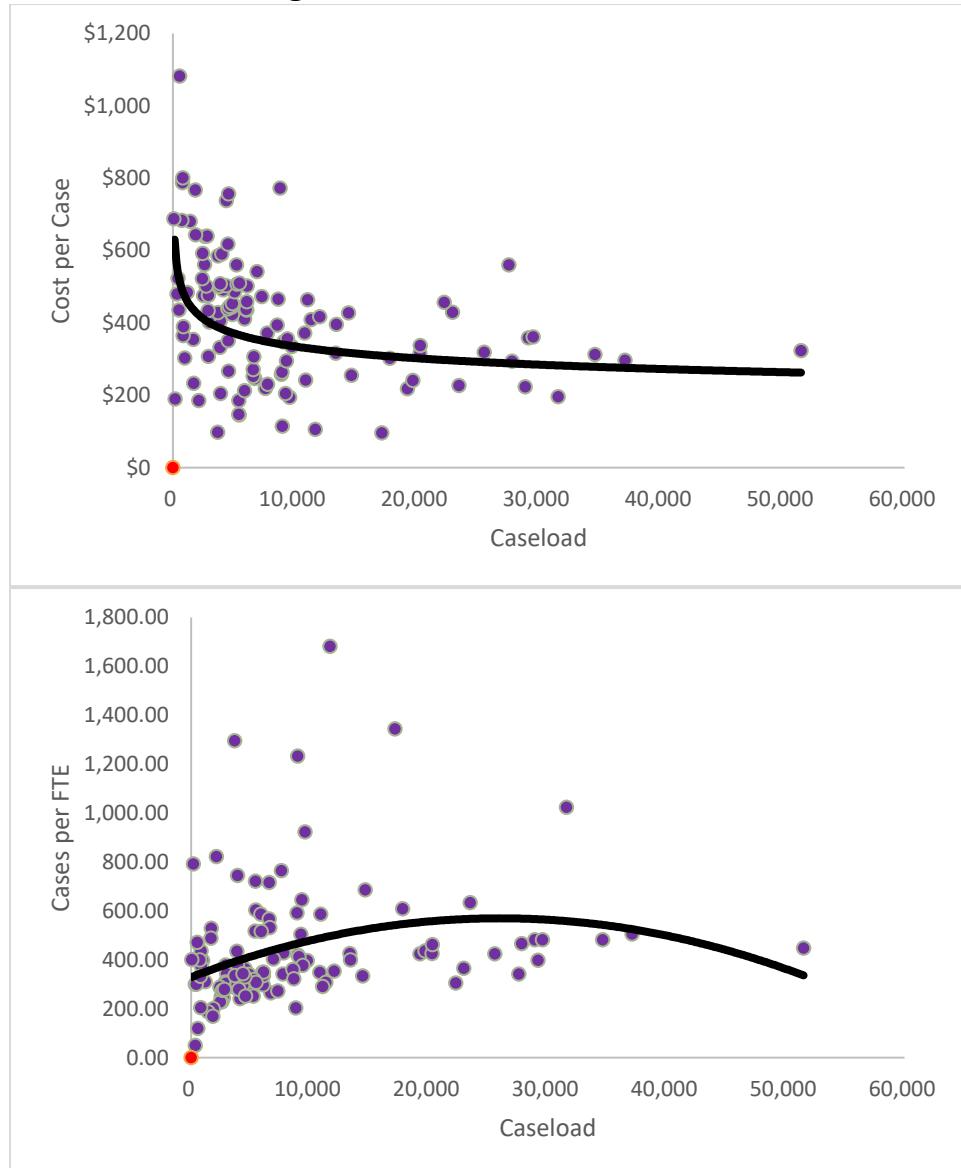
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 46: Efficient Frontier for Document Examination—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 2 | \$14,273 | 12 | 44 | \$7,142 | 22 |
| 3 | \$13,034 | 13 | 46 | \$7,071 | 23 |
| 4 | \$12,221 | 14 | 48 | \$7,004 | 23 |
| 5 | \$11,625 | 15 | 50 | \$6,941 | 23 |
| 6 | \$11,160 | 15 | 55 | \$6,794 | 23 |
| 8 | \$10,463 | 16 | 60 | \$6,663 | 24 |
| 10 | \$9,953 | 17 | 65 | \$6,545 | 24 |
| 12 | \$9,555 | 17 | 70 | \$6,437 | 25 |
| 14 | \$9,231 | 18 | 75 | \$6,246 | 25 |
| 16 | \$8,959 | 18 | 80 | \$6,005 | 25 |
| 18 | \$8,725 | 19 | 85 | \$5,806 | 25 |
| 20 | \$8,522 | 19 | 90 | \$5,651 | 26 |
| 22 | \$8,342 | 20 | 95 | \$5,539 | 26 |
| 24 | \$8,181 | 20 | 100 | \$5,469 | 26 |
| 26 | \$8,035 | 20 | 105 | \$5,442 | 27 |
| 28 | \$7,903 | 21 | 110 | \$5,458 | 27 |
| 30 | \$7,782 | 21 | 115 | \$5,516 | 27 |
| 32 | \$7,670 | 21 | 120 | \$5,618 | 27 |
| 34 | \$7,567 | 21 | 125 | \$5,762 | 27 |
| 36 | \$7,471 | 22 | 130 | \$5,949 | 28 |
| 38 | \$7,381 | 22 | 135 | \$6,179 | 28 |
| 40 | \$7,296 | 22 | 140 | \$6,451 | 28 |
| 42 | \$7,217 | 22 | 145 | \$6,767 | 28 |

Drugs—Controlled Substances Analysis

**Figure 15: Efficient Frontier for Drugs-Controlled Substances Analysis—
Average Total Cost v. Cases Processed**



**Figure 16: Efficient Frontier Drugs-Controlled Substances Analysis—
Cases/FTE v. Caseload**

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

**Table 47: Efficient Frontier for Drugs-Controlled Substances Analysis—
Efficient Cost/Case for Various Caseloads**

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|--------|---------------------|---------------|
| 50 | \$854 | 205 | 10,000 | \$334 | 425 |
| 100 | \$755 | 226 | 11,000 | \$328 | 431 |
| 150 | \$703 | 239 | 12,000 | \$323 | 436 |
| 200 | \$668 | 248 | 13,000 | \$316 | 441 |
| 250 | \$642 | 256 | 14,000 | \$303 | 445 |
| 500 | \$567 | 282 | 16,000 | \$280 | 453 |
| 750 | \$528 | 298 | 18,000 | \$261 | 461 |
| 1,000 | \$502 | 310 | 20,000 | \$246 | 468 |
| 1,250 | \$482 | 319 | 22,000 | \$235 | 474 |
| 1,500 | \$467 | 327 | 24,000 | \$229 | 479 |
| 1,750 | \$454 | 334 | 26,000 | \$227 | 485 |
| 2,000 | \$444 | 341 | 28,000 | \$230 | 490 |
| 2,250 | \$435 | 346 | 30,000 | \$237 | 494 |
| 2,500 | \$427 | 351 | 32,000 | \$248 | 499 |
| 3,000 | \$413 | 360 | 34,000 | \$264 | 503 |
| 3,500 | \$402 | 368 | 36,000 | \$284 | 507 |
| 4,000 | \$392 | 375 | 38,000 | \$308 | 518 |
| 4,500 | \$384 | 381 | 40,000 | \$337 | 499 |
| 5,000 | \$377 | 386 | 42,000 | \$370 | 478 |
| 6,000 | \$365 | 396 | 44,000 | \$407 | 453 |
| 7,000 | \$355 | 405 | 46,000 | \$448 | 426 |
| 8,000 | \$347 | 412 | 48,000 | \$494 | 396 |
| 9,000 | \$340 | 419 | 50,000 | \$545 | 363 |

Evidence Screening & Processing

Figure 17: Efficient Frontier for Evidence Screening & Processing—Average Total Cost v. Cases Processed

