Project FORESIGHT Annual Report, 2021-2022

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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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	78.17	44.07	86.53	173.40
Crime Scene Investigation	NA	1.40	5.53	16.59
Digital evidence	NA	3.05	7.80	23.40
DNA Casework	NA	40.66	79.03	125.11
DNA Database	NA	42.50	145.09	248.03
Document Examination	NA	0.60	0.83	1.15
Drugs - Controlled Substances	504.10	176.52	235.54	360.22
Evidence Screening & Processing	NA	35.86	64.39	576.89
Explosives	NA	0.11	0.12	0.12
Fingerprints	46.66	26.24	36.69	64.58
Fingerprints Database (including IAFIS)	NA	14.89	23.16	67.84
Fire analysis	1.32	2.05	2.52	5.65
Firearms and Ballistics	9.47	10.23	19.90	37.84
Firearms Database (including NIBIN)	NA	31.68	115.46	247.44
Forensic Pathology	NA	57.62	58.58	63.70
Gun Shot Residue (GSR)	NA	2.28	5.07	8.19
Marks and Impressions	NA	0.20	0.40	0.70
Serology/Biology	NA	20.57	38.88	57.15
Toxicology ante mortem (excluding BAC)	75.01	40.34	65.03	98.37
Toxicology post mortem (excluding BAC)	NA	51.85	70.90	142.46
Trace Evidence	NA	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

Items per 100,000 population

Area of Investigation	Idaho	25th percentile	Median	75th percentile
Blood Alcohol	76.59	52.52	76.59	101.35
Crime Scene Investigation	NA	6.77	420.77	485.47
Digital evidence	NA	4.73	10.47	26.66
DNA Casework	NA	151.36	240.65	583.72
DNA Database	NA	121.83	173.15	241.32
Document Examination	NA	2.14	3.87	6.32
Drugs - Controlled Substances	664.49	477.55	649.69	1,014.37
Evidence Screening & Processing	NA	37.87	65.38	92.88
Explosives	NA	0.32	0.34	0.36
Fingerprints	234.25	55.41	163.83	332.10
Fingerprints Database (including IAFIS)	NA	32.45	49.54	74.15
Fire analysis	7.05	5.68	8.64	11.78
Firearms and Ballistics	110.68	61.57	113.23	144.42
Firearms Database (including NIBIN)	NA	66.05	157.47	797.22
Forensic Pathology	NA	54.38	55.61	56.83
Gun Shot Residue (GSR)	NA	3.74	6.68	21.69
Marks and Impressions	NA	0.78	0.80	5.38
Serology/Biology	NA	33.20	154.38	241.04
Toxicology ante mortem (excluding BAC)	70.33	40.36	53.08	69.91
Toxicology post mortem (excluding BAC)	NA	68.67	93.39	105.89
Trace Evidence	NA	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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	76.59	47.36	109.95	150.22
Crime Scene Investigation	NA		49,718	
Digital evidence	NA		12,980	
DNA Casework	NA	265.12	387.27	719.61
DNA Database	NA	219.77	288.37	320.02
Document Examination	NA	5.55	8.99	9.45
Drugs - Controlled Substances	738.56	523.75	721.19	946.80
Evidence Screening & Processing	NA	58.36	79.44	100.53
Explosives	NA	1.06	1.14	1.22
Fingerprints	195.69	96.45	184.48	443.24
Fingerprints Database (including IAFIS)	NA	53.76	88.26	488.82
Fire analysis	7.05	7.05	12.17	25.28
Firearms and Ballistics	109.21	109.80	123.16	150.88
Firearms Database (including NIBIN)	NA	676.31	938.19	1,133.06
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	5.22	27.66	53.87
Marks and Impressions	NA	40.63	80.78	120.93
Serology/Biology	NA	236.97	245.58	285.12
Toxicology ante mortem (excluding BAC)	70.33	61.30	80.45	85.11
Toxicology post mortem (excluding BAC)	NA	68.97	130.37	197.38
Trace Evidence	NA	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

Tests Performed per 100,000 population				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	152.97	101.08	158.80	234.17
Crime Scene Investigation	NA	440.54	455.84	471.14
Digital evidence	NA	17.99	38.09	73.61
DNA Casework	NA	653.20	705.21	1,000.91
DNA Database	NA	283.02	309.30	1,253.85
Document Examination	NA	4.35	4.35	4.35
Drugs - Controlled Substances	2,102.95	1,226.30	1,594.69	2,683.82
Evidence Screening & Processing	NA	294.99	423.18	551.36
Explosives	NA	2.61	4.01	5.40
Fingerprints	4,177.96	307.64	416.73	1,212.52
Fingerprints Database (including IAFIS)	NA	131.26	209.71	288.16
Fire analysis	9.52	10.05	11.24	24.70
Firearms and Ballistics	77.96	107.73	144.50	175.95
Firearms Database (including NIBIN)	NA	239.98	278.70	317.42
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	4.86	48.67	62.59
Marks and Impressions	NA	2.00	3.13	4.25
Serology/Biology	NA	223.79	368.60	444.96
Toxicology ante mortem (excluding BAC)	213.99	94.26	181.83	236.99
Toxicology post mortem (excluding BAC)	NA	154.83	264.01	618.92
Trace Evidence	NA	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

Reports per 100,000 population				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	76.59	43.49	71.42	137.99
Crime Scene Investigation	NA	5.96	8.44	105.34
Digital evidence	NA	2.52	7.55	37.88
DNA Casework	NA	45.51	81.98	134.73
DNA Database	NA	20.11	57.19	136.75
Document Examination	NA	0.62	0.97	1.19
Drugs - Controlled Substances	501.95	199.05	267.92	469.48
Evidence Screening & Processing	NA	39.78	39.78	39.78
Explosives	NA	0.12	0.13	0.13
Fingerprints	44.87	28.05	35.69	72.30
Fingerprints Database (including IAFIS)	NA	14.85	22.67	73.15
Fire analysis	1.32	1.97	2.42	5.48
Firearms and Ballistics	7.10	14.86	17.11	39.29
Firearms Database (including NIBIN)	NA	31.56	131.96	410.16
Forensic Pathology	NA	55.06	56.47	57.89
Gun Shot Residue (GSR)	NA	2.24	4.35	8.42
Marks and Impressions	NA	0.17	0.47	0.99
Serology/Biology	NA	8.85	32.69	46.81
Toxicology ante mortem (excluding BAC)	70.33	39.16	56.14	76.70
Toxicology post mortem (excluding BAC)	NA	50.45	68.15	88.88
Trace Evidence	NA	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	Idaho	25th percentile	Median	75th percentile
Blood Alcohol	$236	$126	$220	$336
Crime Scene Investigation	NA	$1,518	$3,981	$7,432
Digital evidence	NA	$1,536	$2,714	$5,301
DNA Casework	NA	$1,154	$1,482	$2,333
DNA Database	NA	$47	$79	$134
Document Examination	NA	$5,842	$6,935	$10,661
Drugs - Controlled Substances	$194	$288	$407	$502
Evidence Screening & Processing	NA	$603	$949	$1,163
Explosives	NA	$10,115	$18,048	$23,330
Fingerprints	$1,302	$790	$1,077	$1,460
Fingerprints Database (including IAFIS)	NA	$226	$532	$947
Fire analysis	$1,126	$1,972	$3,064	$5,013
Firearms and Ballistics	$1,623	$1,423	$2,405	$3,549
Firearms Database (including NIBIN)	NA	$81	$223	$611
Forensic Pathology	NA	$1,992	$2,098	$2,278
Gun Shot Residue (GSR)	NA	$2,309	$3,424	$4,764
Marks and Impressions	NA	$5,804	$6,902	$9,523
Serology/Biology	NA	$840	$1,172	$1,946
Toxicology ante mortem (excluding BAC)	$607	$589	$798	$997
Toxicology post mortem (excluding BAC)	NA	$636	$899	$1,017
Trace Evidence	NA	$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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	$241	$140	$221	$317
Crime Scene Investigation	NA	$317	$674	$1,449
Digital evidence	NA	$1,015	$1,693	$2,922
DNA Casework	NA	$386	$496	$755
DNA Database	NA	$45	$68	$105
Document Examination	NA	$1,434	$1,551	$2,136
Drugs - Controlled Substances	$147	$162	$227	$282
Evidence Screening & Processing	NA	$293	$452	$481
Explosives	NA	$3,768	$4,618	$6,256
Fingerprints	$259	$296	$398	$568
Fingerprints Database (including IAFIS)	NA	$55	$162	$231
Fire analysis	$210	$792	$1,204	$2,051
Firearms and Ballistics	$139	$409	$798	$1,187
Firearms Database (including NIBIN)	NA	$38	$90	$157
Forensic Pathology	NA	$1,982	$2,012	$2,043
Gun Shot Residue (GSR)	NA	$1,247	$1,744	$2,543
Marks and Impressions	NA	$2,156	$2,314	$3,251
Serology/Biology	NA	$245	$336	$573
Toxicology ante mortem (excluding BAC)	$648	$557	$685	$877
Toxicology post mortem (excluding BAC)	NA	$340	$413	$513
Trace Evidence	NA	$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

Cost per Sample by Investigative Area				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	$241	$137	$226	$299
Crime Scene Investigation	NA	$190	$446	$715
Digital evidence	NA	$845	$1,614	$2,200
DNA Casework	NA	$242	$342	$487
DNA Database	NA	$44	$63	$102
Document Examination	NA	$891	$926	$1,402
Drugs - Controlled Substances	$132	$113	$142	$171
Evidence Screening & Processing	NA	$308	$467	$496
Explosives	NA	$1,319	$1,787	$2,265
Fingerprints	$310	$203	$260	$359
Fingerprints Database (including IAFIS)	NA	$69	$99	$166
Fire analysis	$210	$395	$599	$882
Firearms and Ballistics	$141	$329	$541	$720
Firearms Database (including NIBIN)	NA	$77	$92	$218
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	$756	$904	$1,181
Marks and Impressions	NA	$650	$779	$1,074
Serology/Biology	NA	$56	$83	$135
Toxicology ante mortem (excluding BAC)	$648	$570	$756	$923
Toxicology post mortem (excluding BAC)	NA	$200	$230	$299
Trace Evidence	NA	$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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	$121	$73	$124	$168
Crime Scene Investigation	NA	$11	$11	$272
Digital evidence	NA	$236	$423	$782
DNA Casework	NA	$59	$82	$120
DNA Database	NA	$41	$62	$102
Document Examination	NA	$340	$449	$911
Drugs - Controlled Substances	$46	$51	$63	$77
Evidence Screening & Processing	NA	$80	$110	$139
Explosives	NA	$327	$416	$537
Fingerprints	$15	$84	$113	$171
Fingerprints Database (including IAFIS)	NA	$196	$295	$393
Fire analysis	$156	$251	$378	$602
Firearms and Ballistics	$197	$239	$447	$599
Firearms Database (including NIBIN)	NA	$119	$145	$171
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	$451	$598	$892
Marks and Impressions	NA	$486	$549	$701
Serology/Biology	NA	$49	$65	$107
Toxicology ante mortem (excluding BAC)	$213	$91	$112	$157
Toxicology post mortem (excluding BAC)	NA	$79	$93	$122
Trace Evidence	NA	$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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	$241	$142	$227	$322
Crime Scene Investigation	NA	$1,078	$3,261	$5,315
Digital evidence	NA	$1,564	$3,252	$6,838
DNA Casework	NA	$1,172	$1,595	$2,357
DNA Database	NA	$42	$66	$108
Document Examination	NA	$5,945	$6,262	$8,695
Drugs - Controlled Substances	$195	$298	$423	$505
Evidence Screening & Processing	NA		$869	
Explosives	NA	$12,430	$17,971	$20,449
Fingerprints	$1,354	$789	$1,019	$1,466
Fingerprints Database (including IAFIS)	NA	$206	$239	$905
Fire analysis	$1,126	$2,148	$3,177	$5,257
Firearms and Ballistics	$2,164	$1,417	$2,166	$3,413
Firearms Database (including NIBIN)	NA	$138	$219	$601
Forensic Pathology	NA	$1,957	$1,981	$2,006
Gun Shot Residue (GSR)	NA	$2,600	$3,860	$4,949
Marks and Impressions	NA	$6,073	$6,663	$9,348
Serology/Biology	NA	$902	$1,261	$2,159
Toxicology ante mortem (excluding BAC)	$648	$633	$841	$1,080
Toxicology post mortem (excluding BAC)	NA	$671	$891	$1,037
Trace Evidence	NA	$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:

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

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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	$116,826	$75,473	$90,521	$107,254
Crime Scene Investigation	NA	$94,460	$110,535	$121,777
Digital evidence	NA	$82,053	$107,845	$121,857
DNA Casework	NA	$108,614	$127,810	$140,473
DNA Database	NA	$93,439	$103,200	$121,594
Document Examination	NA	$110,890	$116,196	$138,811
Drugs - Controlled Substances	$132,167	$101,091	$115,455	$127,503
Evidence Screening & Processing	NA	$77,764	$97,373	$104,348
Explosives	NA	$95,834	$110,615	$131,331
Fingerprints	$92,292	$98,641	$105,813	$117,890
Fingerprints Database (including IAFIS)	NA	$94,350	$108,290	$149,757
Fire analysis	$75,862	$102,254	$114,586	$124,984
Firearms and Ballistics	$73,916	$104,644	$114,610	$127,673
Firearms Database (including NIBIN)	NA	$64,558	$91,960	$149,202
Forensic Pathology	NA	$192,423	$275,030	$363,491
Gun Shot Residue (GSR)	NA	$98,493	$104,998	$118,930
Marks and Impressions	NA	$97,754	$115,051	$146,216
Serology/Biology	NA	$90,580	$102,152	$113,666
Toxicology ante mortem (excluding BAC)	$126,906	$95,066	$105,011	$116,727
Toxicology post mortem (excluding BAC)	NA	$98,248	$105,816	$113,229
Trace Evidence	NA	$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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	0.98	1.01	1.05	1.09
Crime Scene Investigation	NA	4.32	4.83	5.11
Digital evidence	NA	1.43	2.48	2.90
DNA Casework	NA	2.88	3.05	3.27
DNA Database	NA	0.97	1.00	1.03
Document Examination	NA	3.96	4.10	4.69
Drugs - Controlled Substances	1.32	1.69	1.79	1.94
Evidence Screening & Processing	NA	2.42	2.46	2.50
Explosives	NA	3.00	3.64	3.78
Fingerprints	5.02	2.18	2.34	2.50
Fingerprints Database (including IAFIS)	NA	1.76	2.91	3.91
Fire analysis	5.36	2.46	2.55	2.74
Firearms and Ballistics	11.69	2.73	2.86	3.08
Firearms Database (including NIBIN)	NA	1.03	1.39	1.59
Forensic Pathology	NA	0.94	0.97	1.00
Gun Shot Residue (GSR)	NA	1.99	2.09	2.19
Marks and Impressions	NA	2.64	2.80	3.11
Serology/Biology	NA	3.54	3.67	3.85
Toxicology ante mortem (excluding BAC)	0.94	1.11	1.19	1.25
Toxicology post mortem (excluding BAC)	NA	1.61	2.23	2.35
Trace Evidence	NA	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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	0.98	1.05	1.08	1.13
Crime Scene Investigation	NA	7.77	7.96	8.50
Digital evidence	NA	3.82	4.10	4.24
DNA Casework	NA	4.70	4.97	5.23
DNA Database	NA	0.97	1.01	1.06
Document Examination	NA	6.39	6.55	7.71
Drugs - Controlled Substances	1.47	2.78	3.01	3.14
Evidence Screening & Processing	NA	2.30	2.37	2.41
Explosives	NA	9.60	9.86	10.09
Fingerprints	4.19	3.62	3.85	4.05
Fingerprints Database (including IAFIS)	NA	1.76	2.51	3.78
Fire analysis	5.36	5.43	5.93	6.30
Firearms and Ballistics	11.53	4.47	4.80	5.01
Firearms Database (including NIBIN)	NA	1.42	1.64	2.21
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	3.90	4.15	4.33
Marks and Impressions	NA	8.77	8.93	9.44
Serology/Biology	NA	16.61	17.40	18.03
Toxicology ante mortem (excluding BAC)	0.94	1.07	1.12	1.17
Toxicology post mortem (excluding BAC)	NA	3.27	3.94	4.09
Trace Evidence	NA	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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	1.96	1.78	1.90	2.00
Crime Scene Investigation	NA	12.55	13.35	13.59
Digital evidence	NA	15.55	16.76	17.79
DNA Casework	NA	19.72	20.93	21.74
DNA Database	NA	0.98	1.01	1.05
Document Examination	NA	13.07	17.41	17.96
Drugs - Controlled Substances	4.17	6.25	6.68	7.02
Evidence Screening & Processing	NA	10.74	11.84	12.93
Explosives	NA	37.78	42.00	45.00
Fingerprints	89.54	8.27	8.76	9.30
Fingerprints Database (including IAFIS)	NA	2.27	2.47	2.66
Fire analysis	7.24	8.80	9.23	9.81
Firearms and Ballistics	8.23	5.54	5.75	6.20
Firearms Database (including NIBIN)	NA	1.36	1.91	2.46
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	6.13	6.44	6.70
Marks and Impressions	NA	12.57	12.98	13.36
Serology/Biology	NA	19.06	20.02	20.89
Toxicology ante mortem (excluding BAC)	2.85	7.50	7.98	8.44
Toxicology post mortem (excluding BAC)	NA	7.65	10.54	10.80
Trace Evidence	NA	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

Reports per Case by Investigative Area

Area of Investigation	Idaho	25th percentile	Median	75th percentile
Blood Alcohol	0.98	0.95	0.99	1.02
Crime Scene Investigation	NA	0.99	1.02	1.12
Digital evidence	NA	0.89	1.01	1.06
DNA Casework	NA	0.96	1.01	1.05
DNA Database	NA	0.96	0.99	1.04
Document Examination	NA	0.97	1.00	1.08
Drugs - Controlled Substances	1.00	0.96	1.00	1.02
Evidence Screening & Processing	NA	0.56	0.56	0.56
Explosives	NA	1.00	1.00	1.14
Fingerprints	0.96	0.94	0.98	1.03
Fingerprints Database (including IAFIS)	NA	0.97	1.00	1.01
Fire analysis	1.00	0.94	1.00	1.00
Firearms and Ballistics	0.75	0.95	1.00	1.04
Firearms Database (including NIBIN)	NA	0.74	1.00	1.00
Forensic Pathology	NA	0.96	0.99	1.02
Gun Shot Residue (GSR)	NA	0.93	1.00	1.04
Marks and Impressions	NA	0.97	1.00	1.07
Serology/Biology	NA	0.93	0.98	1.01
Toxicology ante mortem (excluding BAC)	0.94	0.94	1.00	1.03
Toxicology post mortem (excluding BAC)	NA	0.97	1.00	1.04
Trace Evidence	NA	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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	1.00	1.00	1.03	1.08
Crime Scene Investigation	NA	1.58	1.65	1.78
Digital evidence	NA	1.36	1.46	1.54
DNA Casework	NA	1.54	1.60	1.74
DNA Database	NA	0.96	1.01	1.06
Document Examination	NA	1.44	1.64	1.76
Drugs - Controlled Substances	1.11	1.54	1.64	1.76
Evidence Screening & Processing	NA	0.94	0.98	1.01
Explosives	NA	2.61	2.68	2.85
Fingerprints	0.84	1.53	1.68	1.76
Fingerprints Database (including IAFIS)	NA	1.00	1.00	1.00
Fire analysis	1.00	2.11	2.28	2.40
Firearms and Ballistics	0.99	1.51	1.65	1.75
Firearms Database (including NIBIN)	NA	1.00	1.01	1.04
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	1.82	1.99	2.07
Marks and Impressions	NA	2.98	3.13	3.50
Serology/Biology	NA	4.42	4.69	4.93
Toxicology ante mortem (excluding BAC)	1.00	0.89	0.93	0.99
Toxicology post mortem (excluding BAC)	NA	1.60	1.72	1.85
Trace Evidence	NA	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

Tests per Item Examined Internally by Investigative Area				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	2.00	1.69	1.80	1.91
Crime Scene Investigation	NA	1.01	1.01	1.02
Digital evidence	NA	5.52	5.99	6.32
DNA Casework	NA	6.45	6.81	7.29
DNA Database	NA	0.98	1.02	1.06
Document Examination	NA	4.03	4.23	4.60
Drugs - Controlled Substances	3.16	3.38	3.68	4.01
Evidence Screening & Processing	NA	8.26	10.87	13.48
Explosives	NA	10.74	11.72	11.96
Fingerprints	17.84	3.54	3.83	3.99
Fingerprints Database (including IAFIS)	NA	0.78	1.15	1.52
Fire analysis	1.35	3.35	3.59	3.69
Firearms and Ballistics	0.70	1.85	2.02	2.17
Firearms Database (including NIBIN)	NA	1.00	1.67	2.33
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	2.88	3.08	3.21
Marks and Impressions	NA	4.38	4.56	4.89
Serology/Biology	NA	5.23	5.43	5.61
Toxicology ante mortem (excluding BAC)	3.04	6.00	6.65	6.93
Toxicology post mortem (excluding BAC)	NA	4.30	4.70	4.98
Trace Evidence	NA	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

Reports per Item Examined Internally by Investigative Area				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	1.00	0.90	0.95	1.00
Crime Scene Investigation	NA	0.20	0.21	0.24
Digital evidence	NA	0.36	0.41	0.70
DNA Casework	NA	0.30	0.33	0.35
DNA Database	NA	0.94	0.99	1.04
Document Examination	NA	0.23	0.25	0.27
Drugs - Controlled Substances	0.76	0.50	0.54	0.57
Evidence Screening & Processing	NA	0.33	0.33	0.33
Explosives	NA	0.26	0.27	0.33
Fingerprints	0.19	0.39	0.42	0.44
Fingerprints Database (including IAFIS)	NA	0.23	0.40	0.63
Fire analysis	0.19	0.36	0.38	0.41
Firearms and Ballistics	0.06	0.32	0.36	0.37
Firearms Database (including NIBIN)	NA	0.10	0.43	0.88
Forensic Pathology	NA	1.01	1.02	1.02
Gun Shot Residue (GSR)	NA	0.44	0.47	0.52
Marks and Impressions	NA	0.32	0.35	0.38
Serology/Biology	NA	0.24	0.26	0.27
Toxicology ante mortem (excluding BAC)	1.00	0.78	0.83	0.92
Toxicology post mortem (excluding BAC)	NA	0.43	0.46	0.56
Trace Evidence	NA	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

Tests per Sample by Investigative Area				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	2.00	1.65	1.75	1.83
Crime Scene Investigation	NA			
Digital evidence	NA	4.13	4.31	4.48
DNA Casework	NA	4.01	4.17	4.37
DNA Database	NA	0.97	1.00	1.04
Document Examination	NA	1.88	2.66	2.76
Drugs - Controlled Substances	2.85	2.11	2.21	2.35
Evidence Screening & Processing	NA	4.75	5.03	5.31
Explosives	NA	4.10	4.28	4.44
Fingerprints	21.35	2.13	2.30	2.49
Fingerprints Database (including IAFIS)	NA	0.41	0.41	0.41
Fire analysis	1.35	1.48	1.54	1.64
Firearms and Ballistics	0.71	1.16	1.21	1.29
Firearms Database (including NIBIN)	NA	3.00	3.00	3.00
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	1.42	1.54	1.62
Marks and Impressions	NA	1.42	1.47	1.50
Serology/Biology	NA	1.11	1.16	1.20
Toxicology ante mortem (excluding BAC)	3.04	6.54	7.05	7.50
Toxicology post mortem (excluding BAC)	NA	2.50	2.65	2.86
Trace Evidence	NA	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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	1.00	0.87	0.92	0.96
Crime Scene Investigation	NA	0.13	0.13	0.13
Digital evidence	NA	0.24	0.27	0.28
DNA Casework	NA	0.19	0.20	0.22
DNA Database	NA	0.95	0.99	1.04
Document Examination	NA	0.14	0.15	0.16
Drugs - Controlled Substances	0.68	0.31	0.33	0.36
Evidence Screening & Processing	NA	0.33	0.33	0.33
Explosives	NA	0.10	0.10	0.11
Fingerprints	0.23	0.23	0.26	0.27
Fingerprints Database (including IAFIS)	NA	0.30	0.40	0.70
Fire analysis	0.19	0.16	0.17	0.19
Firearms and Ballistics	0.07	0.20	0.21	0.22
Firearms Database (including NIBIN)	NA	0.51	0.68	0.83
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	0.22	0.24	0.26
Marks and Impressions	NA	0.10	0.11	0.11
Serology/Biology	NA	0.05	0.06	0.06
Toxicology ante mortem (excluding BAC)	1.00	0.81	0.89	0.94
Toxicology post mortem (excluding BAC)	NA	0.24	0.26	0.32
Trace Evidence	NA	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	Idaho	25th percentile	Median	75th percentile
Blood Alcohol	658.9	318.8	605.4	983.4
Crime Scene Investigation	NA	15.7	45.6	75.7
Digital evidence	NA	26.2	42.7	87.5
DNA Casework	NA	78.3	101.0	133.6
DNA Database	NA	1,204.9	2,515.7	3,702.9
Document Examination	NA	16.5	21.0	26.6
Drugs - Controlled Substances	922.0	300.3	360.5	481.5
Evidence Screening & Processing	NA	105.5	144.9	174.1
Explosives	NA	5.6	7.6	11.2
Fingerprints	90.5	94.4	133.0	162.2
Fingerprints Database (including IAFIS)	NA	216.7	327.2	549.6
Fire analysis	102.0	26.4	43.4	70.4
Firearms and Ballistics	68.0	45.0	63.8	112.4
Firearms Database (including NIBIN)	NA	336.7	684.4	1,092.2
Forensic Pathology	NA	104.4	155.5	207.1
Gun Shot Residue (GSR)	NA	26.5	34.1	57.8
Marks and Impressions	NA	14.2	19.1	27.2
Serology/Biology	NA	58.5	112.7	144.9
Toxicology ante mortem (excluding BAC)	298.3	139.9	185.5	266.8
Toxicology post mortem (excluding BAC)	NA	138.4	169.1	202.6
Trace Evidence	NA	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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	645.59	330.0	564.9	1,067.5
Crime Scene Investigation	NA	88.2	258.8	365.9
Digital evidence	NA	53.2	79.7	129.1
DNA Casework	NA	228.4	319.6	403.6
DNA Database	NA	1,972.7	2,923.7	3,805.2
Document Examination	NA	67.9	90.3	101.8
Drugs - Controlled Substances	1,215.31	533.1	664.7	894.6
Evidence Screening & Processing	NA	242.8	337.8	406.3
Explosives	NA	21.1	27.8	34.1
Fingerprints	454.12	244.8	328.5	425.2
Fingerprints Database (including IAFIS)	NA	562.5	742.1	2,017.0
Fire analysis	546.62	65.0	102.5	164.5
Firearms and Ballistics	794.70	128.3	198.6	356.5
Firearms Database (including NIBIN)	NA	1,098.9	1,298.7	2,943.0
Forensic Pathology	NA	205.3	206.1	206.9
Gun Shot Residue (GSR)	NA	52.9	66.5	100.6
Marks and Impressions	NA	34.0	51.8	69.7
Serology/Biology	NA	173.8	366.4	503.8
Toxicology ante mortem (excluding BAC)	279.69	167.8	207.9	255.3
Toxicology post mortem (excluding BAC)	NA	273.3	323.3	407.3
Trace Evidence	NA	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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	645.6	346.7	581.0	1,025.8
Crime Scene Investigation	NA	211.4	459.2	644.0
Digital evidence	NA	79.2	93.8	198.9
DNA Casework	NA	346.6	489.4	645.4
DNA Database	NA	2,382.3	3,126.2	3,892.3
Document Examination	NA	112.5	134.4	169.9
Drugs - Controlled Substances	1,350.8	898.8	1,071.6	1,220.0
Evidence Screening & Processing	NA	239.2	331.2	364.1
Explosives	NA	54.2	76.1	104.6
Fingerprints	379.4	367.3	499.5	610.9
Fingerprints Database (including IAFIS)	NA	742.1	877.6	1,797.8
Fire analysis	546.6	114.6	189.2	338.2
Firearms and Ballistics	784.1	212.3	280.9	492.6
Firearms Database (including NIBIN)	NA	810.6	1,153.0	2,726.4
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	97.2	128.4	193.3
Marks and Impressions	NA	98.7	161.2	194.2
Serology/Biology	NA	780.0	1,414.3	2,251.3
Toxicology ante mortem (excluding BAC)	279.7	158.0	187.4	252.2
Toxicology post mortem (excluding BAC)	NA	463.2	594.9	685.1
Trace Evidence	NA	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

Tests per FTE by Investigative Area				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	1,289	567	1,042	1,819
Crime Scene Investigation	NA	313	334	334
Digital evidence	NA	222	395	725
DNA Casework	NA	1,487	2,042	2,681
DNA Database	NA	2,481	3,276	4,066
Document Examination	NA	156	383	428
Drugs - Controlled Substances	3,846	1,961	2,253	2,915
Evidence Screening & Processing	NA	1,116	1,244	1,372
Explosives	NA	191	261	364
Fingerprints	8,100	818	1,102	1,473
Fingerprints Database (including IAFIS)	NA	444	669	895
Fire analysis	738	223	308	508
Firearms and Ballistics	560	261	341	622
Firearms Database (including NIBIN)	NA	875	970	1,065
Forensic Pathology	NA			
Gun Shot Residue (GSR)	NA	148	203	287
Marks and Impressions	NA	138	218	258
Serology/Biology	NA	980	1,853	2,624
Toxicology ante mortem (excluding BAC)	851	1,014	1,235	1,599
Toxicology post mortem (excluding BAC)	NA	1,202	1,548	1,802
Trace Evidence	NA	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