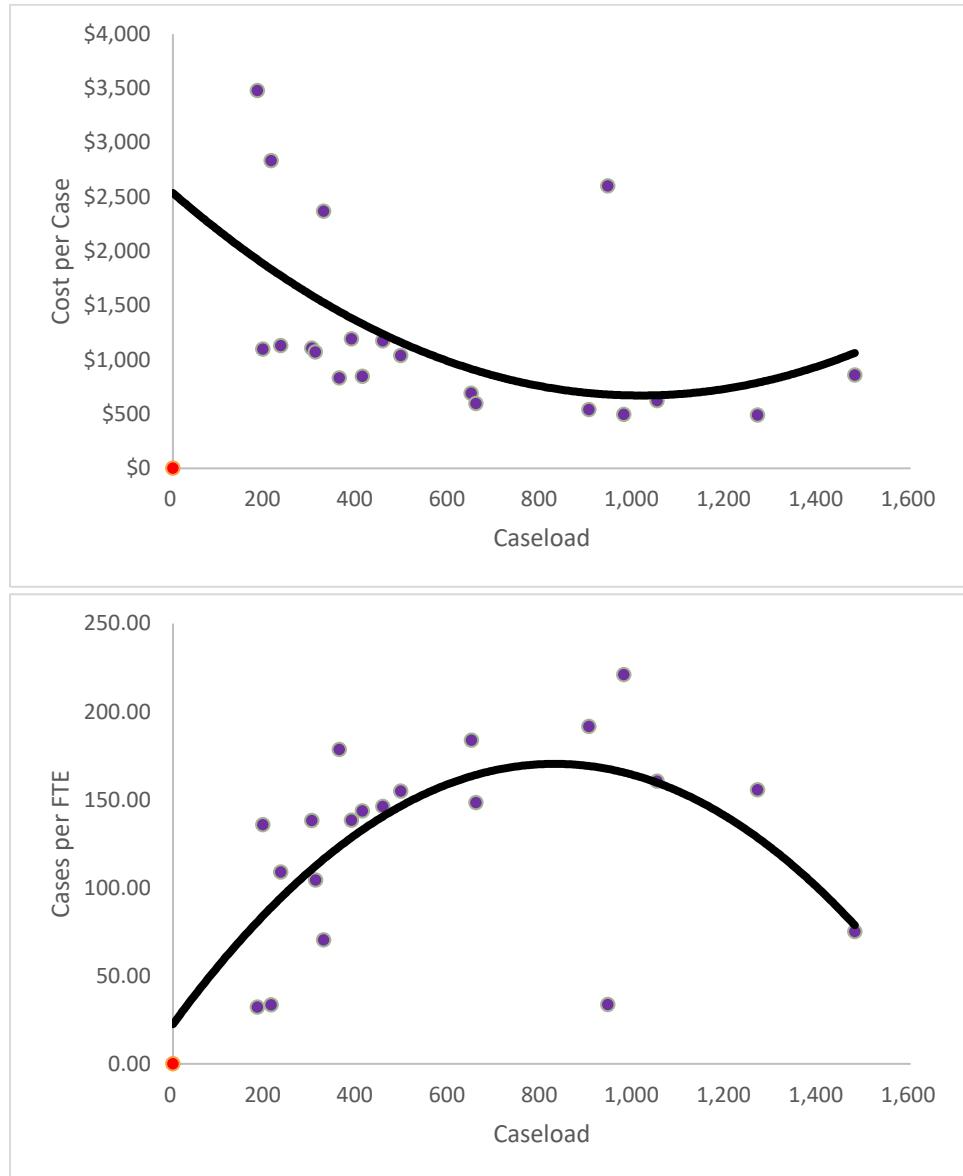


Figure 18: Efficient Frontier for Evidence Screening & Processing — Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 48: Efficient Frontier for Evidence Screening & Processing—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 175 | \$1,948 | 78 | 750 | \$798 | 169 |
| 200 | \$1,873 | 85 | 775 | \$775 | 170 |
| 225 | \$1,801 | 92 | 800 | \$754 | 170 |
| 250 | \$1,730 | 98 | 825 | \$736 | 170 |
| 275 | \$1,662 | 104 | 850 | \$720 | 170 |
| 300 | \$1,596 | 110 | 875 | \$706 | 170 |
| 325 | \$1,532 | 116 | 900 | \$695 | 169 |
| 350 | \$1,471 | 121 | 925 | \$685 | 168 |
| 375 | \$1,412 | 126 | 950 | \$679 | 167 |
| 400 | \$1,355 | 131 | 975 | \$674 | 166 |
| 425 | \$1,301 | 135 | 1,000 | \$671 | 164 |
| 450 | \$1,248 | 140 | 1,025 | \$671 | 162 |
| 475 | \$1,198 | 144 | 1,050 | \$673 | 160 |
| 500 | \$1,150 | 147 | 1,075 | \$678 | 157 |
| 525 | \$1,105 | 151 | 1,100 | \$684 | 154 |
| 550 | \$1,062 | 154 | 1,125 | \$693 | 151 |
| 575 | \$1,021 | 157 | 1,150 | \$705 | 148 |
| 600 | \$982 | 159 | 1,200 | \$734 | 140 |
| 625 | \$946 | 161 | 1,250 | \$772 | 132 |
| 650 | \$912 | 164 | 1,300 | \$819 | 122 |
| 675 | \$880 | 165 | 1,350 | \$876 | 111 |
| 700 | \$850 | 167 | 1,400 | \$941 | 100 |
| 725 | \$823 | 168 | 1,450 | \$1,016 | 87 |

Explosives Analysis

Figure 19: Efficient Frontier for Explosives Analysis—Average Total Cost v. Cases Processed

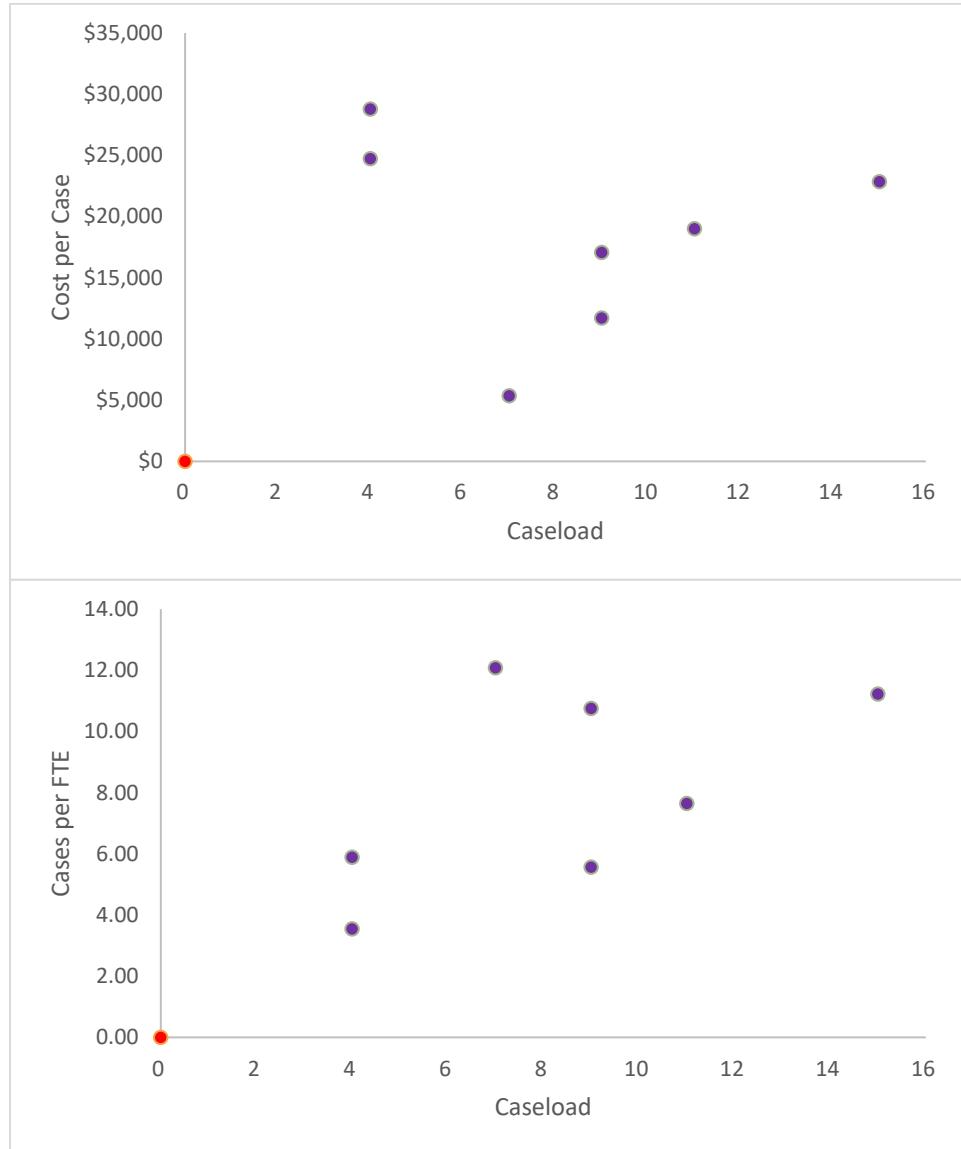


Figure 20 : Efficient Frontier for Explosives Analysis—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

The sample size was too small to enable a relevant estimation of the efficient frontiers.

Table 49: Efficient Frontier for Explosives Analysis—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 1 | \$44,699 | 3 | 24 | \$17,421 | 8 |
| 2 | \$36,396 | 3 | 25 | \$17,211 | 8 |
| 3 | \$32,273 | 4 | 26 | \$17,012 | 8 |
| 4 | \$29,634 | 4 | 28 | \$16,643 | 8 |
| 5 | \$27,737 | 5 | 30 | \$16,306 | 9 |
| 6 | \$26,277 | 5 | 32 | \$15,997 | 9 |
| 7 | \$25,103 | 5 | 34 | \$15,712 | 9 |
| 8 | \$24,129 | 5 | 36 | \$15,447 | 9 |
| 9 | \$23,301 | 6 | 38 | \$15,202 | 9 |
| 10 | \$22,585 | 6 | 40 | \$14,973 | 10 |
| 11 | \$21,955 | 6 | 42 | \$14,758 | 10 |
| 12 | \$21,397 | 6 | 44 | \$14,556 | 10 |
| 13 | \$20,895 | 6 | 46 | \$14,365 | 10 |
| 14 | \$20,440 | 7 | 48 | \$14,184 | 10 |
| 15 | \$20,027 | 7 | 50 | \$14,014 | 10 |
| 16 | \$19,647 | 7 | 52 | \$13,853 | 11 |
| 17 | \$19,297 | 7 | 54 | \$13,699 | 10 |
| 18 | \$18,972 | 7 | 56 | \$13,551 | 10 |
| 19 | \$18,670 | 7 | 58 | \$13,411 | 10 |
| 20 | \$18,389 | 7 | 60 | \$13,277 | 10 |
| 21 | \$18,124 | 8 | 62 | \$13,148 | 10 |
| 22 | \$17,876 | 8 | 64 | \$13,025 | 10 |
| 23 | \$17,643 | 8 | 66 | \$12,906 | 9 |

The sample size was too small to enable a relevant estimation of the efficient frontiers. The Efficient Cost/Case values represent the 2020-2021 efficient metrics adjusted for inflation using the Consumer Price Index.

Fingerprint ID

Figure 21: Efficient Frontier for Fingerprint Identification—Average Total Cost v. Cases Processed

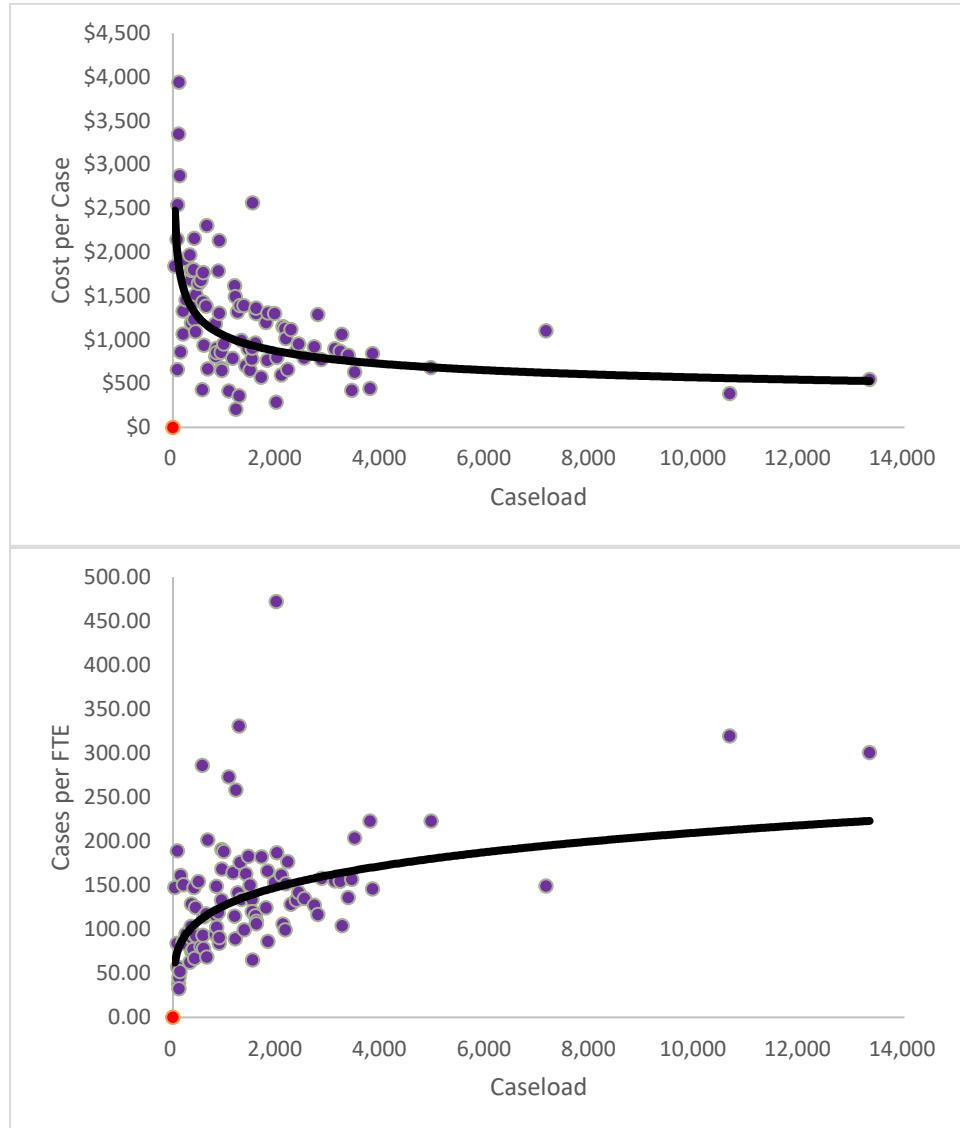


Figure 22: Efficient Frontier for Fingerprint Identification—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 50: Efficient Frontier for Fingerprint Identification—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|--------|---------------------|---------------|
| 30 | \$3,012 | 61 | 1,400 | \$961 | 138 |
| 40 | \$2,765 | 64 | 1,650 | \$915 | 143 |
| 50 | \$2,587 | 68 | 1,900 | \$878 | 147 |
| 75 | \$2,294 | 74 | 2,150 | \$846 | 151 |
| 100 | \$2,106 | 78 | 2,400 | \$819 | 155 |
| 125 | \$1,971 | 82 | 2,900 | \$774 | 161 |
| 150 | \$1,867 | 85 | 3,400 | \$738 | 166 |
| 175 | \$1,783 | 88 | 3,900 | \$709 | 171 |
| 200 | \$1,714 | 91 | 4,400 | \$684 | 176 |
| 250 | \$1,604 | 95 | 4,900 | \$662 | 180 |
| 300 | \$1,519 | 99 | 5,400 | \$643 | 184 |
| 350 | \$1,451 | 102 | 5,900 | \$627 | 187 |
| 400 | \$1,395 | 105 | 6,400 | \$612 | 191 |
| 450 | \$1,347 | 108 | 6,900 | \$598 | 194 |
| 500 | \$1,305 | 111 | 7,400 | \$586 | 197 |
| 600 | \$1,236 | 115 | 7,900 | \$575 | 199 |
| 700 | \$1,181 | 119 | 8,400 | \$564 | 202 |
| 800 | \$1,135 | 122 | 8,900 | \$555 | 205 |
| 900 | \$1,096 | 125 | 9,400 | \$546 | 207 |
| 1,000 | \$1,062 | 128 | 10,400 | \$530 | 211 |
| 1,100 | \$1,033 | 131 | 11,400 | \$515 | 216 |
| 1,200 | \$1,006 | 133 | 12,400 | \$503 | 220 |
| 1,300 | \$983 | 136 | 13,400 | \$491 | 223 |