Reports per FTE by Investigative Area				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	645.6	339.4	548.8	982.9
Crime Scene Investigation	NA	21.2	50.4	82.4
Digital evidence	NA	23.1	39.0	86.0
DNA Casework	NA	76.9	99.9	132.6
DNA Database	NA	1,838.8	2,954.5	3,884.6
Document Examination	NA	18.5	20.8	25.2
Drugs - Controlled Substances	918.0	290.9	355.1	476.7
Evidence Screening & Processing	NA		87.8	
Explosives	NA	5.4	7.0	11.4
Fingerprints	87.0	96.2	123.2	159.0
Fingerprints Database (including IAFIS)	NA	263.5	453.9	556.5
Fire analysis	102.0	24.4	38.6	61.1
Firearms and Ballistics	51.0	45.5	65.0	101.2
Firearms Database (including NIBIN)	NA	318.8	476.4	838.6
Forensic Pathology	NA	207.9	209.3	210.8
Gun Shot Residue (GSR)	NA	25.2	32.7	47.0
Marks and Impressions	NA	15.3	18.4	31.9
Serology/Biology	NA	46.5	95.5	132.7
Toxicology ante mortem (excluding BAC)	279.7	135.4	168.4	247.2
Toxicology post mortem (excluding BAC)	NA	133.8	156.8	191.7
Trace Evidence	NA	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				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	75.03%	66.47%	75.02%	83.09%
Crime Scene Investigation	NA	68.09%	77.41%	89.10%
Digital evidence	NA	65.62%	76.70%	91.98%
DNA Casework	NA	68.50%	76.51%	83.43%
DNA Database	NA	49.56%	58.65%	69.17%
Document Examination	NA	73.83%	87.12%	92.85%
Drugs - Controlled Substances	73.93%	73.93%	81.06%	85.57%
Evidence Screening & Processing	NA	69.60%	80.00%	85.32%
Explosives	NA	83.54%	85.72%	94.76%
Fingerprints	78.38%	75.58%	83.89%	85.36%
Fingerprints Database (including IAFIS)	NA	75.48%	79.93%	88.36%
Fire analysis	66.07%	74.47%	83.68%	85.62%
Firearms and Ballistics	67.00%	71.97%	76.71%	82.27%
Firearms Database (including NIBIN)	NA	65.60%	73.69%	83.65%
Forensic Pathology	NA	80.72%	84.88%	89.27%
Gun Shot Residue (GSR)	NA	77.65%	83.97%	86.66%
Marks and Impressions	NA	83.13%	90.73%	91.53%
Serology/Biology	NA	83.22%	87.87%	90.18%
Toxicology ante mortem (excluding BAC)	70.05%	65.11%	71.67%	75.90%
Toxicology post mortem (excluding BAC)	NA	65.48%	77.19%	83.18%
Trace Evidence	NA	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

Capital Expenditures/Total Expenditures				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	1.87%	2.98%	5.58%	9.66%
Crime Scene Investigation	NA	1.64%	5.75%	10.87%
Digital evidence	NA	2.82%	6.98%	16.04%
DNA Casework	NA	4.05%	6.33%	9.05%
DNA Database	NA	4.78%	8.82%	20.70%
Document Examination	NA	0.30%	1.44%	4.23%
Drugs - Controlled Substances	8.09%	3.53%	5.16%	7.30%
Evidence Screening & Processing	NA	3.27%	5.07%	7.26%
Explosives	NA	1.59%	2.08%	5.90%
Fingerprints	0.58%	3.36%	4.09%	5.90%
Fingerprints Database (including IAFIS)	NA	2.47%	4.24%	6.06%
Fire analysis	0.27%	2.89%	3.43%	4.98%
Firearms and Ballistics	1.22%	3.30%	4.81%	7.39%
Firearms Database (including NIBIN)	NA	4.80%	6.09%	9.73%
Forensic Pathology	NA	2.00%	2.15%	3.38%
Gun Shot Residue (GSR)	NA	2.67%	4.40%	5.77%
Marks and Impressions	NA	1.55%	1.66%	3.69%
Serology/Biology	NA	0.99%	1.70%	3.33%
Toxicology ante mortem (excluding BAC)	1.53%	5.53%	9.01%	12.83%
Toxicology post mortem (excluding BAC)	NA	3.00%	5.25%	7.90%
Trace Evidence	NA	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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	5.61%	3.35%	5.89%	10.91%
Crime Scene Investigation	NA	0.22%	0.77%	6.41%
Digital evidence	NA	0.00%	0.81%	3.46%
DNA Casework	NA	4.21%	6.75%	12.51%
DNA Database	NA	1.97%	5.11%	9.85%
Document Examination	NA	0.44%	1.20%	3.70%
Drugs - Controlled Substances	3.10%	2.73%	4.06%	8.14%
Evidence Screening & Processing	NA	2.21%	3.49%	5.11%
Explosives	NA	1.63%	2.12%	5.21%
Fingerprints	1.17%	1.27%	1.66%	5.97%
Fingerprints Database (including IAFIS)	NA	0.72%	3.28%	8.45%
Fire analysis	5.87%	2.60%	3.23%	6.07%
Firearms and Ballistics	0.63%	3.07%	5.40%	7.82%
Firearms Database (including NIBIN)	NA	0.87%	6.72%	15.47%
Forensic Pathology	NA	3.10%	3.63%	5.96%
Gun Shot Residue (GSR)	NA	1.52%	2.21%	2.93%
Marks and Impressions	NA	1.01%	1.24%	2.20%
Serology/Biology	NA	2.50%	3.08%	5.09%
Toxicology ante mortem (excluding BAC)	11.03%	6.03%	7.59%	11.05%
Toxicology post mortem (excluding BAC)	NA	4.41%	6.27%	8.94%
Trace Evidence	NA	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

Other Expenditures/Total Expenditures by Investigative Area				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	17.49%	4.95%	7.89%	12.37%
Crime Scene Investigation	NA	5.21%	7.87%	13.75%
Digital evidence	NA	3.09%	6.62%	15.07%
DNA Casework	NA	4.66%	7.03%	11.10%
DNA Database	NA	11.66%	17.86%	24.93%
Document Examination	NA	5.13%	8.73%	11.80%
Drugs - Controlled Substances	14.88%	5.59%	7.95%	10.26%
Evidence Screening & Processing	NA	6.65%	10.61%	17.81%
Explosives	NA	2.01%	4.60%	6.15%
Fingerprints	19.87%	7.15%	9.32%	10.44%
Fingerprints Database (including IAFIS)	NA	4.19%	5.93%	10.39%
Fire analysis	27.79%	6.65%	9.12%	9.99%
Firearms and Ballistics	31.15%	6.35%	11.19%	14.68%
Firearms Database (including NIBIN)	NA	4.95%	6.24%	13.12%
Forensic Pathology	NA	5.64%	6.86%	7.45%
Gun Shot Residue (GSR)	NA	6.64%	7.87%	10.14%
Marks and Impressions	NA	5.02%	5.80%	6.38%
Serology/Biology	NA	5.18%	6.62%	7.84%
Toxicology ante mortem (excluding BAC)	17.39%	7.12%	10.23%	12.93%
Toxicology post mortem (excluding BAC)	NA	6.41%	9.19%	12.49%
Trace Evidence	NA	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

Turnaround Time from Last Item Received by Investigative Area				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	12	8	13	25
Crime Scene Investigation	NA	14	14	14
Digital evidence	NA	4	8	11
DNA Casework	NA	16	34	101
DNA Database	NA	7	7	7
Document Examination	NA	46	46	46
Drugs - Controlled Substances	8	8	21	47
Evidence Screening & Processing	NA			
Explosives	NA	57	57	57
Fingerprints	78	8	8	35
Fingerprints Database (including IAFIS)	NA	1	2	2
Fire analysis	20	37	54	66
Firearms and Ballistics	9	10	16	45
Firearms Database (including NIBIN)	NA	2	11	26
Forensic Pathology	NA	52	52	52
Gun Shot Residue (GSR)	NA	51	54	202
Marks and Impressions	NA	7	13	18
Serology/Biology	NA	15	25	34
Toxicology ante mortem (excluding BAC)	25	25	37	53
Toxicology post mortem (excluding BAC)	NA	29	35	42
Trace Evidence	NA	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

Turnaround Time from First Item Received by Investigative Area				
Area of Investigation	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	13	23	29	38
Crime Scene Investigation	NA	30	41	53
Digital evidence	NA	50	113	158
DNA Casework	NA	105	134	153
DNA Database	NA	46	59	71
Document Examination	NA	39	60	80
Drugs - Controlled Substances	9	57	71	86
Evidence Screening & Processing	NA	34	42	49
Explosives	NA	125	132	136
Fingerprints	91	54	70	83
Fingerprints Database (including IAFIS)	NA	5	11	20
Fire analysis	14	55	105	130
Firearms and Ballistics	33	57	73	86
Firearms Database (including NIBIN)	NA	4	8	21
Forensic Pathology	NA	62	71	79
Gun Shot Residue (GSR)	NA	80	91	114
Marks and Impressions	NA	80	99	114
Serology/Biology	NA	56	67	80
Toxicology ante mortem (excluding BAC)	27	51	66	78
Toxicology post mortem (excluding BAC)	NA	60	76	86
Trace Evidence	NA	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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Blood Alcohol	0.07%	0.00%	1.43%	1.70%
Crime Scene Investigation	NA	0.00%	5.02%	7.49%
Digital evidence	NA	0.86%	6.92%	15.53%
DNA Casework	NA	8.04%	9.10%	11.19%
DNA Database	NA	0.00%	10.40%	11.62%
Document Examination	NA	0.00%	10.90%	14.13%
Drugs - Controlled Substances	1.06%	0.10%	7.87%	8.91%
Evidence Screening & Processing	NA	2.98%	3.77%	5.53%
Explosives	NA	0.00%	25.00%	44.44%
Fingerprints	23.68%	2.47%	8.25%	9.85%
Fingerprints Database (including IAFIS)	NA	0.00%	0.00%	0.00%
Fire analysis	0.00%	0.00%	13.76%	18.52%
Firearms and Ballistics	10.00%	8.85%	10.70%	12.11%
Firearms Database (including NIBIN)	NA	0.00%	0.00%	0.00%
Forensic Pathology	NA	5.43%	7.54%	9.20%
Gun Shot Residue (GSR)	NA	10.55%	12.98%	19.05%
Marks and Impressions	NA	12.64%	17.26%	27.68%
Serology/Biology	NA	7.08%	8.15%	8.99%
Toxicology ante mortem (excluding BAC)	1.05%	2.02%	8.77%	10.09%
Toxicology post mortem (excluding BAC)	NA	0.39%	8.34%	9.99%
Trace Evidence	NA	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	**Idaho**	**25th percentile**	**Median**	**75th percentile**
Cases				
Total	NA	77	280	734
Mobile	NA	205	499	696
Computer	NA	12	38	99
Video	NA	23	55	123
Mass Storage	NA	0	0	2
Internet of Things	NA	0	3	21
Reports				
Total	NA	87	197	778
Mobile	NA	230	554	1,450
Computer	NA	4	31	94
Video	NA	31	64	141
Mass Storage	NA	2	10	37
Internet of Things	NA	6	13	55
FTE				
Total	NA	2.25	4.00	7.74
Mobile	NA	0.67	1.01	1.24
Computer	NA	1.00	1.23	3.00
Video	NA	1.00	2.00	3.05
Mass Storage	NA	0.00	0.00	0.24
Internet of Things	NA	0.00	0.18	1.00

Table 36: Digital Evidence Level II Metrics

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

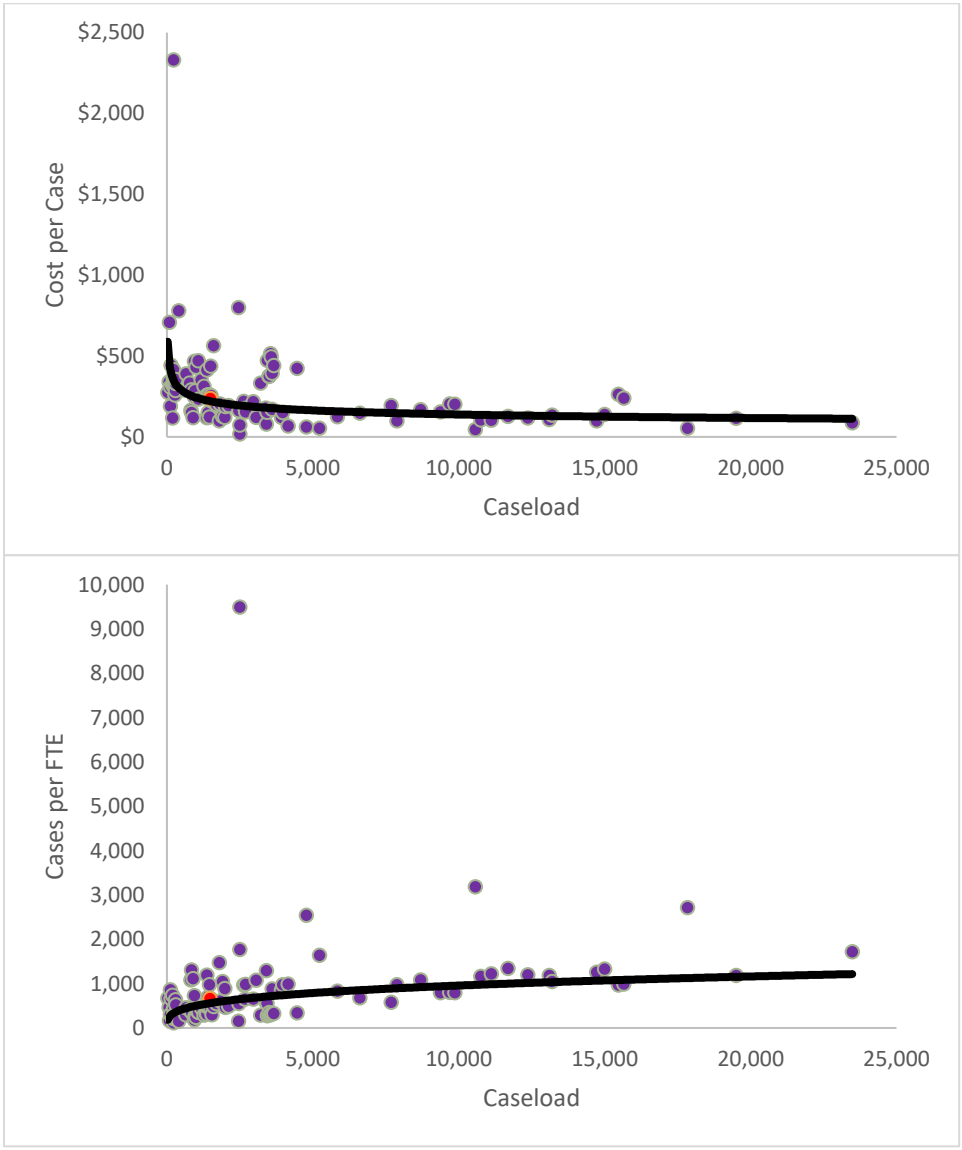


Figure 4: Efficient Frontier for Blood Alcohol Analysis—Cases/FTE v. Cases Processed