Fingerprint Database

Figure 23: Efficient Frontier for Fingerprint Database—Average Total Cost v. Cases Processed

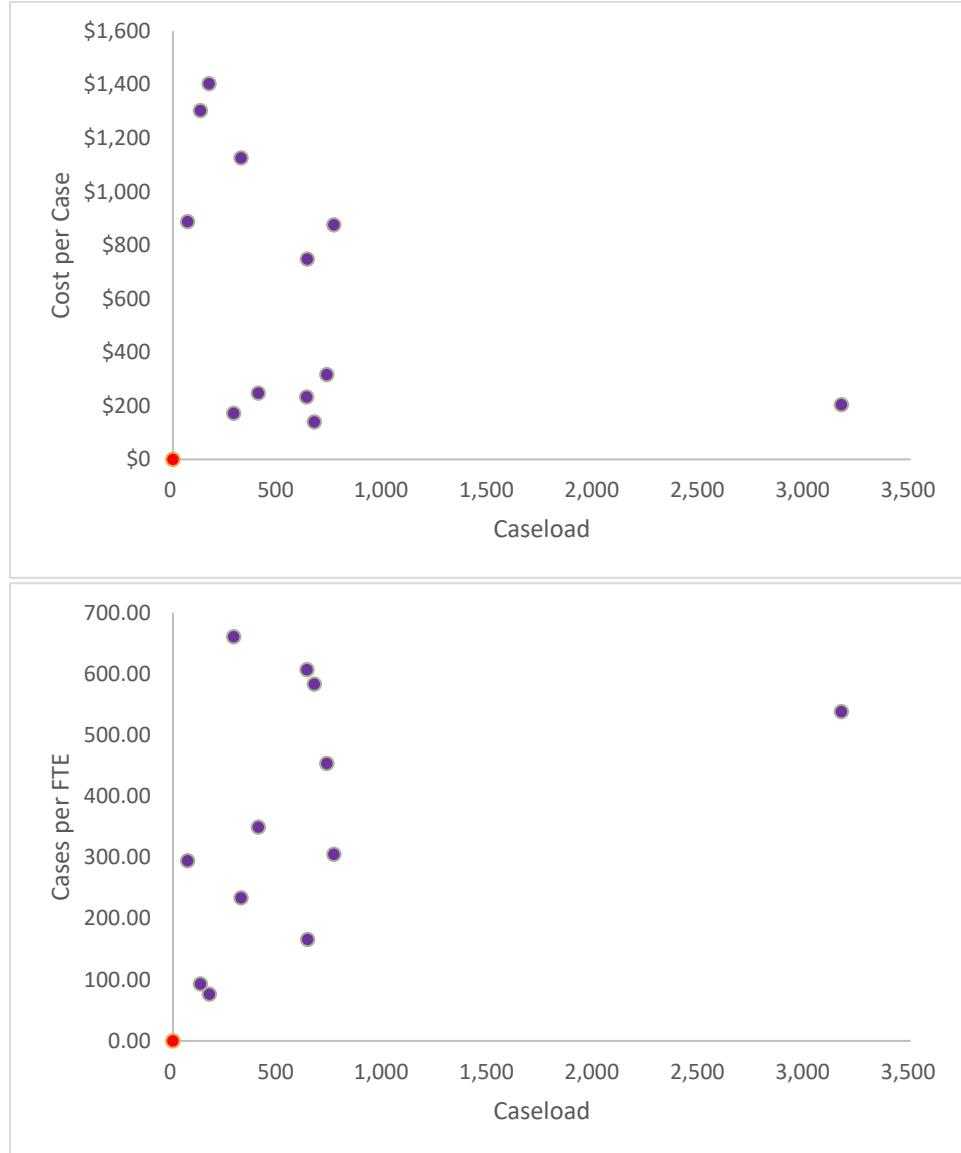


Figure 24: Efficient Frontier for Fingerprint Database—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Note: This is the third year collecting details from the use of the fingerprint database. The number of responses was too small for accurate estimation of the efficient frontiers for Cost/Case or Cases/FTE.

Fire Analysis

Figure 25: Efficient Frontier for Fire Analysis--Average Total Cost v. Cases Processed

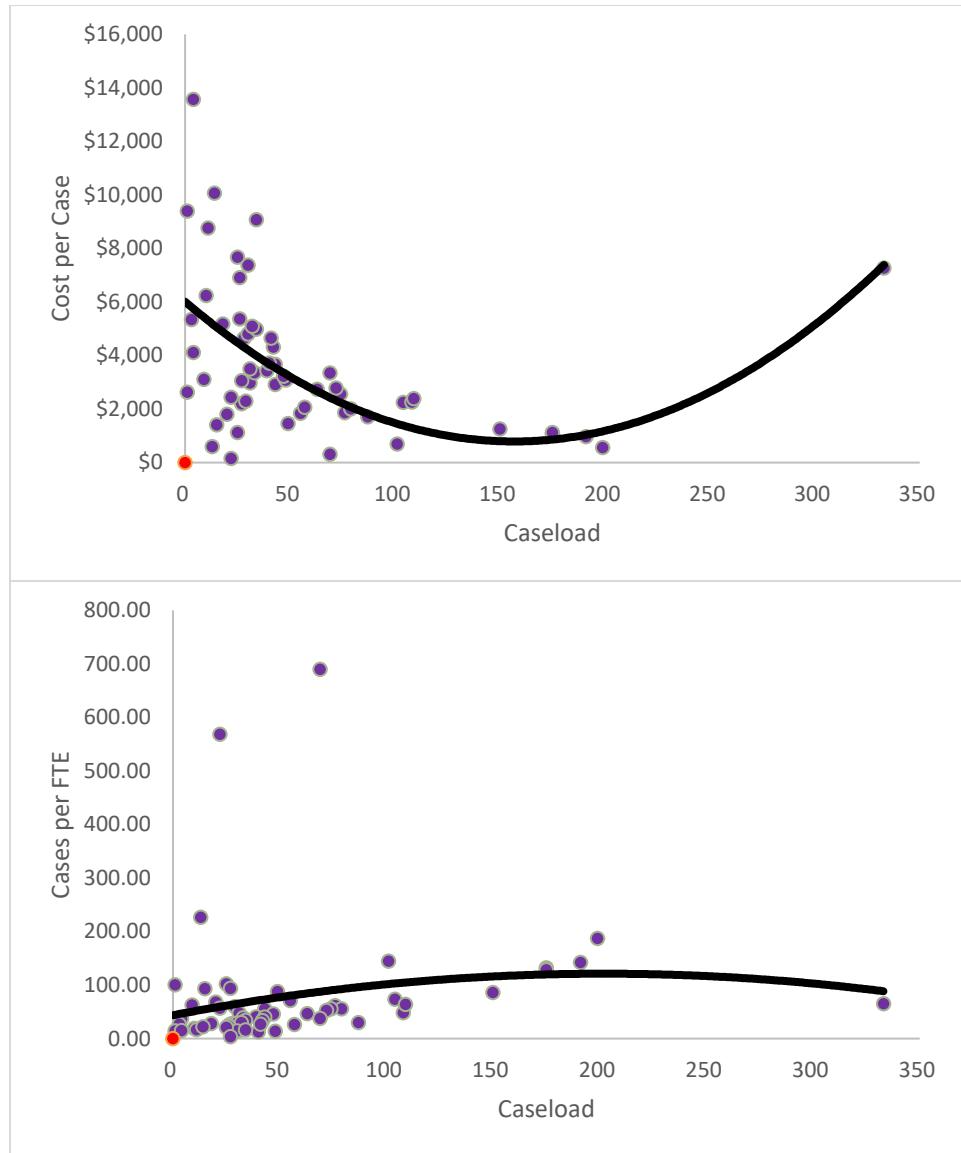


Figure 26: Efficient Frontier for Fire Analysis—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 51: Efficient Frontier for Fire Analysis—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 1 | \$8,091 | 19 | 38 | \$4,281 | 70 |
| 2 | \$6,594 | 23 | 40 | \$4,168 | 71 |
| 3 | \$6,560 | 25 | 45 | \$3,893 | 74 |
| 4 | \$6,487 | 27 | 50 | \$3,629 | 77 |
| 5 | \$6,414 | 28 | 55 | \$3,377 | 80 |
| 6 | \$6,342 | 32 | 60 | \$3,136 | 83 |
| 7 | \$6,271 | 34 | 65 | \$2,907 | 86 |
| 8 | \$6,200 | 37 | 70 | \$2,689 | 88 |
| 9 | \$6,129 | 40 | 75 | \$2,483 | 91 |
| 10 | \$6,059 | 42 | 80 | \$2,288 | 93 |
| 12 | \$5,920 | 46 | 90 | \$1,932 | 97 |
| 14 | \$5,783 | 49 | 100 | \$1,622 | 101 |
| 16 | \$5,648 | 52 | 110 | \$1,358 | 105 |
| 18 | \$5,514 | 55 | 120 | \$1,140 | 108 |
| 20 | \$5,383 | 58 | 130 | \$968 | 111 |
| 22 | \$5,253 | 60 | 140 | \$842 | 114 |
| 24 | \$5,125 | 61 | 150 | \$761 | 116 |
| 26 | \$4,999 | 62 | 175 | \$760 | 120 |
| 28 | \$4,875 | 64 | 200 | \$1,045 | 121 |
| 30 | \$4,752 | 65 | 225 | \$1,617 | 120 |
| 32 | \$4,632 | 66 | 250 | \$2,475 | 117 |
| 34 | \$4,513 | 68 | 300 | \$5,050 | 103 |
| 36 | \$4,396 | 69 | 350 | \$8,771 | 79 |

Firearms & Ballistics Analysis

Figure 27: Efficient Frontier for Firearms & Ballistics Analysis—Average Total Cost v. Cases Processed