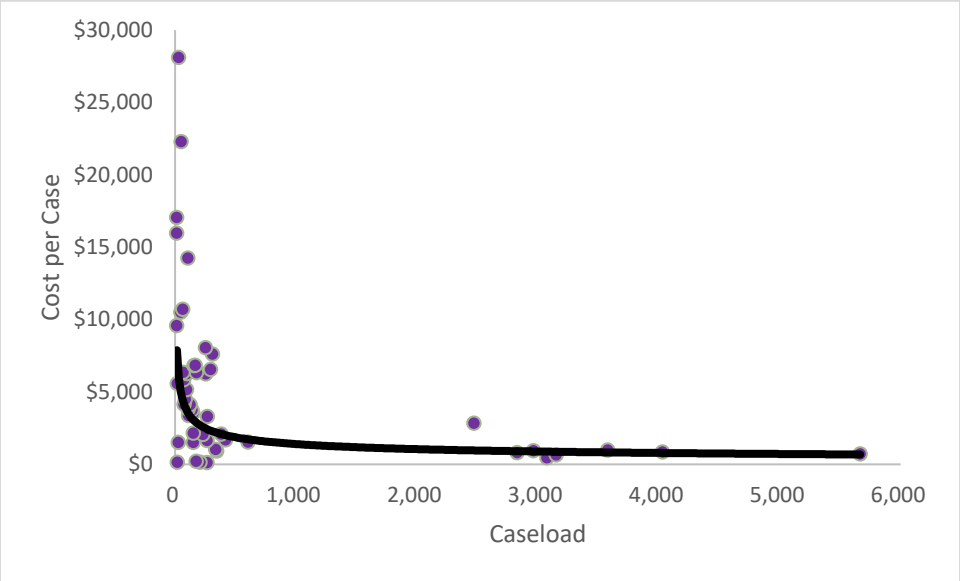
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



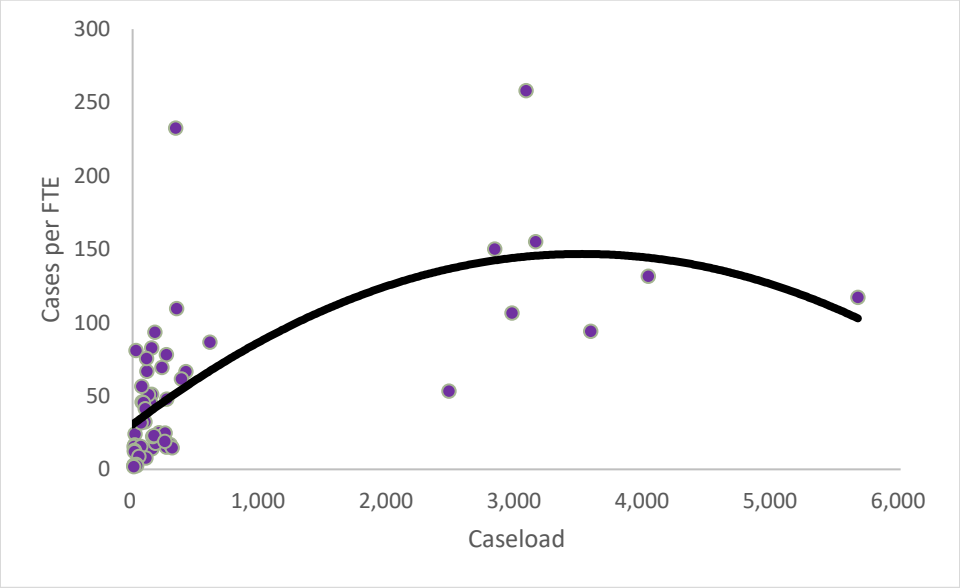


Figure 6: Efficient Frontier Crime Scene Investigation—Cases/FTE v. Caseload

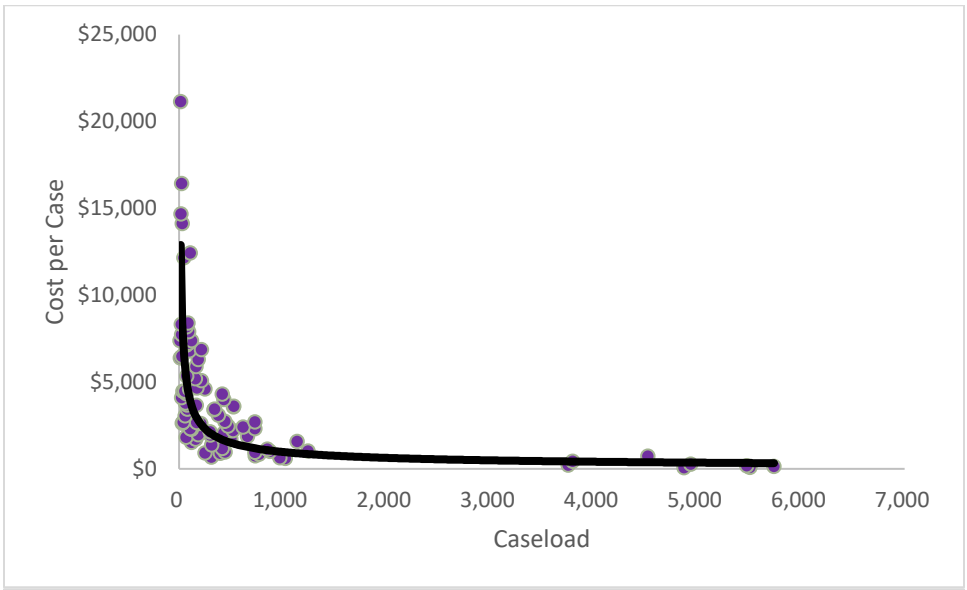
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



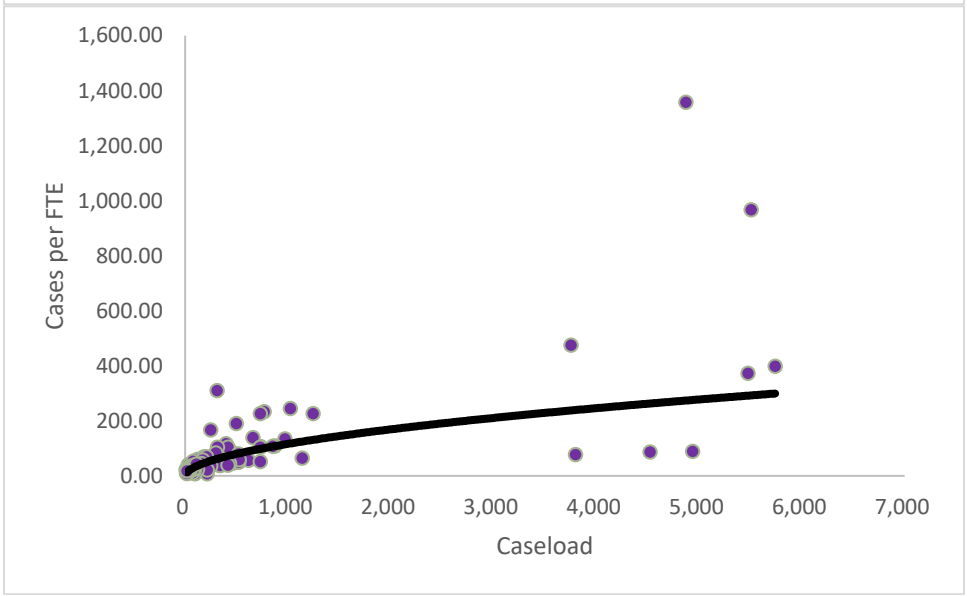


Figure 8: Efficient Frontier Digital Evidence Analysis—Cases/FTE v. Caseload

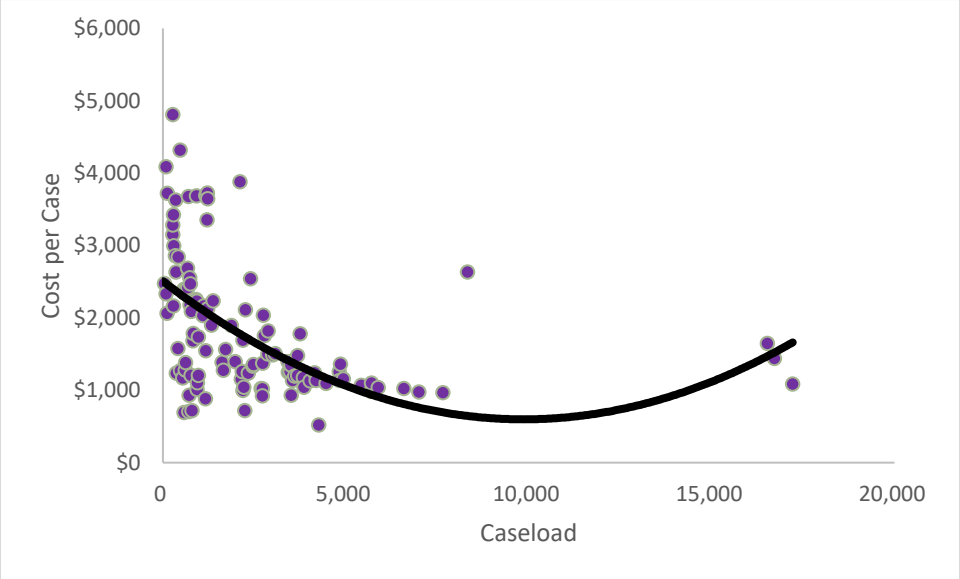
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



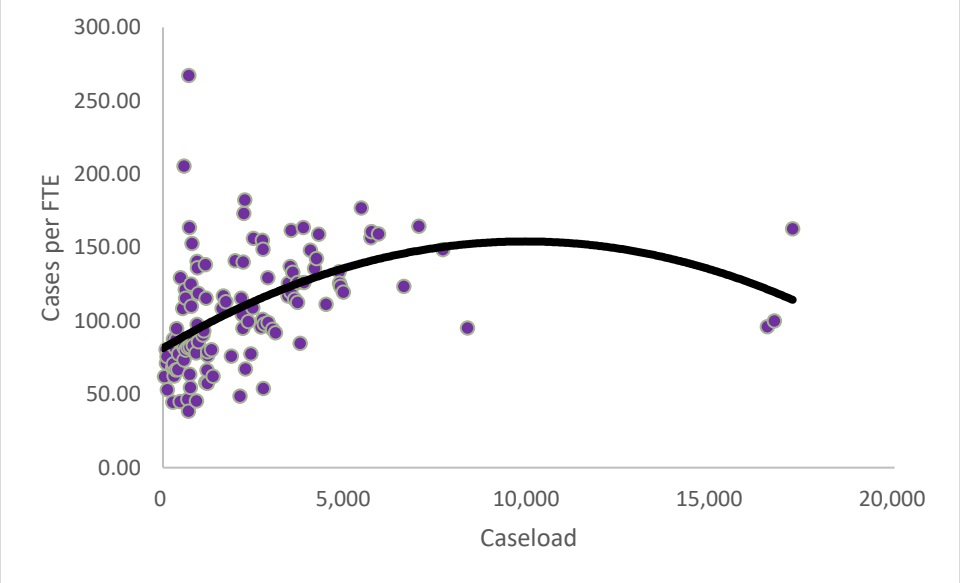


Figure 10: Efficient Frontier DNA Casework Analysis—Cases/FTE v. Caseload

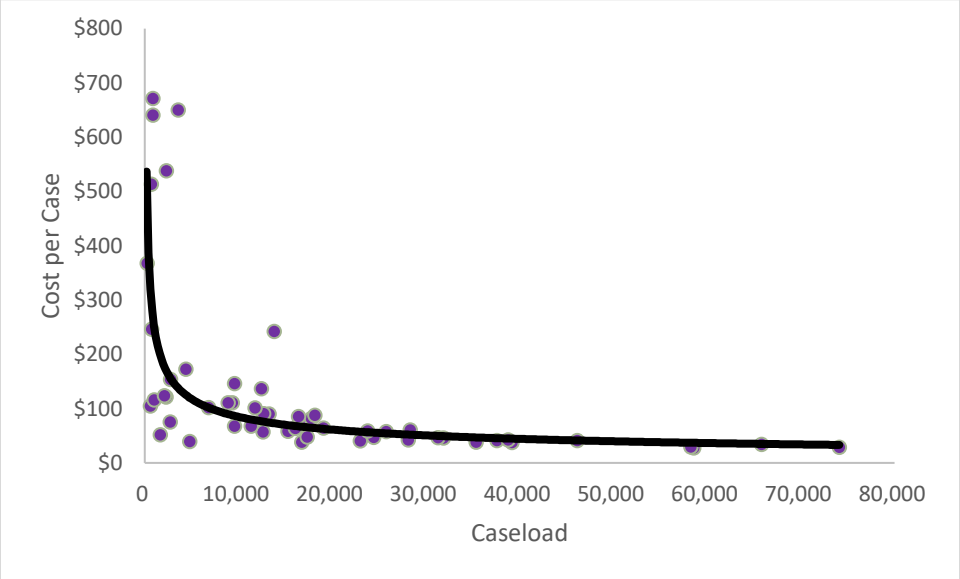
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



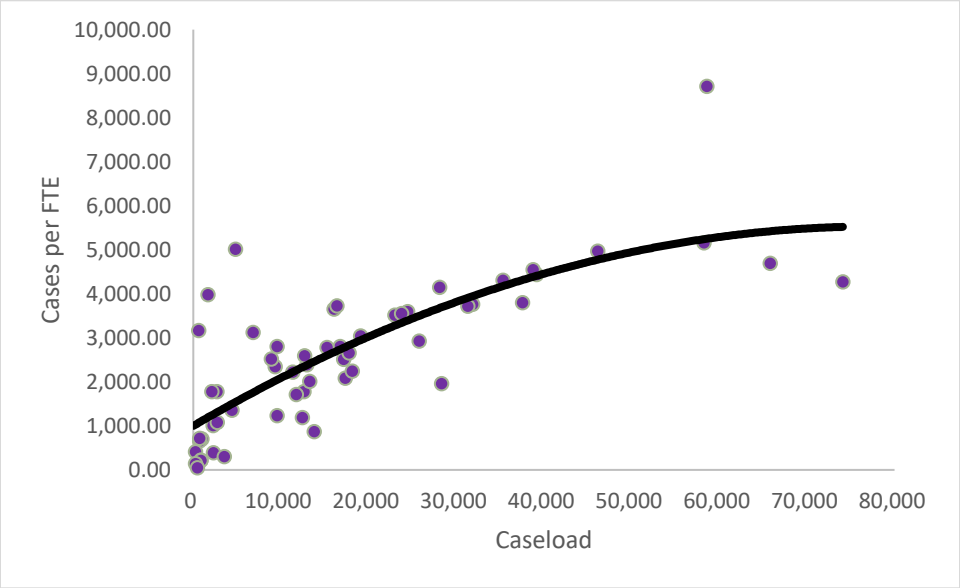


Figure 12: Efficient Frontier DNA Database—Cases/FTE v. Caseload

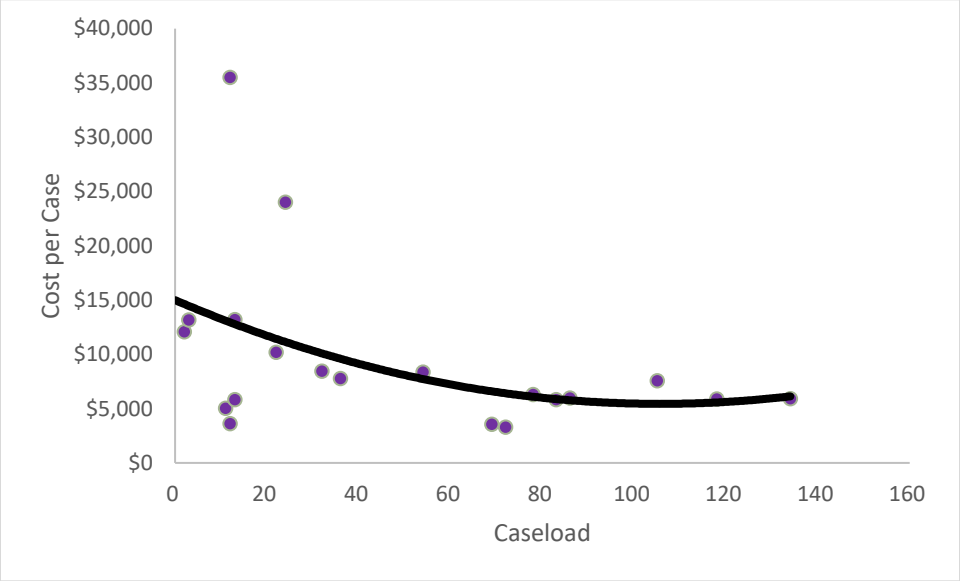
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