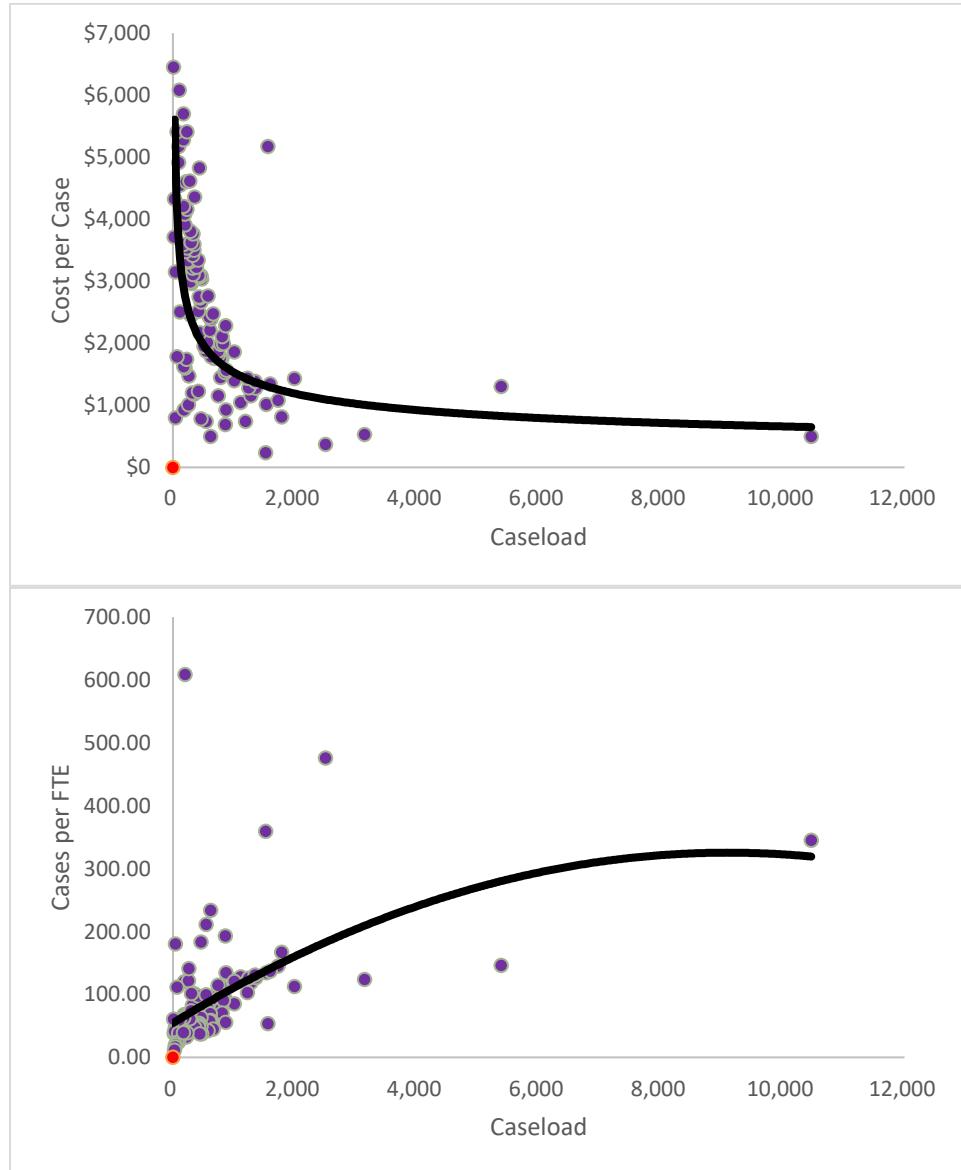


Figure 28: Efficient Frontier for Firearms & Ballistics Analysis—Cases/FTE v. Caseload

Table 52: Efficient Frontier for Firearms & Ballistics Analysis—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|--------|---------------------|---------------|
| 25 | \$6,871 | 28 | 1,100 | \$1,443 | 115 |
| 50 | \$5,162 | 36 | 1,200 | \$1,392 | 121 |
| 75 | \$4,368 | 41 | 1,300 | \$1,347 | 126 |
| 100 | \$3,879 | 45 | 1,400 | \$1,307 | 132 |
| 125 | \$3,538 | 49 | 1,500 | \$1,270 | 137 |
| 150 | \$3,282 | 52 | 1,750 | \$1,192 | 149 |
| 175 | \$3,080 | 55 | 2,000 | \$1,128 | 161 |
| 200 | \$2,915 | 57 | 2,250 | \$1,074 | 172 |
| 225 | \$2,777 | 59 | 2,500 | \$1,029 | 183 |
| 250 | \$2,658 | 61 | 2,750 | \$989 | 194 |
| 300 | \$2,466 | 65 | 3,000 | \$954 | 204 |
| 350 | \$2,314 | 69 | 3,250 | \$923 | 214 |
| 400 | \$2,190 | 72 | 3,500 | \$895 | 223 |
| 450 | \$2,086 | 75 | 4,000 | \$847 | 241 |
| 500 | \$1,998 | 78 | 4,500 | \$807 | 257 |
| 550 | \$1,921 | 81 | 5,000 | \$773 | 271 |
| 600 | \$1,853 | 84 | 5,500 | \$743 | 283 |
| 650 | \$1,793 | 87 | 6,000 | \$717 | 294 |
| 700 | \$1,739 | 90 | 6,500 | \$694 | 304 |
| 750 | \$1,690 | 93 | 7,500 | \$654 | 317 |
| 800 | \$1,646 | 96 | 8,500 | \$621 | 324 |
| 900 | \$1,568 | 102 | 9,500 | \$593 | 325 |
| 1,000 | \$1,501 | 108 | 10,500 | \$569 | 319 |

Firearms Database

Figure 29: Efficient Frontier for Firearms Database—Average Total Cost v. Cases Processed

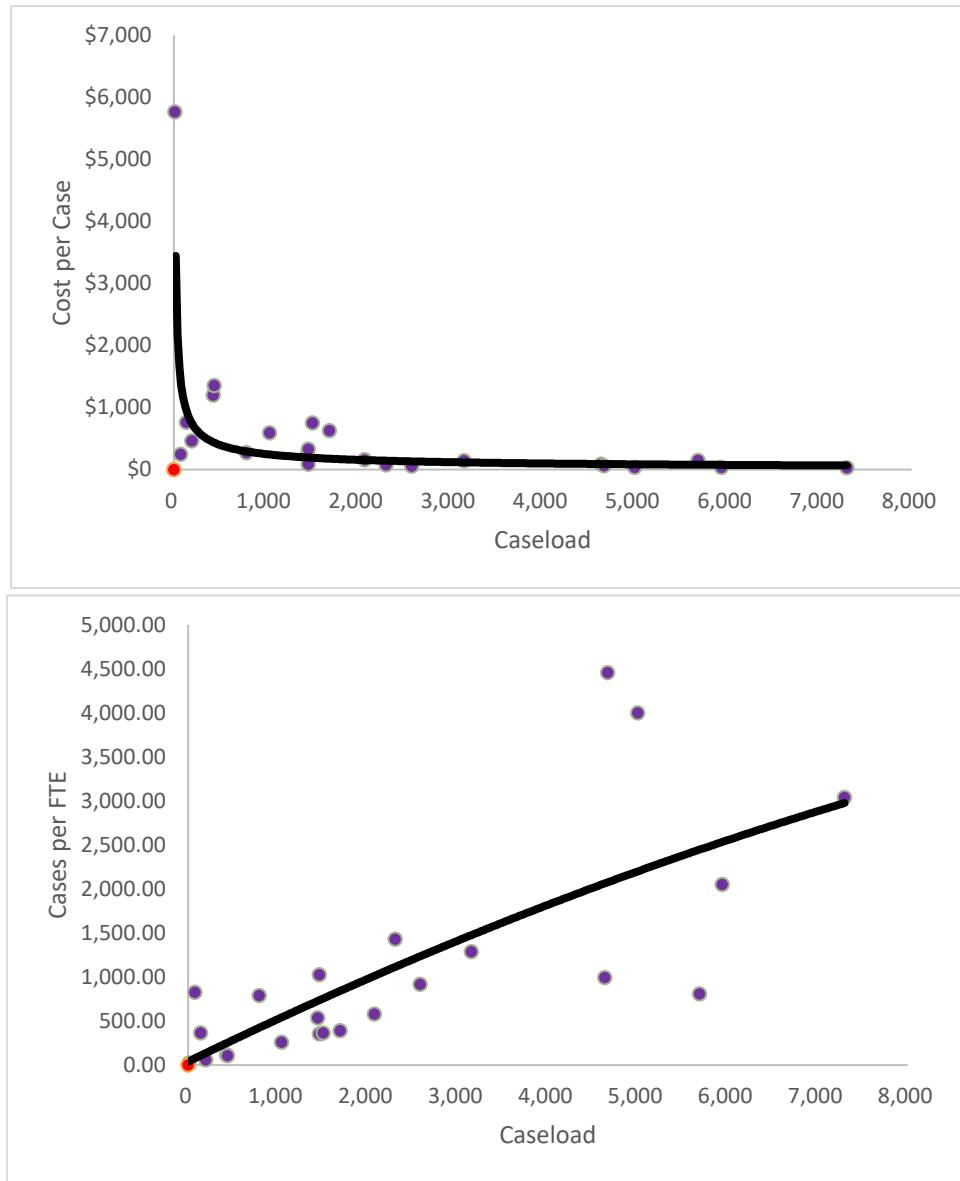


Figure 30: Efficient Frontier for Firearms Database—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 53: Efficient Frontier for Firearms Database—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 10 | \$5,448 | 27 | 1,500 | \$190 | 756 |
| 20 | \$3,425 | 42 | 1,750 | \$171 | 870 |
| 30 | \$2,610 | 55 | 2,000 | \$157 | 982 |
| 40 | \$2,153 | 66 | 2,250 | \$145 | 1,092 |
| 50 | \$1,854 | 76 | 2,500 | \$135 | 1,201 |
| 100 | \$1,165 | 118 | 2,750 | \$127 | 1,308 |
| 150 | \$888 | 153 | 3,000 | \$119 | 1,414 |
| 200 | \$732 | 184 | 3,250 | \$113 | 1,517 |
| 250 | \$631 | 213 | 3,500 | \$108 | 1,620 |
| 300 | \$558 | 239 | 3,750 | \$103 | 1,720 |
| 350 | \$503 | 264 | 4,000 | \$98 | 1,820 |
| 400 | \$460 | 287 | 4,250 | \$95 | 1,917 |
| 450 | \$425 | 310 | 4,500 | \$91 | 2,013 |
| 500 | \$396 | 332 | 4,750 | \$88 | 2,107 |
| 600 | \$351 | 373 | 5,000 | \$85 | 2,200 |
| 700 | \$316 | 411 | 5,250 | \$82 | 2,291 |
| 800 | \$289 | 448 | 5,500 | \$80 | 2,380 |
| 900 | \$267 | 483 | 5,750 | \$77 | 2,468 |
| 1,000 | \$249 | 525 | 6,000 | \$75 | 2,555 |
| 1,100 | \$234 | 572 | 6,250 | \$73 | 2,639 |
| 1,200 | \$221 | 618 | 6,500 | \$71 | 2,722 |
| 1,300 | \$209 | 665 | 7,000 | \$68 | 2,884 |
| 1,400 | \$199 | 711 | 7,500 | \$65 | 3,039 |

Forensic Pathology

Figure 31: Efficient Frontier for Forensic Pathology—Average Total Cost v. Cases Processed