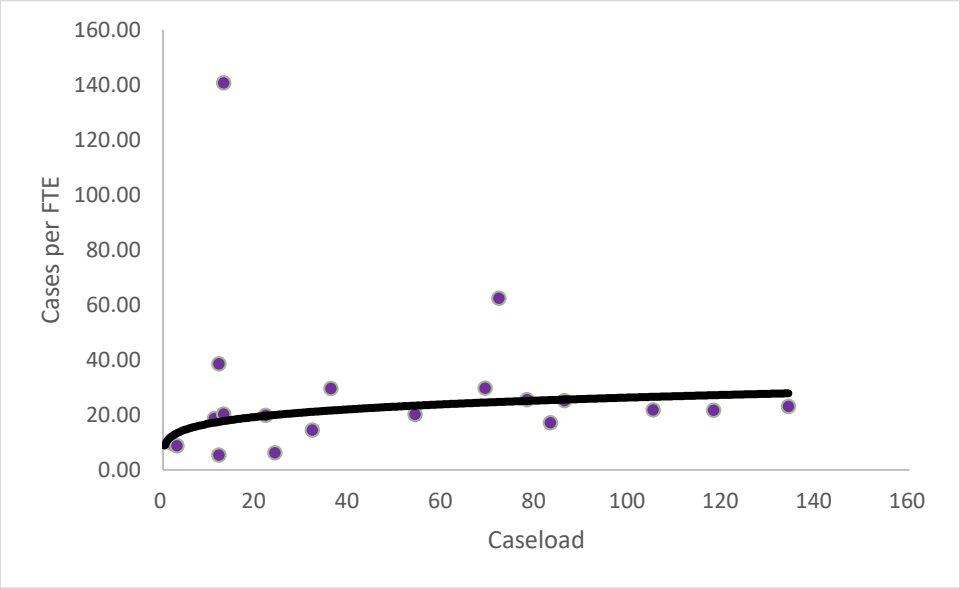


Figure 14: Efficient Frontier Document Examination—Cases/FTE v. Caseload

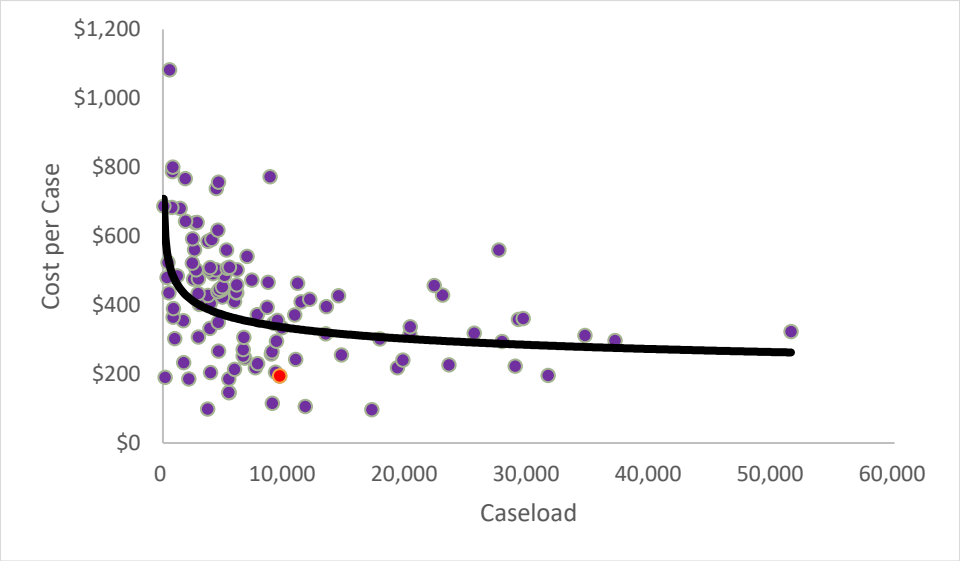
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



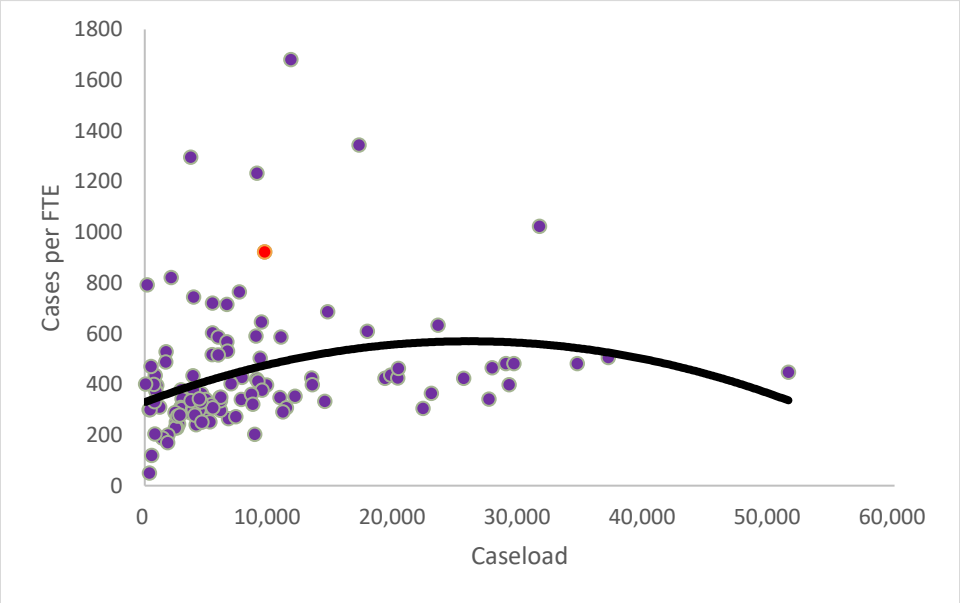


Figure 16: Efficient Frontier Drugs-Controlled Substances Analysis—Cases/FTE v. Caseload

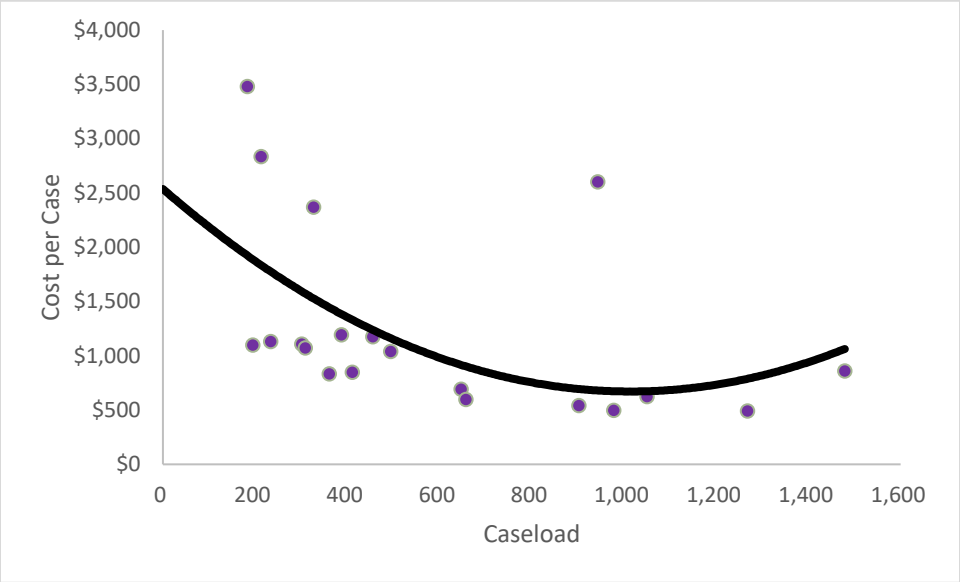
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



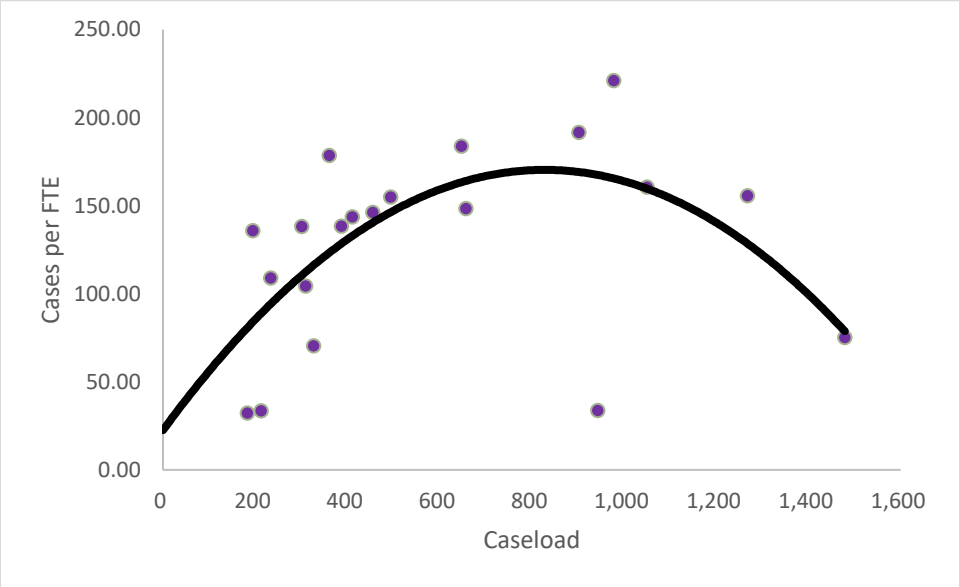


Figure 18: Efficient Frontier for Evidence Screening & Processing — Cases/FTE v. Caseload

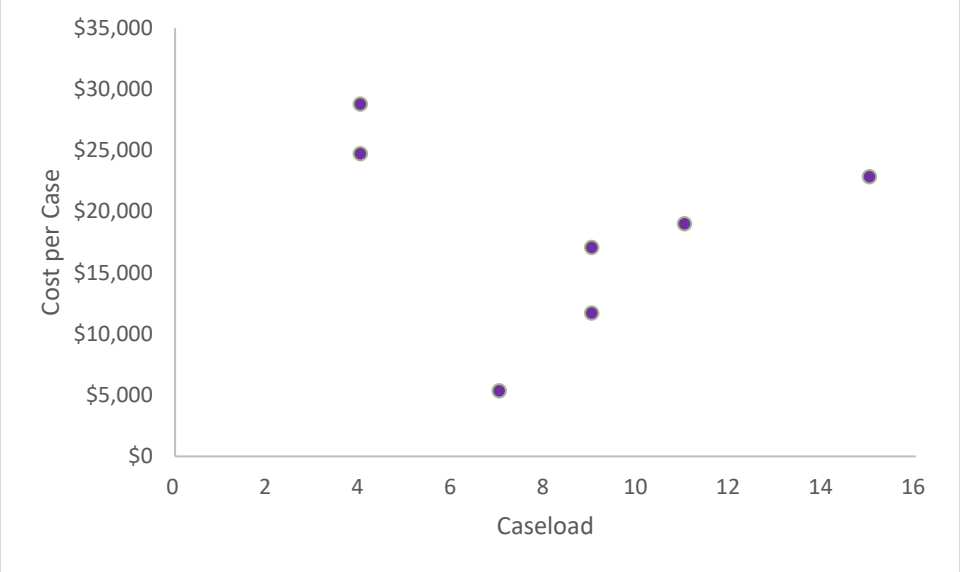
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



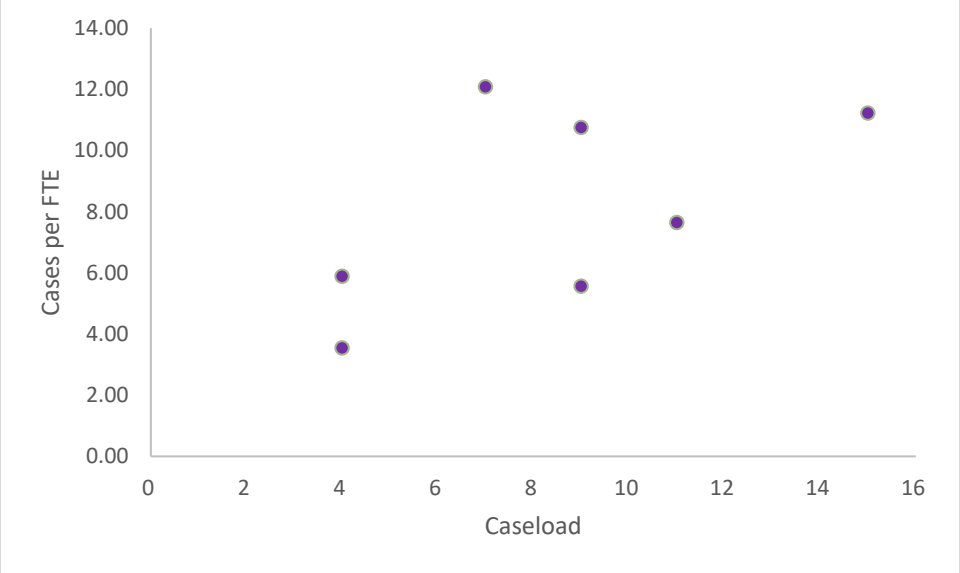


Figure 20 : Efficient Frontier for Explosives Analysis—Cases/FTE v. Caseload

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

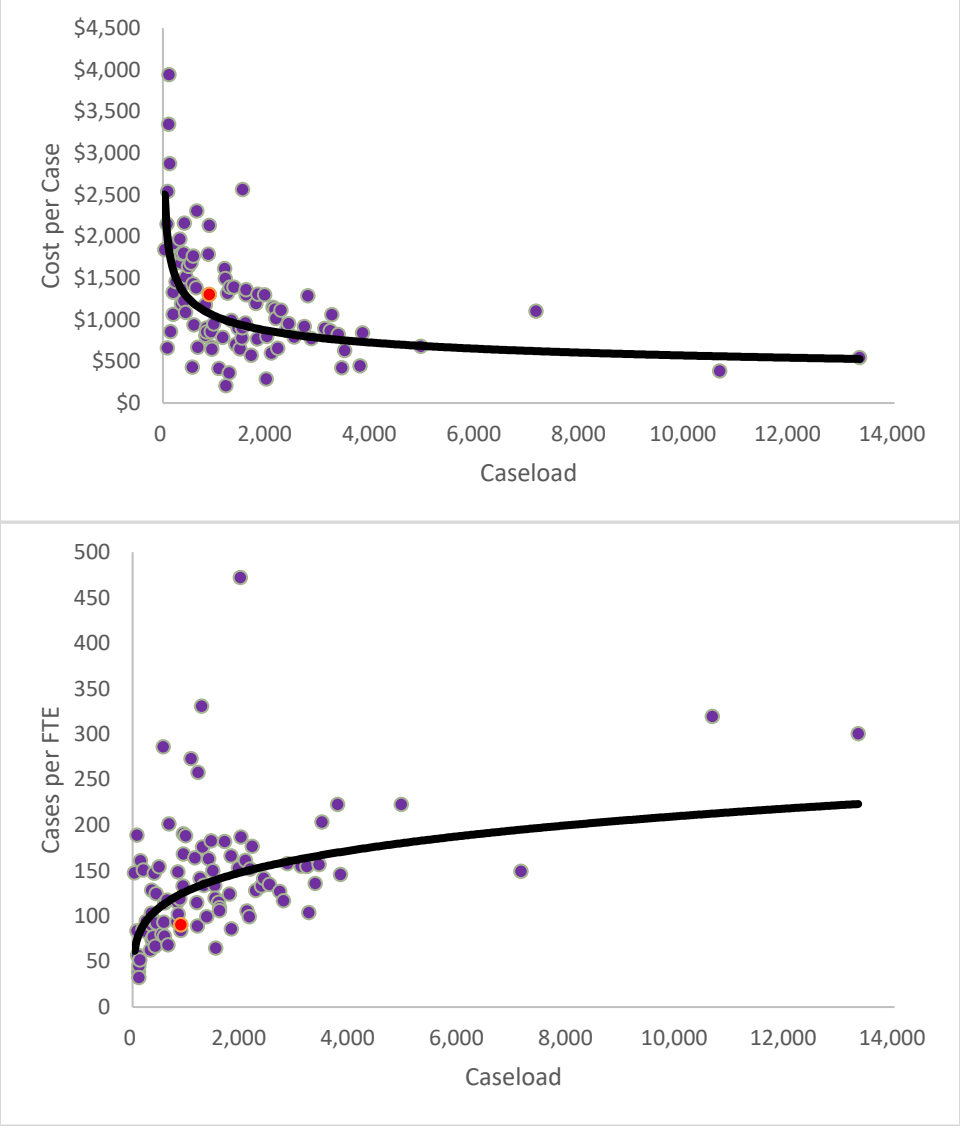


Figure 22: Efficient Frontier for Fingerprint Identification—Cases/FTE v. Caseload

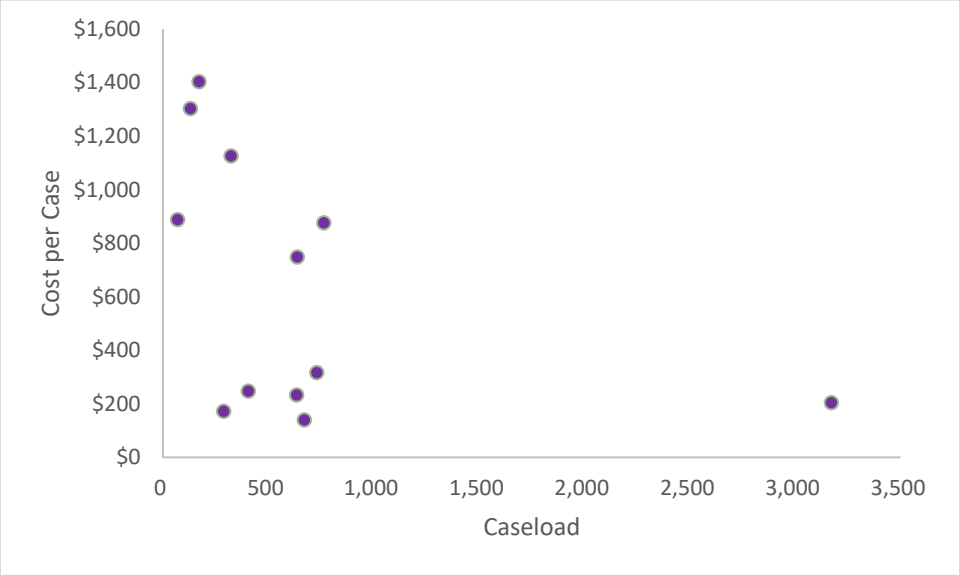
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



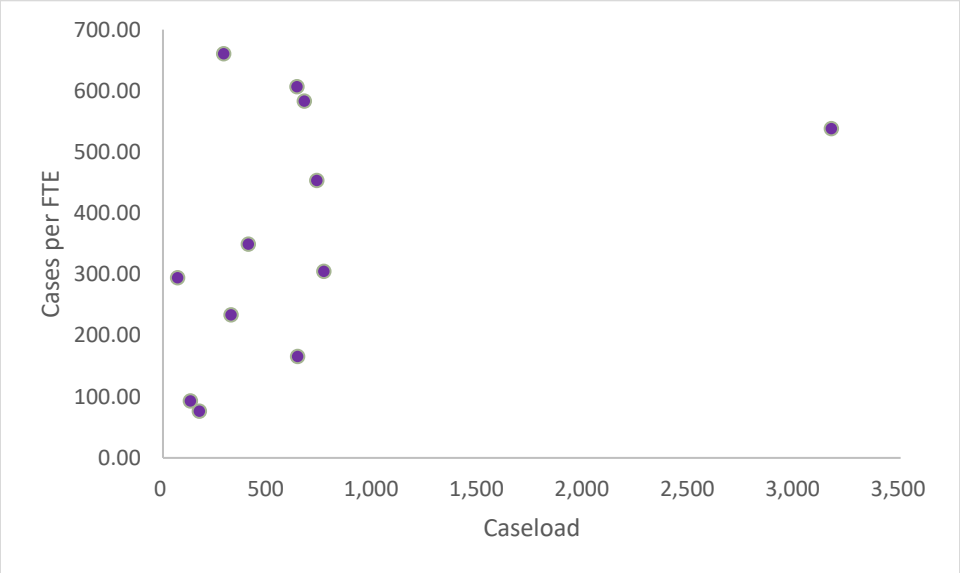


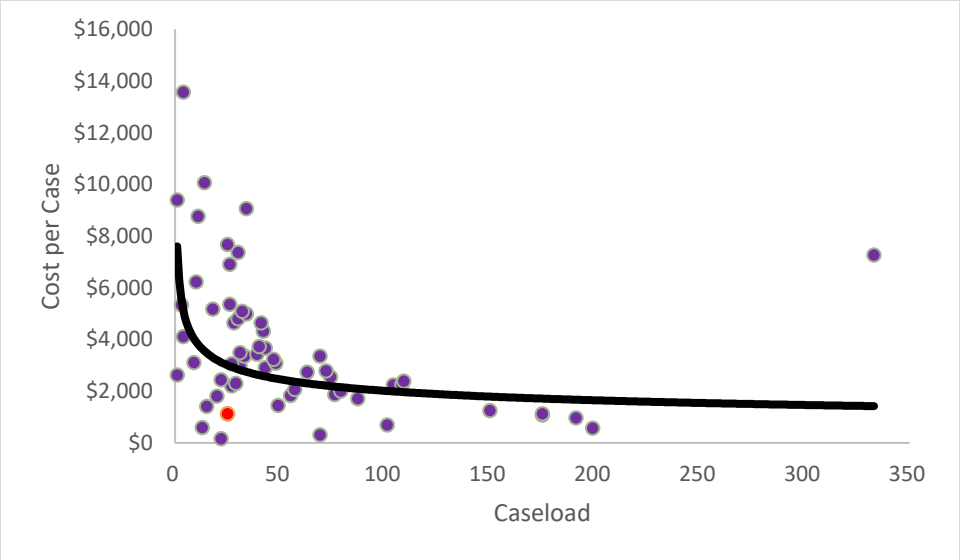
Figure 24: Efficient Frontier for Fingerprint Database—Cases/FTE v. Caseload

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



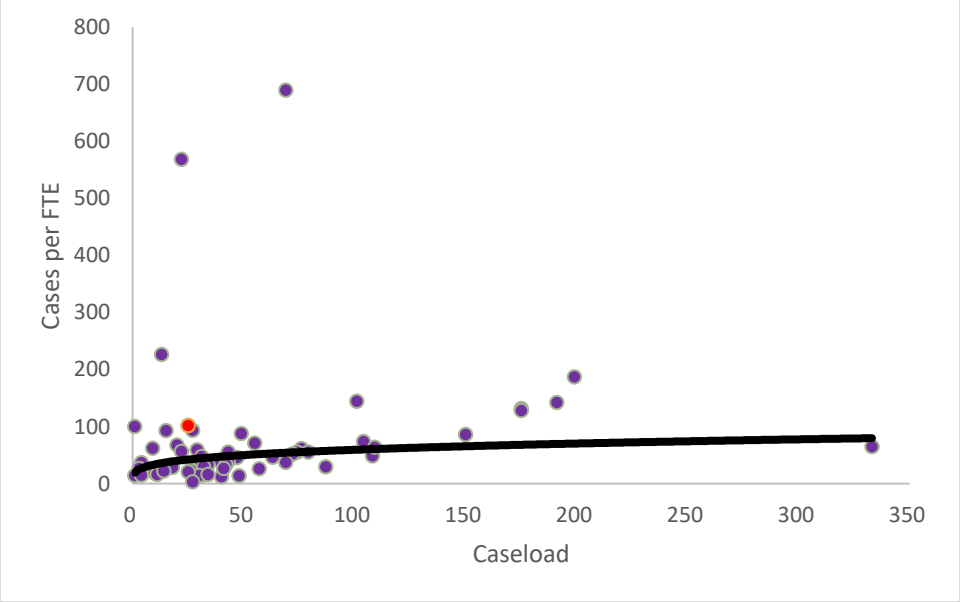


Figure 26: Efficient Frontier for Fire Analysis—Cases/FTE v. Caseload

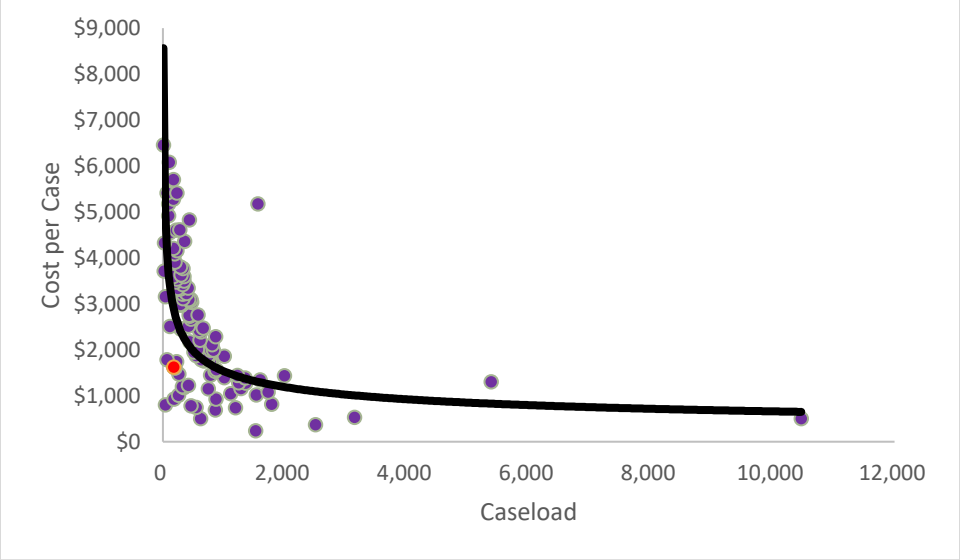
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



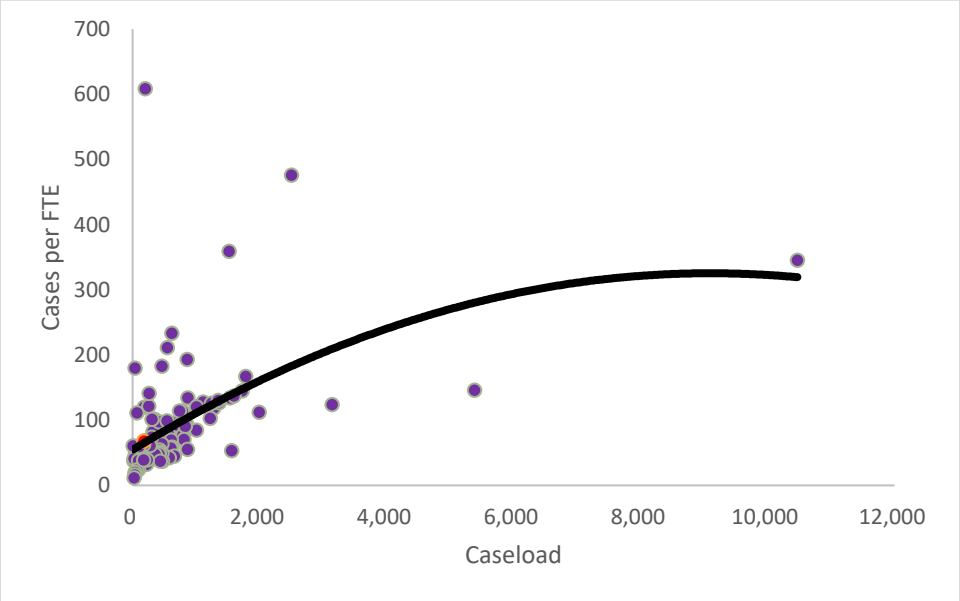


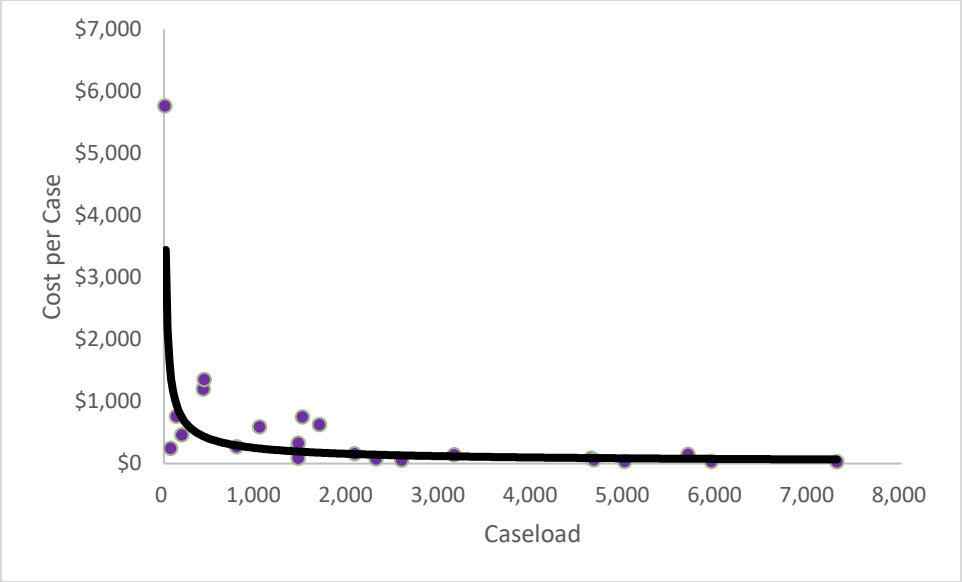
Figure 28: Efficient Frontier for Firearms & Ballistics Analysis—Cases/FTE v. Caseload