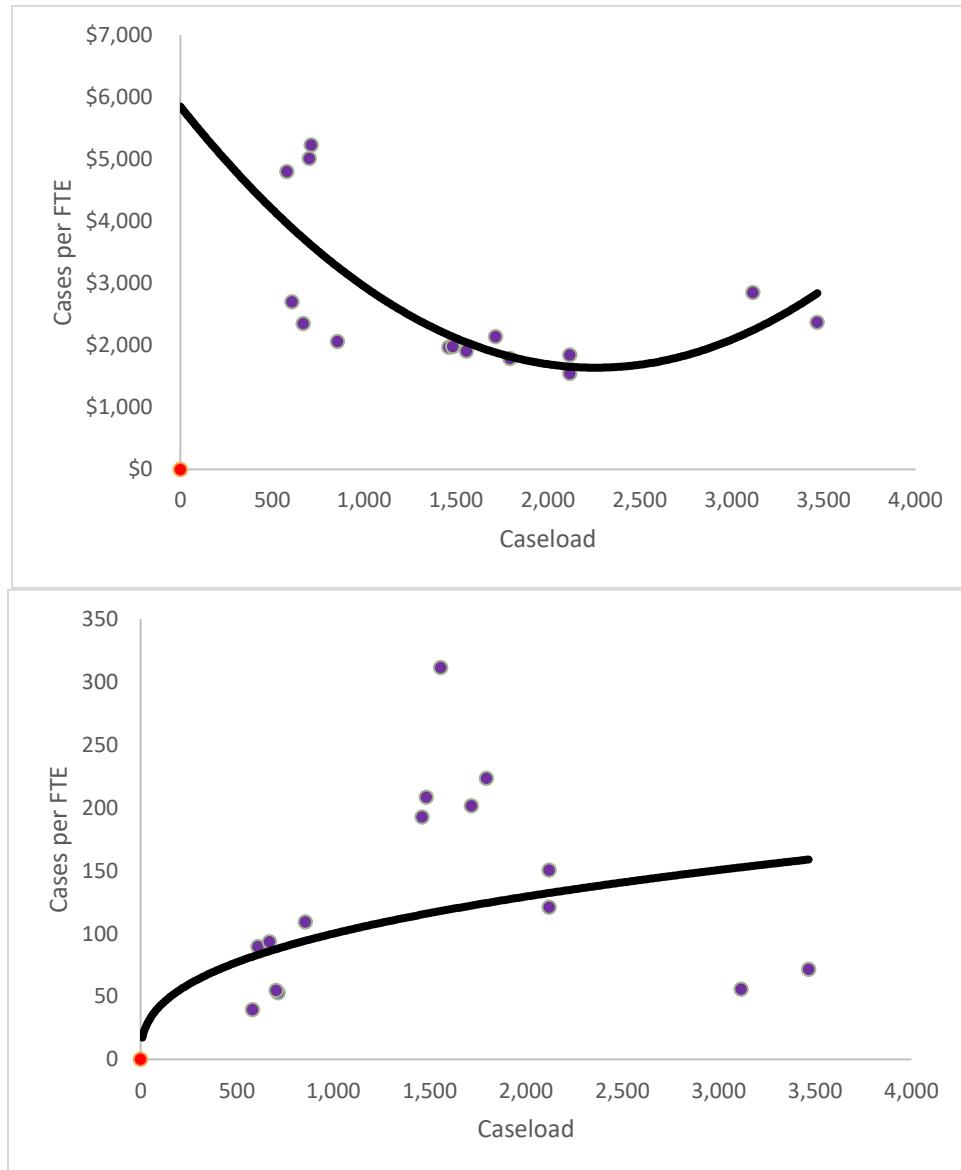


Figure 32: Efficient Frontier for Forensic Pathology—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 54: Efficient Frontier for Forensic Pathology—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 500 | \$4,193 | 77 | 1,650 | \$1,946 | 120 |
| 550 | \$4,050 | 80 | 1,700 | \$1,898 | 122 |
| 600 | \$3,911 | 83 | 1,750 | \$1,854 | 123 |
| 650 | \$3,776 | 85 | 1,800 | \$1,814 | 124 |
| 700 | \$3,646 | 88 | 1,850 | \$1,778 | 126 |
| 750 | \$3,519 | 90 | 1,900 | \$1,746 | 127 |
| 800 | \$3,397 | 92 | 1,950 | \$1,718 | 128 |
| 850 | \$3,278 | 94 | 2,000 | \$1,695 | 129 |
| 900 | \$3,164 | 96 | 2,100 | \$1,660 | 132 |
| 950 | \$3,054 | 98 | 2,200 | \$1,642 | 134 |
| 1,000 | \$2,948 | 100 | 2,300 | \$1,641 | 136 |
| 1,050 | \$2,846 | 102 | 2,400 | \$1,655 | 139 |
| 1,100 | \$2,749 | 104 | 2,500 | \$1,687 | 141 |
| 1,150 | \$2,655 | 105 | 2,600 | \$1,735 | 143 |
| 1,200 | \$2,566 | 107 | 2,700 | \$1,799 | 145 |
| 1,250 | \$2,480 | 109 | 2,800 | \$1,880 | 147 |
| 1,300 | \$2,399 | 110 | 2,900 | \$1,977 | 149 |
| 1,350 | \$2,322 | 112 | 3,000 | \$2,091 | 151 |
| 1,400 | \$2,249 | 113 | 3,100 | \$2,221 | 152 |
| 1,450 | \$2,180 | 115 | 3,200 | \$2,368 | 154 |
| 1,500 | \$2,115 | 116 | 3,300 | \$2,531 | 156 |
| 1,550 | \$2,055 | 118 | 3,400 | \$2,711 | 158 |
| 1,600 | \$1,998 | 119 | 3,500 | \$2,907 | 159 |

Gunshot Residue Analysis

Figure 33: Efficient Frontier for Gunshot Residue Analysis--Average Total Cost v. Cases Processed

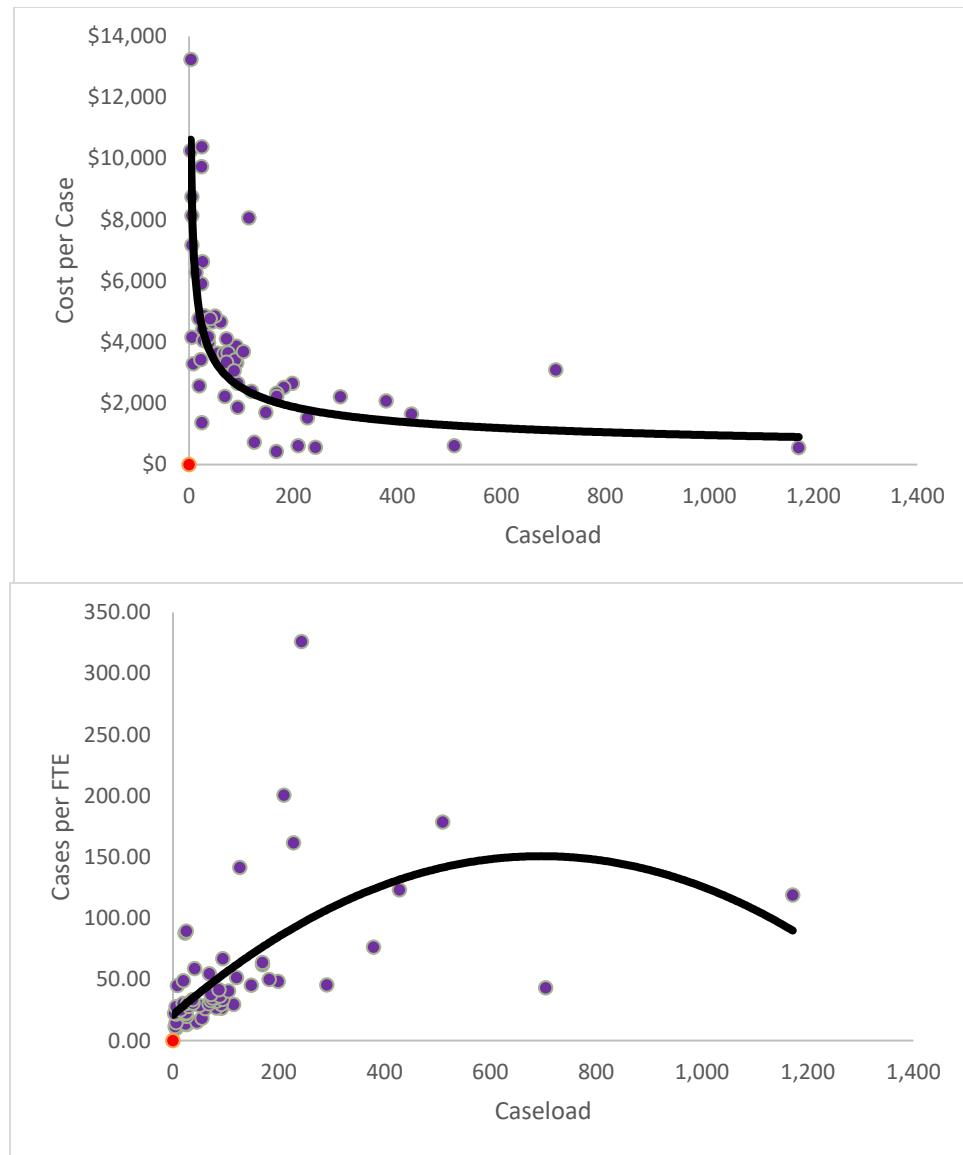


Figure 34: Efficient Frontier for Gunshot Residue Analysis—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 55: Efficient Frontier for Gunshot Residue Analysis—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 2 | \$13,229 | 11 | 60 | \$3,143 | 47 |
| 4 | \$9,870 | 15 | 65 | \$3,038 | 49 |
| 6 | \$8,316 | 17 | 70 | \$2,945 | 51 |
| 8 | \$7,364 | 19 | 80 | \$2,783 | 55 |
| 10 | \$6,701 | 21 | 90 | \$2,648 | 59 |
| 12 | \$6,204 | 22 | 100 | \$2,533 | 63 |
| 14 | \$5,813 | 24 | 110 | \$2,433 | 66 |
| 16 | \$5,494 | 25 | 120 | \$2,345 | 70 |
| 18 | \$5,227 | 26 | 130 | \$2,267 | 74 |
| 20 | \$5,000 | 27 | 140 | \$2,197 | 77 |
| 22 | \$4,802 | 28 | 150 | \$2,134 | 81 |
| 24 | \$4,629 | 30 | 175 | \$1,999 | 89 |
| 26 | \$4,475 | 31 | 200 | \$1,890 | 97 |
| 28 | \$4,337 | 32 | 300 | \$1,592 | 124 |
| 30 | \$4,212 | 33 | 400 | \$1,410 | 145 |
| 32 | \$4,099 | 34 | 500 | \$1,283 | 159 |
| 34 | \$3,995 | 36 | 600 | \$1,188 | 166 |
| 36 | \$3,900 | 37 | 700 | \$1,113 | 167 |
| 38 | \$3,812 | 38 | 800 | \$1,052 | 161 |
| 40 | \$3,730 | 39 | 900 | \$1,001 | 148 |
| 45 | \$3,549 | 41 | 1,000 | \$957 | 128 |
| 50 | \$3,395 | 43 | 1,100 | \$919 | 102 |
| 55 | \$3,261 | 45 | 1,200 | \$886 | 69 |

Marks & Impressions Analysis

Figure 35: Efficient Frontier for Marks & Impressions Analysis--Average Total Cost v. Cases Processed