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



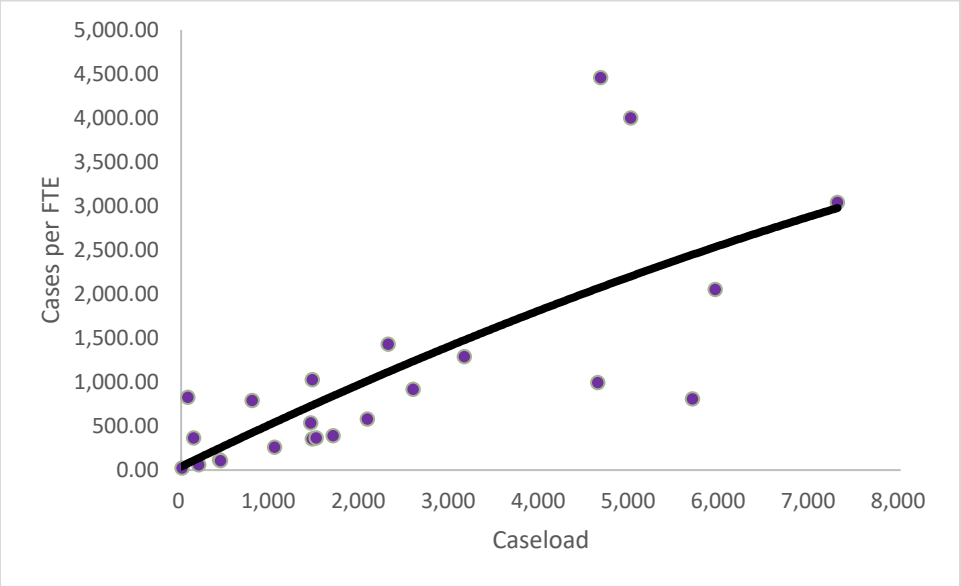


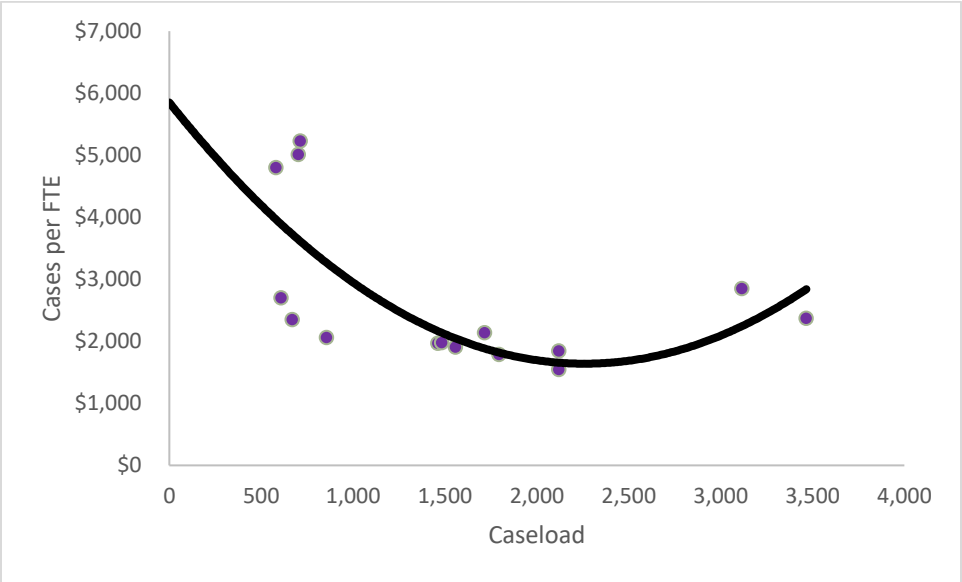
Figure 30: Efficient Frontier for Firearms Database—Cases/FTE v. Caseload

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



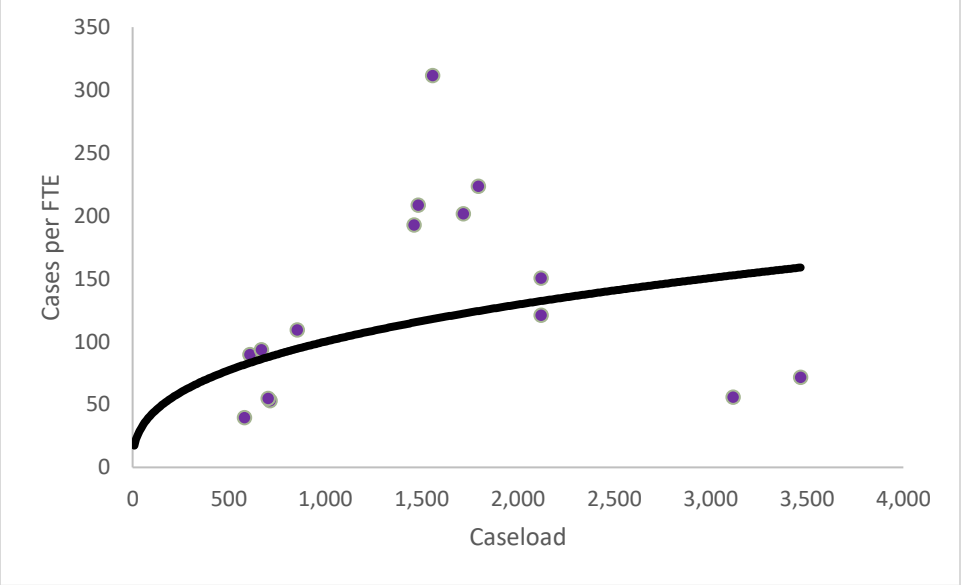


Figure 32: Efficient Frontier for Forensic Pathology—Cases/FTE v. Caseload

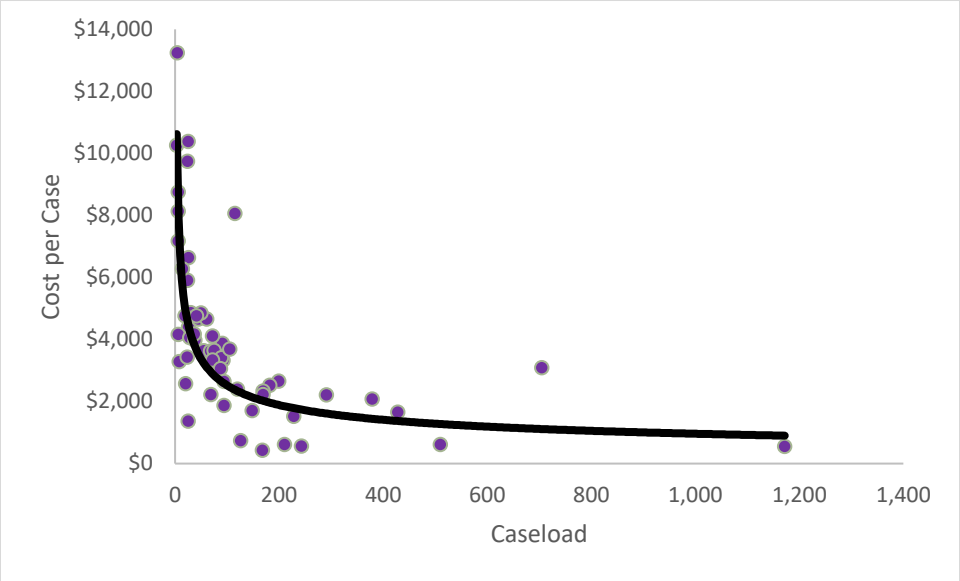
Foresight Project 2021-2022, West Virginia University, Morgantown, WV, USA

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



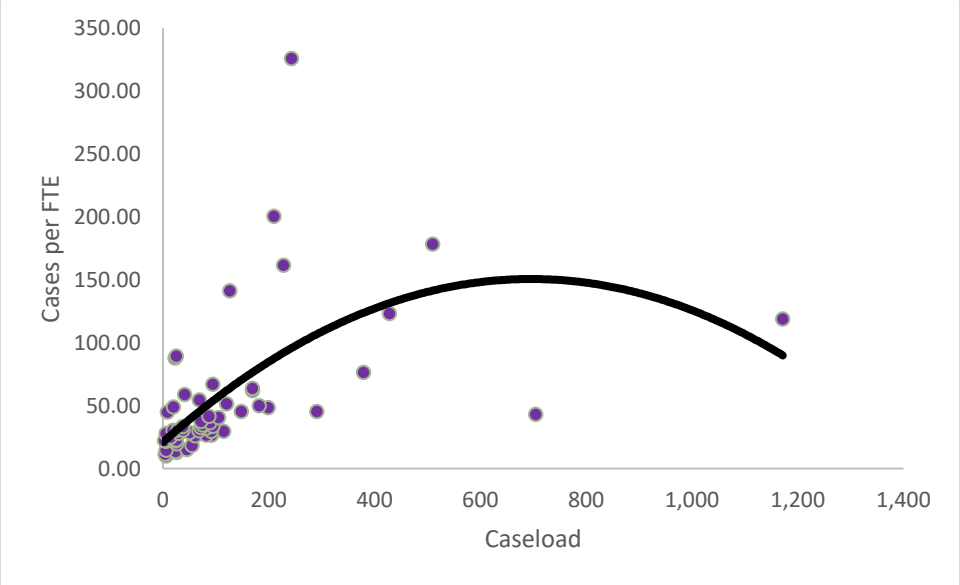


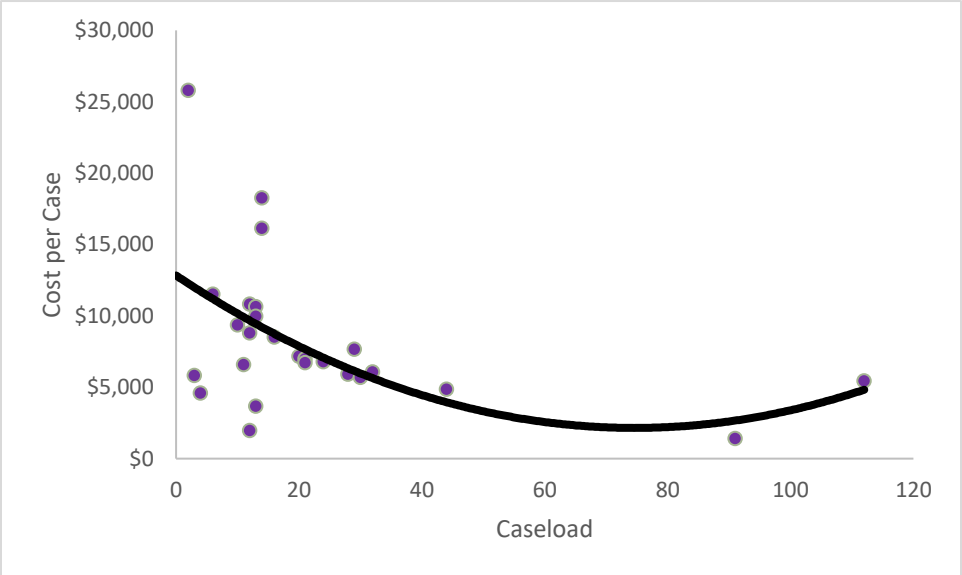
Figure 34: Efficient Frontier for Gunshot Residue Analysis—Cases/FTE v. Caseload

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



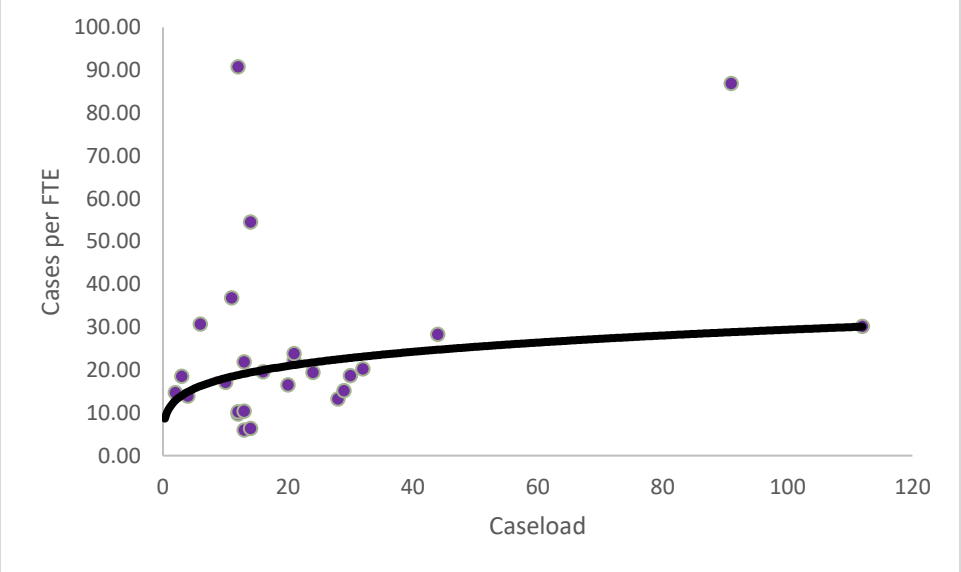


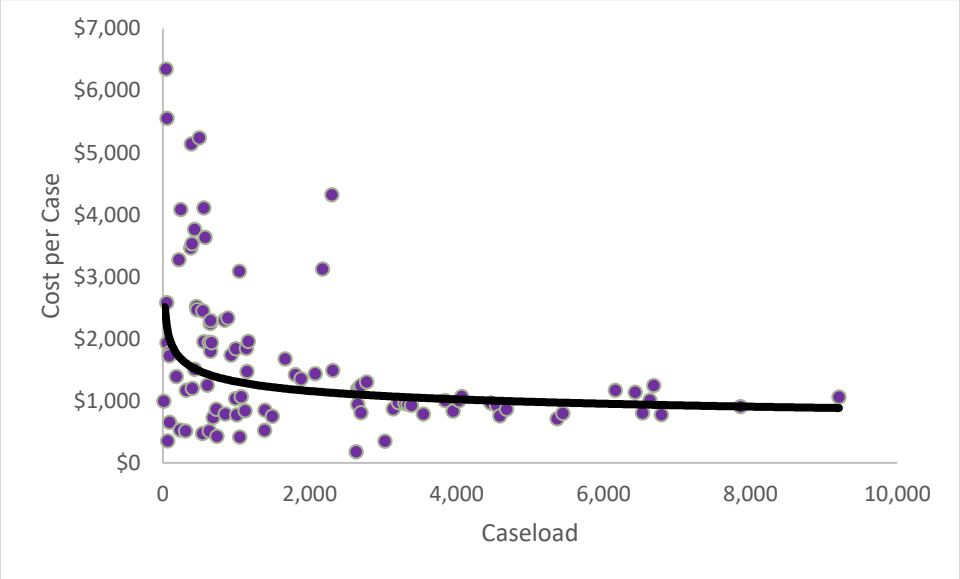
Figure 36: Efficient Frontier for Marks & Impressions Analysis—Cases/FTE v. Caseload