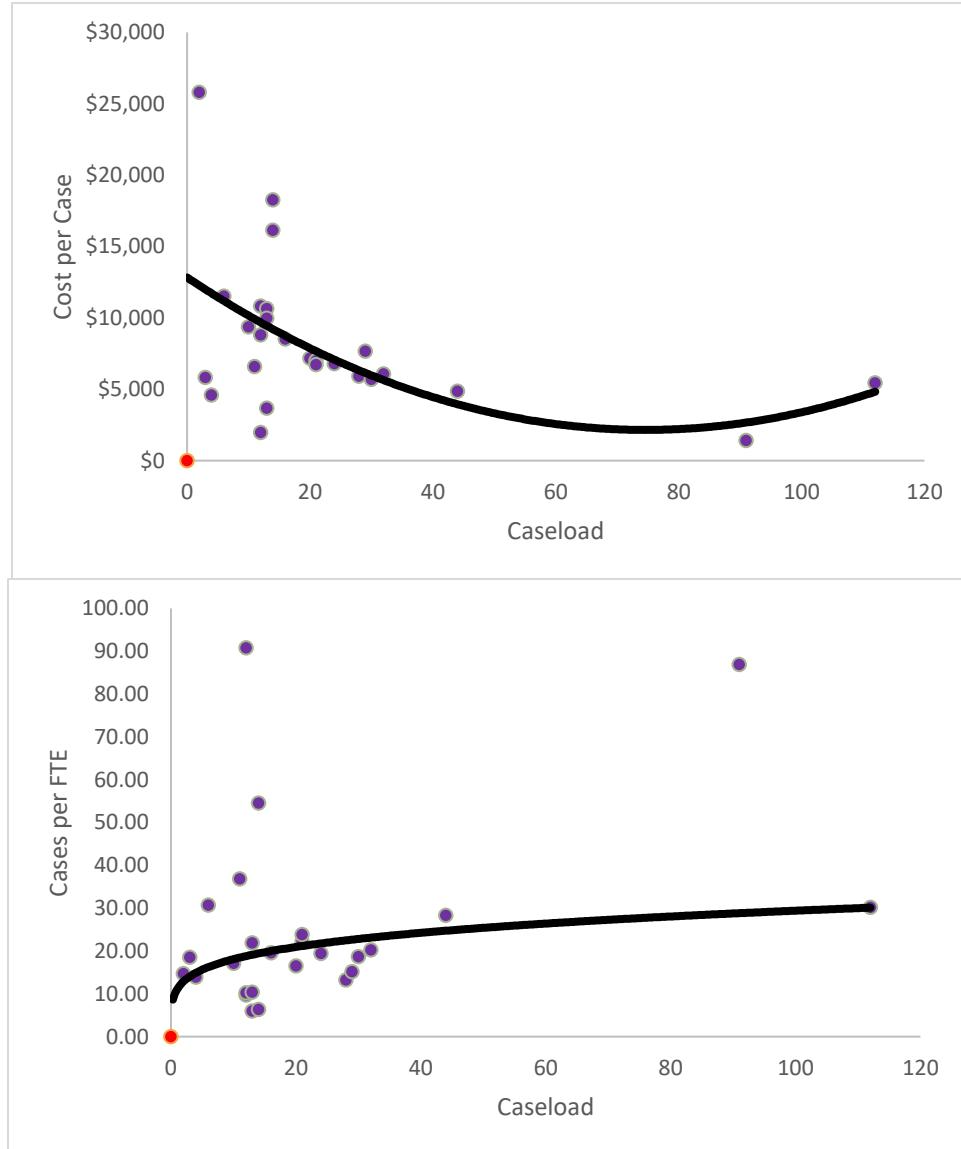


Figure 36: Efficient Frontier for Marks & Impressions Analysis—Cases/FTE v. Caseload

Table 56: Efficient Frontier for Marks & Impressions Analysis—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 2 | \$13,529 | 13 | 48 | \$3,458 | 25 |
| 4 | \$11,722 | 15 | 50 | \$3,261 | 25 |
| 6 | \$11,183 | 16 | 52 | \$3,080 | 26 |
| 8 | \$10,660 | 17 | 54 | \$2,913 | 26 |
| 10 | \$10,153 | 18 | 56 | \$2,763 | 26 |
| 12 | \$9,661 | 19 | 58 | \$2,628 | 26 |
| 14 | \$9,184 | 19 | 60 | \$2,508 | 26 |
| 16 | \$8,723 | 20 | 62 | \$2,404 | 27 |
| 18 | \$8,278 | 20 | 64 | \$2,316 | 27 |
| 20 | \$7,848 | 21 | 66 | \$2,243 | 27 |
| 22 | \$7,433 | 21 | 68 | \$2,186 | 27 |
| 24 | \$7,034 | 22 | 70 | \$2,144 | 27 |
| 26 | \$6,651 | 22 | 75 | \$2,107 | 28 |
| 28 | \$6,283 | 22 | 80 | \$2,167 | 28 |
| 30 | \$5,931 | 23 | 85 | \$2,324 | 28 |
| 32 | \$5,594 | 23 | 90 | \$2,579 | 29 |
| 34 | \$5,273 | 23 | 95 | \$2,930 | 29 |
| 36 | \$4,967 | 24 | 100 | \$3,378 | 29 |
| 38 | \$4,677 | 24 | 105 | \$3,924 | 30 |
| 40 | \$4,402 | 24 | 110 | \$4,566 | 30 |
| 42 | \$4,143 | 24 | 115 | \$5,305 | 30 |
| 44 | \$3,899 | 25 | 120 | \$6,142 | 31 |
| 46 | \$3,671 | 25 | 125 | \$7,075 | 31 |

Serology/Biology Analysis

Figure 37: Efficient Frontier for Serology/Biology Analysis—Average Total Cost v. Caseload

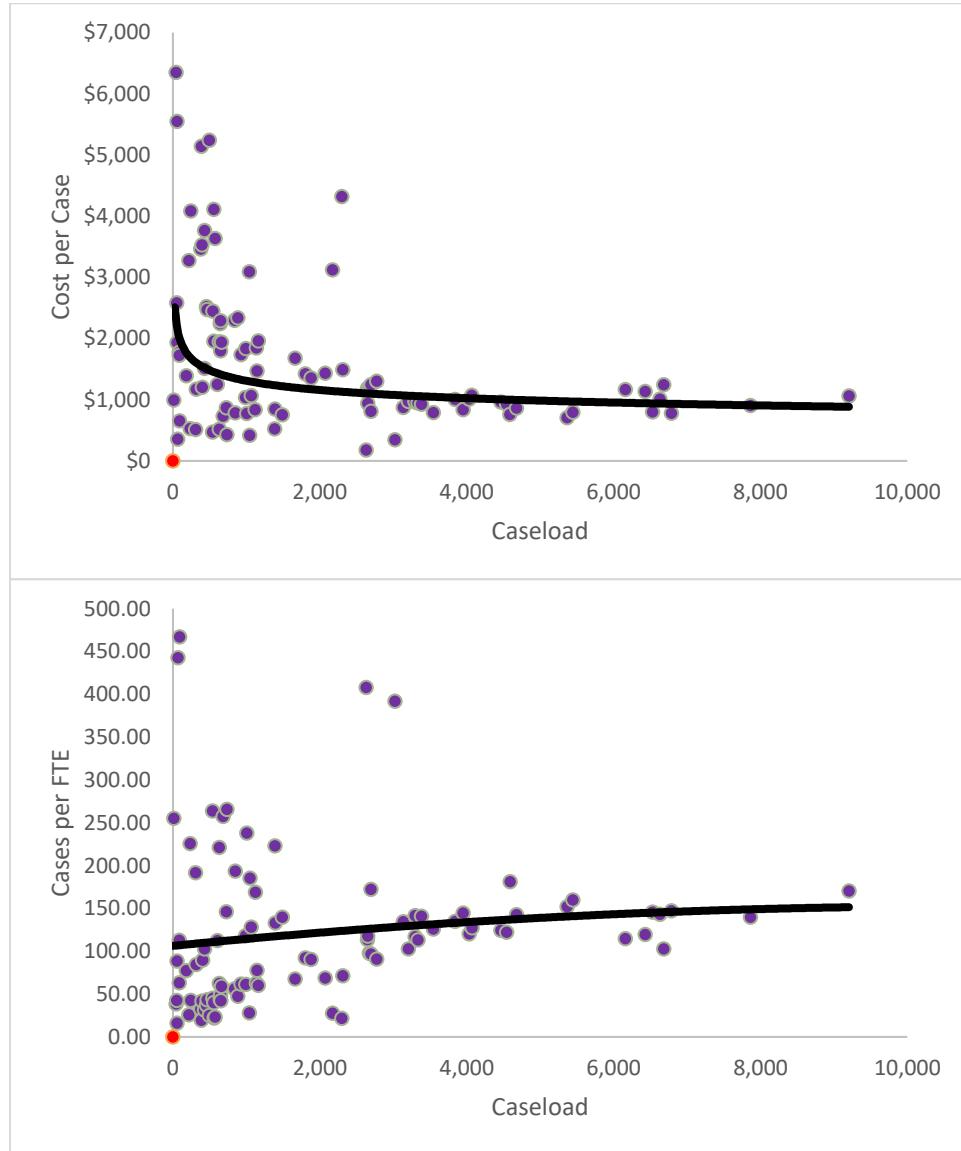


Figure 38: Efficient Frontier for Serology/Biology Analysis—Cases/FTE v. Caseload

Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 57: Efficient Frontier for Serology/Biology Analysis—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|--------|---------------------|---------------|
| 15 | \$2,711 | 52 | 700 | \$1,384 | 88 |
| 30 | \$2,401 | 57 | 750 | \$1,367 | 89 |
| 45 | \$2,236 | 61 | 800 | \$1,352 | 90 |
| 60 | \$2,127 | 63 | 900 | \$1,324 | 91 |
| 75 | \$2,045 | 65 | 1,000 | \$1,300 | 93 |
| 90 | \$1,981 | 67 | 1,100 | \$1,278 | 94 |
| 105 | \$1,928 | 68 | 1,200 | \$1,259 | 95 |
| 120 | \$1,884 | 69 | 1,300 | \$1,241 | 96 |
| 140 | \$1,834 | 71 | 1,400 | \$1,225 | 97 |
| 160 | \$1,791 | 72 | 1,500 | \$1,211 | 98 |
| 180 | \$1,755 | 73 | 1,750 | \$1,179 | 100 |
| 200 | \$1,723 | 74 | 2,000 | \$1,151 | 102 |
| 225 | \$1,688 | 76 | 2,250 | \$1,128 | 103 |
| 250 | \$1,657 | 77 | 2,500 | \$1,107 | 105 |
| 275 | \$1,629 | 78 | 3,000 | \$1,072 | 108 |
| 300 | \$1,605 | 79 | 3,500 | \$1,044 | 110 |
| 350 | \$1,562 | 80 | 4,000 | \$1,020 | 112 |
| 400 | \$1,526 | 82 | 5,000 | \$981 | 115 |
| 450 | \$1,495 | 83 | 6,000 | \$950 | 118 |
| 500 | \$1,467 | 84 | 7,000 | \$925 | 121 |
| 550 | \$1,443 | 85 | 8,000 | \$1,130 | 123 |
| 600 | \$1,421 | 86 | 9,000 | \$1,474 | 125 |
| 650 | \$1,402 | 87 | 10,000 | \$1,931 | 127 |

Toxicology Analysis ante-mortem Analysis

Figure 39: Efficient Frontier for Toxicology Analysis (antemortem)—Average Total Cost v. Caseload

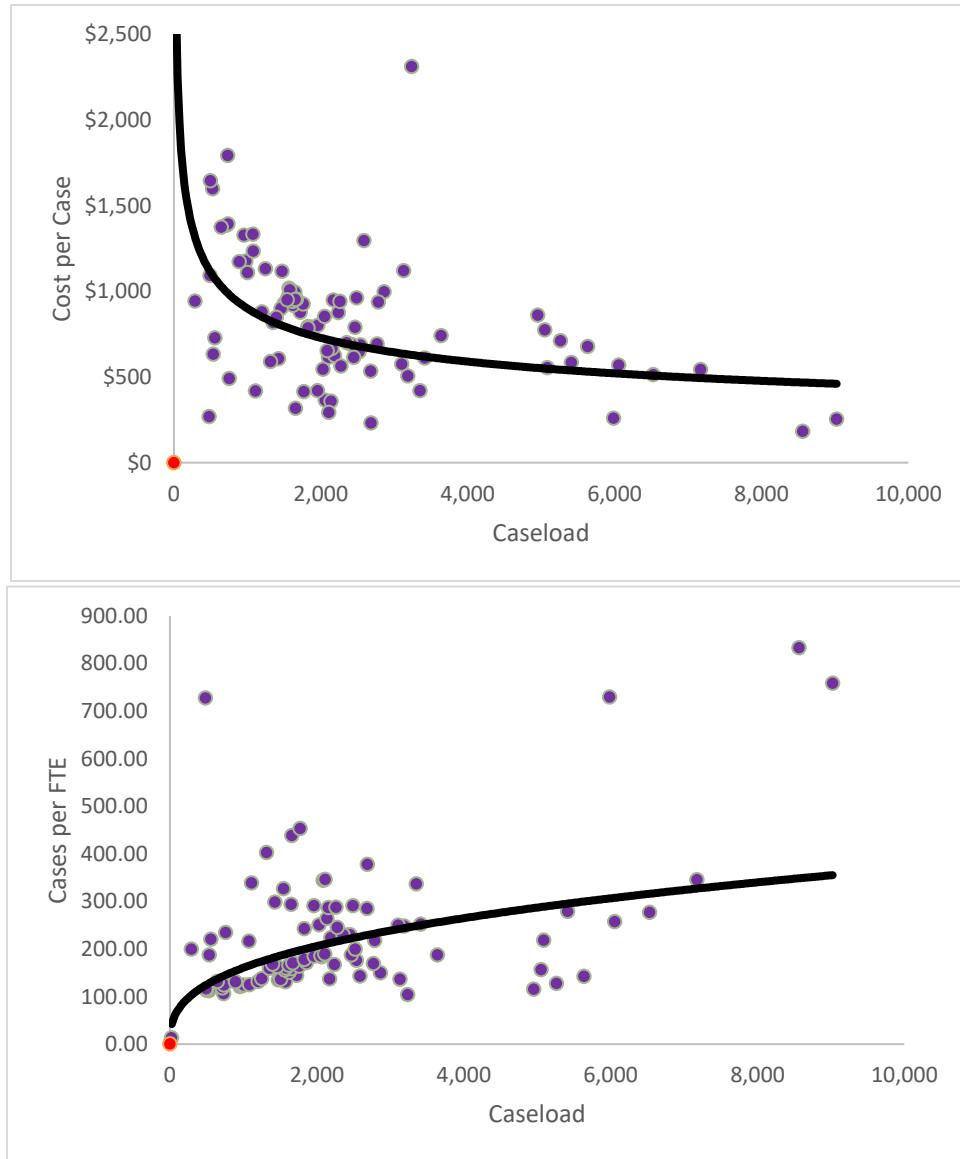


Figure 40: Efficient Frontier for Toxicology Analysis (antemortem)—Cases/FTE v. Caseload

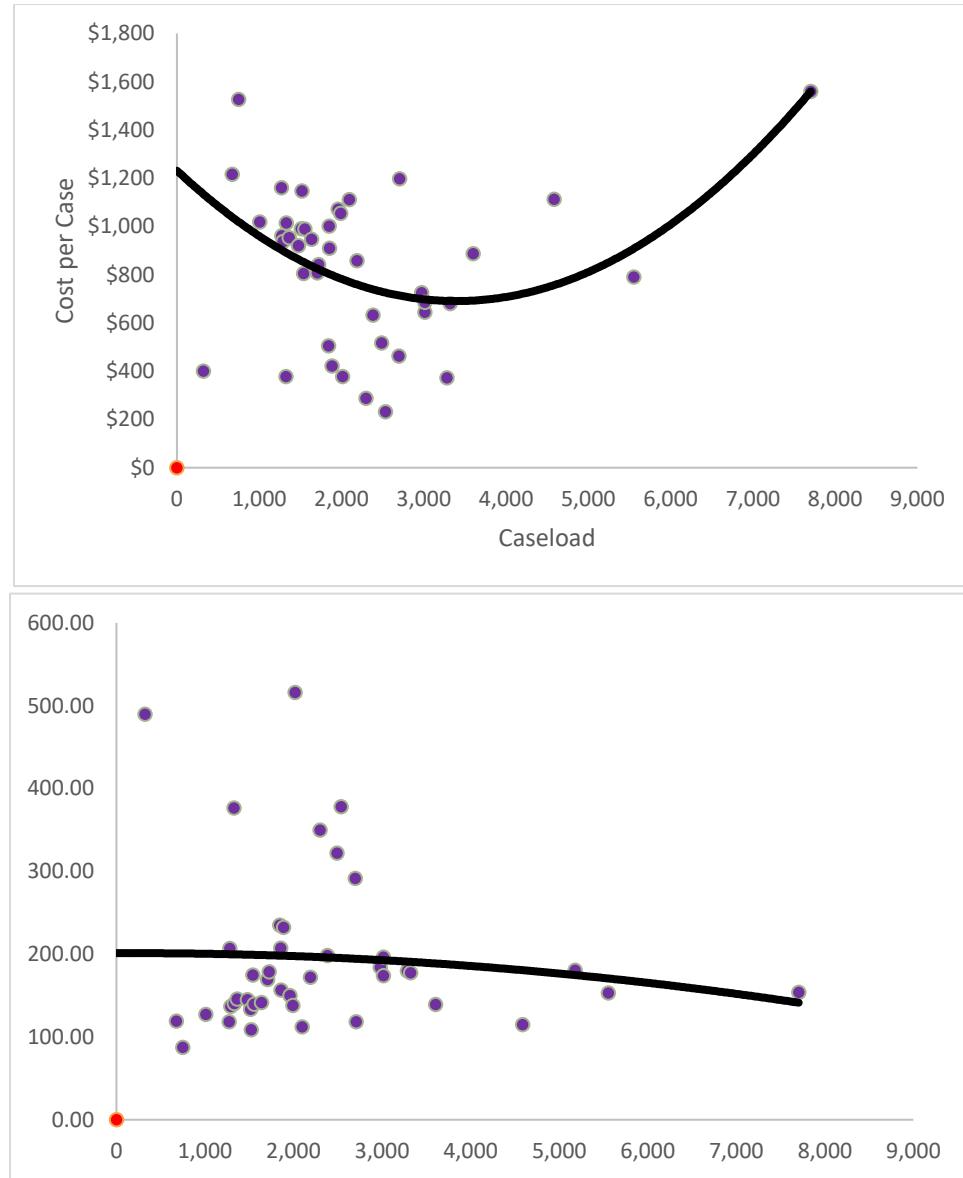
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

Table 58: Efficient Frontier for Toxicology ante-mortem—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 20 | \$5,301 | 39 | 900 | \$1,034 | 155 |
| 40 | \$3,936 | 50 | 1,000 | \$988 | 161 |
| 60 | \$3,307 | 58 | 1,100 | \$948 | 166 |
| 80 | \$2,923 | 65 | 1,200 | \$914 | 171 |
| 100 | \$2,656 | 70 | 1,300 | \$883 | 176 |
| 125 | \$2,413 | 76 | 1,400 | \$855 | 181 |
| 150 | \$2,231 | 81 | 1,500 | \$830 | 186 |
| 175 | \$2,088 | 86 | 1,750 | \$777 | 196 |
| 200 | \$1,972 | 90 | 2,000 | \$734 | 206 |
| 225 | \$1,875 | 94 | 2,250 | \$697 | 215 |
| 250 | \$1,792 | 97 | 2,500 | \$667 | 223 |
| 275 | \$1,720 | 101 | 2,750 | \$640 | 231 |
| 300 | \$1,657 | 104 | 3,000 | \$616 | 239 |
| 350 | \$1,551 | 110 | 3,250 | \$596 | 246 |
| 400 | \$1,464 | 115 | 3,500 | \$577 | 252 |
| 450 | \$1,392 | 120 | 3,750 | \$560 | 259 |
| 500 | \$1,331 | 125 | 4,000 | \$545 | 265 |
| 550 | \$1,277 | 129 | 4,500 | \$518 | 276 |
| 600 | \$1,230 | 133 | 5,000 | \$495 | 287 |
| 650 | \$1,189 | 137 | 5,500 | \$475 | 297 |
| 700 | \$1,152 | 141 | 6,500 | \$442 | 315 |
| 750 | \$1,118 | 145 | 7,500 | \$416 | 332 |
| 800 | \$1,087 | 148 | 8,500 | \$394 | 348 |

Toxicology Analysis post-mortem Analysis

**Figure 41: Efficient Frontier for Toxicology Analysis (postmortem)—
Average Total Cost v. Caseload**



**Figure 42: Efficient Frontier for Toxicology Analysis (postmortem)—
Cases/FTE v. Caseload**

Table 59: Efficient Frontier for Toxicology post-mortem—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 300 | \$1,140 | 201 | 1,700 | \$826 | 199 |
| 325 | \$1,133 | 201 | 1,800 | \$810 | 198 |
| 350 | \$1,126 | 201 | 1,900 | \$796 | 198 |
| 375 | \$1,119 | 201 | 2,000 | \$782 | 198 |
| 400 | \$1,112 | 201 | 2,100 | \$770 | 197 |
| 425 | \$1,105 | 201 | 2,350 | \$742 | 196 |
| 450 | \$1,098 | 201 | 2,600 | \$721 | 195 |
| 475 | \$1,091 | 201 | 2,850 | \$705 | 194 |
| 500 | \$1,084 | 201 | 3,100 | \$695 | 192 |
| 550 | \$1,071 | 201 | 3,350 | \$691 | 191 |
| 600 | \$1,057 | 201 | 3,600 | \$693 | 189 |
| 650 | \$1,044 | 201 | 3,850 | \$700 | 187 |
| 700 | \$1,032 | 201 | 4,100 | \$714 | 185 |
| 750 | \$1,019 | 201 | 4,350 | \$733 | 183 |
| 800 | \$1,007 | 201 | 4,600 | \$758 | 181 |
| 900 | \$983 | 201 | 4,850 | \$789 | 178 |
| 1,000 | \$960 | 200 | 5,100 | \$826 | 176 |
| 1,100 | \$938 | 200 | 5,350 | \$869 | 173 |
| 1,200 | \$917 | 200 | 5,600 | \$918 | 172 |
| 1,300 | \$897 | 200 | 6,100 | \$1,032 | 172 |
| 1,400 | \$878 | 200 | 6,600 | \$1,171 | 171 |
| 1,500 | \$860 | 199 | 7,100 | \$1,332 | 171 |
| 1,600 | \$842 | 199 | 7,600 | \$1,517 | 171 |

Trace Evidence Analysis

Figure 43: Efficient Frontier for Trace Evidence Analysis—Average Total Cost v. Caseload