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



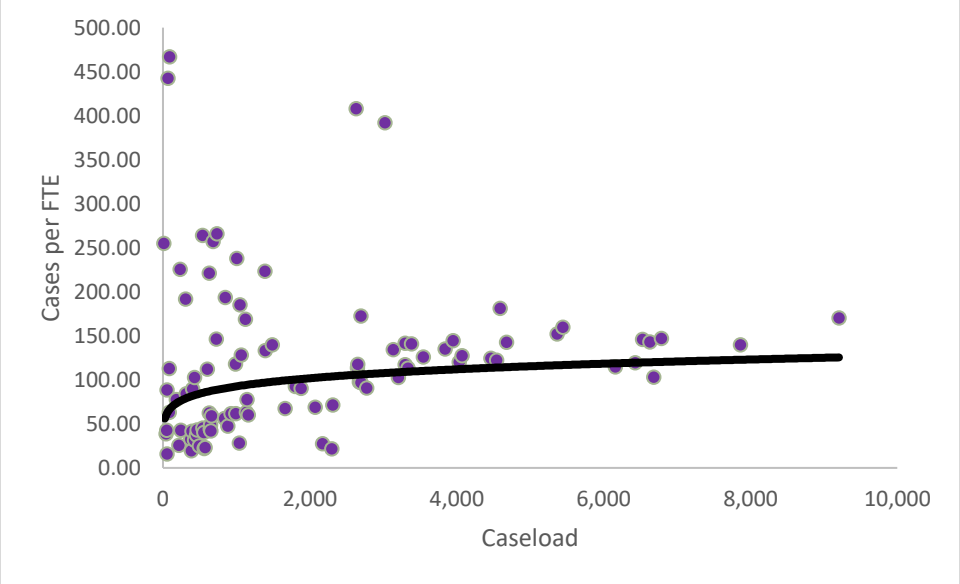


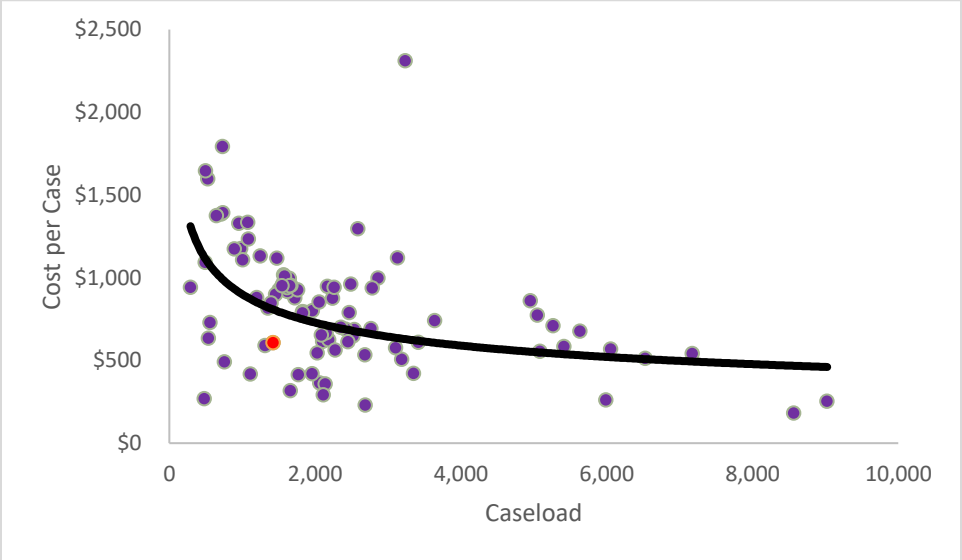
Figure 38: Efficient Frontier for Serology/Biology Analysis—Cases/FTE v. Caseload

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



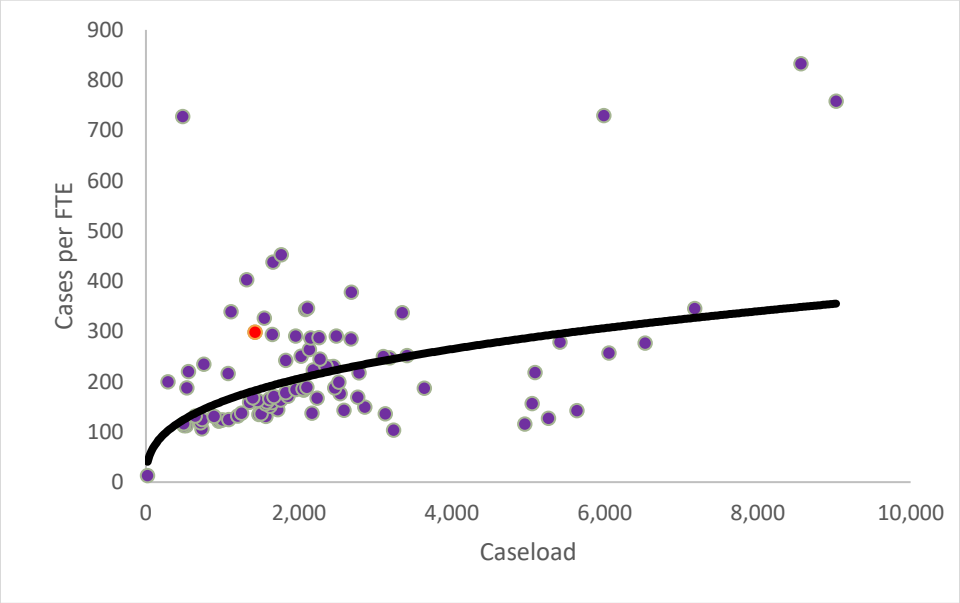


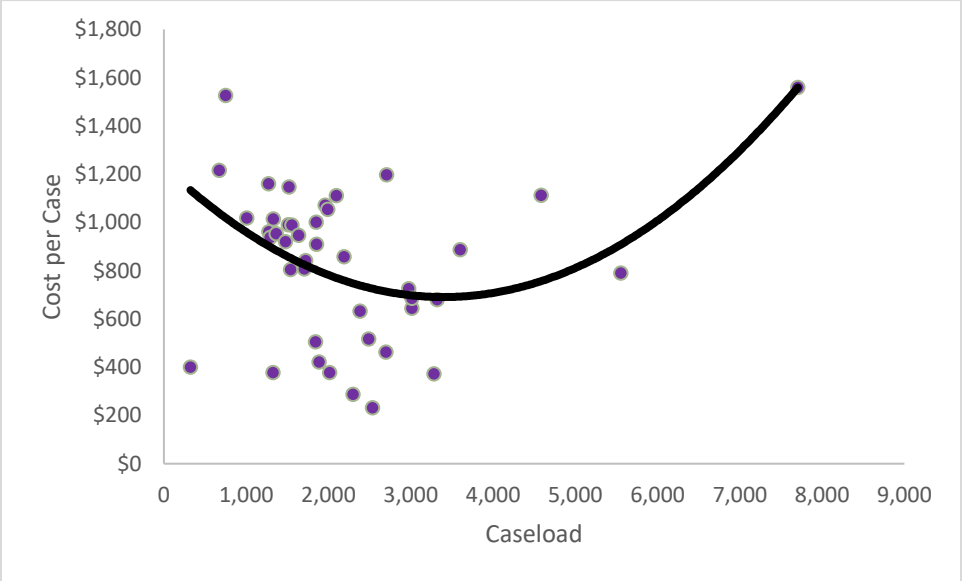
Figure 40: Efficient Frontier for Toxicology Analysis (antemortem)—Cases/FTE v. Caseload

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



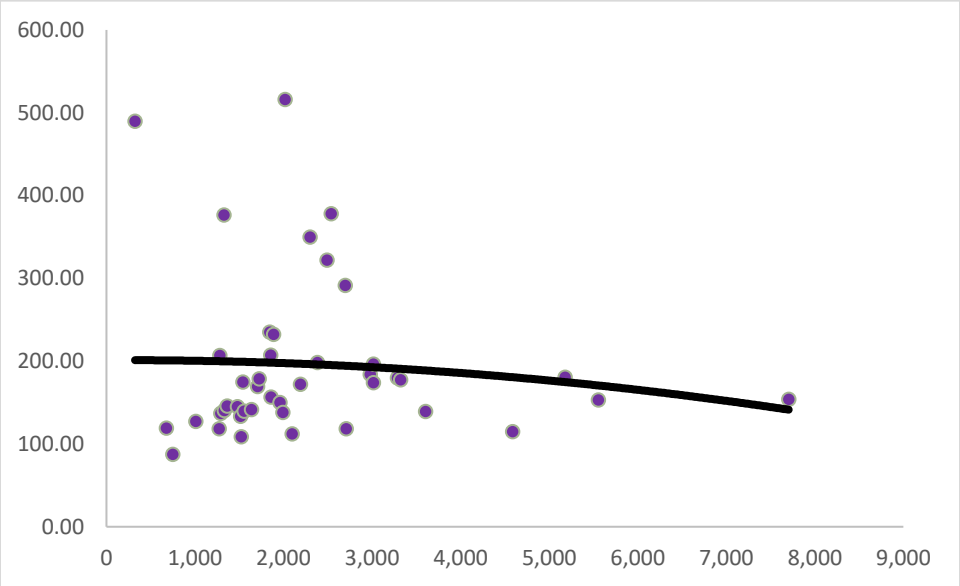


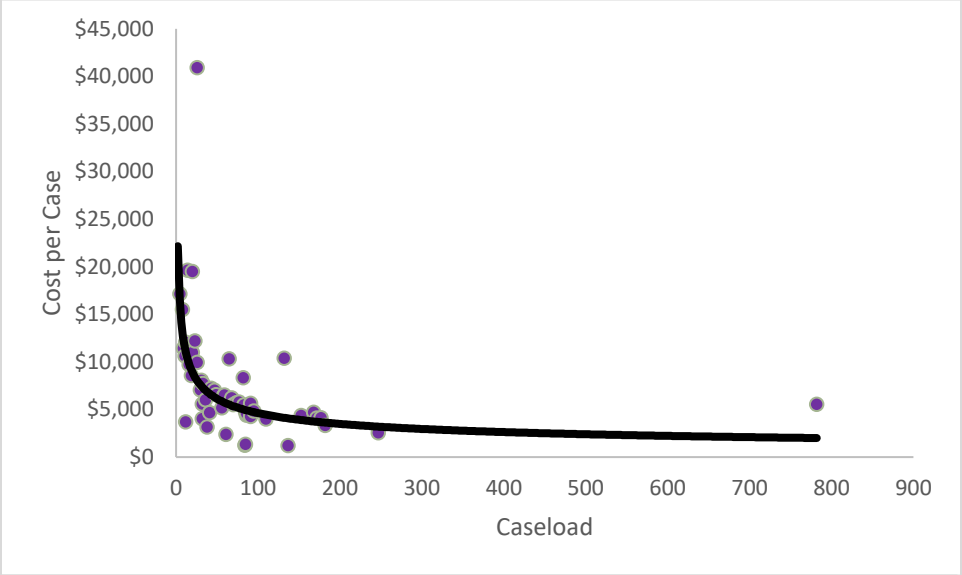
Figure 42: Efficient Frontier for Toxicology Analysis (postmortem)—Cases/FTE v. Caseload

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



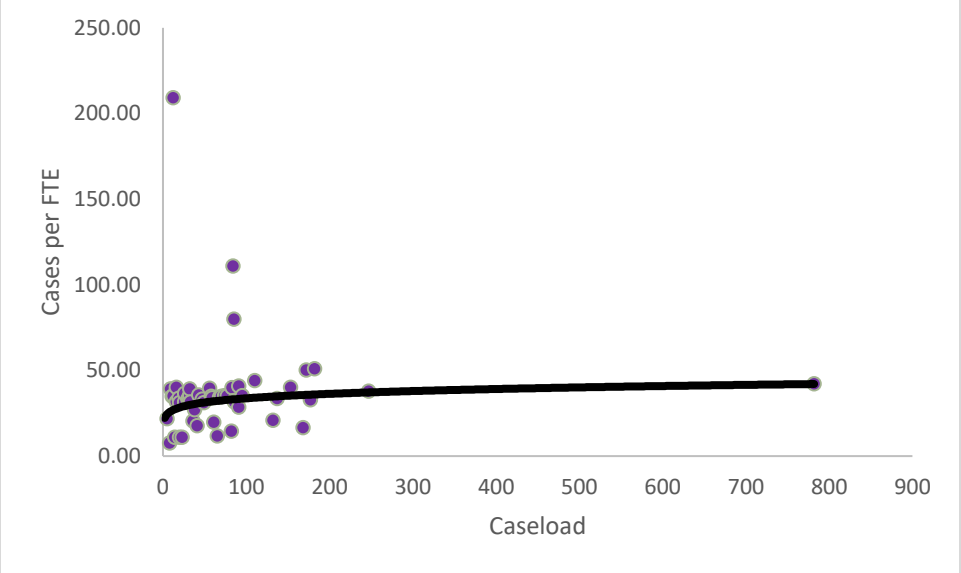


Figure 44: Efficient Frontier for Trace Evidence Analysis—Cases/FTE v. Caseload

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 shoeprints 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.

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McAndrew, W. P., Speaker, P. J., & Houck, M. M. (2023). Forensic Science Management, 2019-2022. *Forensic Science International: Synergy, 6(1)*. https://doi.org/10.1016/j.fsisyn.2022.100301

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Speaker, P. J., (October 2022). Advancements in Understanding the Cost-Effectiveness of Testing Sexual Assault Kits in *Sexual Assault Kits and Reforming the Response to Rape*, Rachel Lovell and Jennifer Langhinrichsen-Rohling, editors.

Speaker, P. J., (2022). Prioritizing the Testing of Sexual Assault Kits. *Sexual Assault Report*.

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Speaker, P. J. (2019). The Jurisdictional Return on Investment from Processing the Backlog of Untested Sexual Assault Kits. *Forensic Science International: Synergy,* 1, 18-23. https://doi.org/10.1016/j.fsisyn.2019.02.055

Houck, M. M. (2019). *FORESIGHT: Problems, Arguments, and Solutions,*). *Forensic Science International: Synergy*, S2, p. S5. https://doi.org/10.1016/j.fsisyn.2019.06.017

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