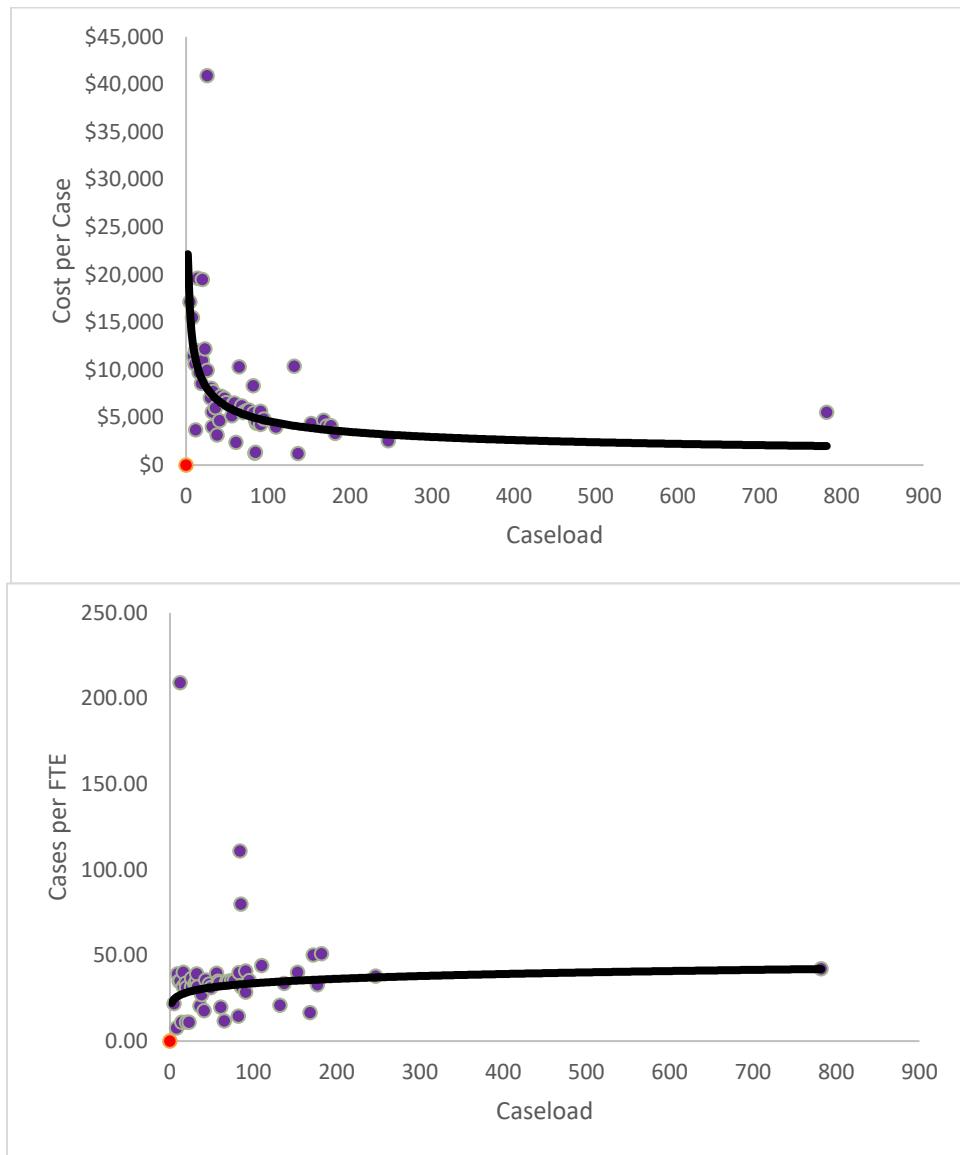


Figure 44: Efficient Frontier for Trace Evidence Analysis—Cases/FTE v. Caseload

Table 60: Efficient Frontier for Trace Evidence Analysis—Efficient Cost/Case for Various Caseloads

| Cases | Efficient Cost/Case | Cases/ FTE | Cases | Efficient Cost/Case | Cases/ FTE |
|-------|---------------------|---------------|-------|---------------------|---------------|
| 5 | \$15,645 | 24 | 140 | \$4,032 | 35 |
| 10 | \$11,800 | 26 | 150 | \$3,920 | 35 |
| 15 | \$10,005 | 28 | 160 | \$3,818 | 35 |
| 20 | \$8,900 | 28 | 170 | \$3,725 | 36 |
| 25 | \$8,127 | 29 | 180 | \$3,640 | 36 |
| 30 | \$7,546 | 30 | 190 | \$3,560 | 36 |
| 35 | \$7,087 | 30 | 200 | \$3,487 | 36 |
| 40 | \$6,712 | 31 | 225 | \$3,324 | 37 |
| 45 | \$6,398 | 31 | 250 | \$3,184 | 37 |
| 50 | \$6,130 | 31 | 275 | \$3,063 | 38 |
| 55 | \$5,896 | 32 | 300 | \$2,956 | 38 |
| 60 | \$5,691 | 32 | 325 | \$2,862 | 38 |
| 65 | \$5,509 | 32 | 350 | \$2,777 | 39 |
| 70 | \$5,345 | 32 | 375 | \$2,700 | 39 |
| 75 | \$5,197 | 33 | 400 | \$2,630 | 39 |
| 80 | \$5,063 | 33 | 425 | \$2,566 | 39 |
| 85 | \$4,939 | 33 | 450 | \$2,507 | 40 |
| 90 | \$4,826 | 33 | 500 | \$2,402 | 40 |
| 95 | \$4,721 | 34 | 550 | \$2,310 | 41 |
| 100 | \$4,623 | 34 | 600 | \$2,230 | 41 |
| 110 | \$4,447 | 34 | 650 | \$2,158 | 41 |
| 120 | \$4,293 | 34 | 700 | \$2,094 | 42 |
| 130 | \$4,155 | 35 | 800 | \$1,983 | 42 |

FORESIGHT Glossary

| Lab RAT | Glossary of Definitions |
|---------------------------------------|--|
| backlog | Open cases that are older than 30 days after submission to the laboratory. |
| capital expense | Purchases of equipment, instruments, etc. with a lifetime longer than three years and a cost above \$1,000. |
| case - institute case | A request from a crime lab "customer" that includes forensic investigations in one or more investigative areas related to an event, crime, or investigation. |
| case - area case | A request for examination in one forensic investigation area. An area case is a subset of an institute case and is equivalent to the term "request." |
| Case – as reported in the LabRat form | Cases reported in LabRat are “area cases” |
| casework | All laboratory activities involved in examination of cases. |
| casework time | Total for operational personnel in an investigation area (in hours) subtracted by the hours of R&D and, E&T and support and service given to external partners. |
| full-time equivalent (FTE) | The work input of a full-time employee working for one full year. |
| investigation area | Area limited by item type and methods as they are listed in the "definitions of investigative areas" tab. |
| item | A single object for examination submitted to the laboratory. Note: one item may be investigated and counted in several investigation areas. |
| non-reporting manager | An individual whose primary responsibilities are in managing and administering a laboratory or a unit thereof and who is not taking part in casework. |
| operational personnel | Personnel in operational units providing casework, research and development (R & D), education and training (E & T) and external support services. Non-reporting unit heads are included. |
| personnel expense | Sum of direct salaries, social expenses (employer contribution to FICA, Medicare, Workers Comp, and Unemployment Comp), retirement (employer contribution only towards pensions, 401K plans, etc.), personnel development and training (internal or external delivery, including travel), and occupational health service expenses (employer contribution only). |
| report | A formal statement of the results of an investigation, or of any matter on which definite information is required, made by some person or body instructed or required to do so. |

| | |
|-------------------|--|
| request | A request for examination in one forensic investigation area. A request is a subset of an institute case and is equivalent to the term "area case." |
| sample | An item of evidence or a portion of an item of evidence that generates a reportable result. |
| support personnel | Forensic laboratory staff providing various internal support services. Management and administration personnel not belonging to the operational units are included. |
| test | An analytical process, including but not limited to visual examination, instrumental analysis, presumptive evaluations, enhancement techniques, extractions, quantifications, microscopic techniques, and comparative examinations. This does not include technical or administrative reviews. |
| Turn-around time | The number of days from a request for examination in an investigative area until issuance of a report. (Note that an area case may have multiple requests and each new request has a separate turn-around time.) |
| workload | Total time spent on all work related to job, including overtime. |

Definitions: Investigative Areas

| Lab RAT | Definitions of Investigation Areas |
|---------------------------------|---|
| Blood Alcohol | The analysis of blood or breath samples to detect the presence of and quantify the amount of alcohol. |
| Computer Analysis | The analysis of computers, computerized consumer goods, and associated hardware for data retrieval and sourcing. |
| Crime Scene Investigation | The collection, analysis, and processing of locations for evidence relating to a criminal incident. |
| Digital evidence | The analysis of multimedia audio, video, and still image materials, such as surveillance recordings and video enhancement. Includes computer analysis as defined above. |
| DNA Casework | Analysis of biological evidence for DNA in criminal cases. |
| DNA Database | Analysis and entry of DNA samples from individuals for database purposes. |
| Document Examination | The analysis of legal, counterfeit, and questioned documents, including handwriting analysis. |
| Drugs - Controlled Substances | The analysis of solid dosage licit and illicit drugs, including pre-cursor materials. |
| Evidence Screening & Processing | The detection, collection, and processing of physical evidence in the laboratory for potential additional analysis. |
| Explosives | The analysis of energetic materials in pre- and post-blast incidents. |
| Fingerprint Identification | The development and analysis of friction ridge patterns. |
| Fingerprint Database | Accessing the fingerprint database (including IAFIS) |
| Fire analysis | The analysis of materials from suspicious fires to include ignitable liquid residue analysis. |
| Firearms and Ballistics | The analysis of firearms and ammunition, to include distance determinations, shooting reconstructions, NIBIN, and toolmarks. |
| Firearms Database | Accessing the firearms database (including NIBIN) |

| | |
|-------------------------|---|
| Forensic Pathology | Forensic pathology is a branch of medicine that deals with the determination of the cause and manner of death in cases in which death occurred under suspicious or unknown circumstances. |
| Gun Shot Residue (GSR) | The analysis of primer residues from discharged firearms (not distance determinations). |
| Hairs & Fibers | The analysis of human and animal hairs (non-DNA) and textile fibers as trace evidence. |
| Marks and Impressions | The analysis of physical patterns received and retained through the interaction of objects of various hardness, including shoemarks and tire tracks. |
| Paint & Glass | The analysis of paints—generically, coatings—and glass as trace evidence. |
| Serology/Biology | The detection, collection, and non-DNA analysis of biological fluids. |
| Toxicology, ante-mortem | The chemical analysis of body fluids and tissues to determine if a drug or poison is present in a living individual, excluding blood alcohol analysis (BAC). |
| Toxicology, post-mortem | The chemical analysis of body fluids and tissues to determine if a drug or poison is present in a deceased individual, excluding blood alcohol analysis (BAC). |
| Trace Evidence | The analysis of materials that, because of their size or texture, transfer from one location to another and persist there for some period of time. Microscopy, either directly or as an adjunct to another instrument, is involved. Includes Hairs & Fibers and Paint & Glass as defined above. |
| Other Specialties | Other forensic science applications not covered by the other categories. |

Project FORESIGHT Publications

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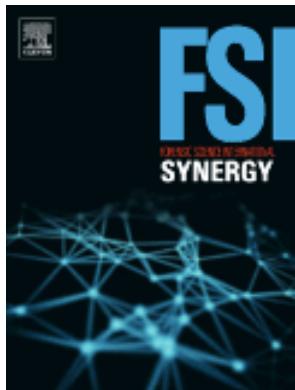
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