



Office of the
Merit Commissioner

Report on the Sampling
Methodology and Extrapolations
for the Merit Performance Audit

2023/24

January 2025



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Background

The purpose of this report is to provide information on the population of appointments, sampling methodology, and method of extrapolation underpinning the 2023/24 Merit Performance Audit.

Under section 8 of the *Public Service Act* (the Act), the Merit Commissioner is responsible for the application of the merit principle by performing random audits of BC Public Service appointments. The Merit Commissioner determines whether recruitment and selection processes resulted in appointments based on merit (as outlined in section 8 of the Act), and whether individuals appointed possessed the required qualifications for the position. The Office of the Merit Commissioner (the Office) reports the audit results to organization heads and the deputy minister of the BC Public Service Agency and summarizes the overall results and analysis of the findings in the annual merit performance audit report. The report is provided to the Legislative Assembly and available on the Office of the Merit Commissioner's website. All organizations identified in Appendix A of the *2023/24 Merit Performance Audit Report* are subject to random audit.

Appointment Population

The 2023/24 audit included appointments made from April 1, 2023, to March 31, 2024. Eligible appointments include permanent appointments and temporary appointments of more than seven months. To run an efficient audit and provide timely feedback, year is divided into four intervals:

- April 1 – June 30, 2023;
- July 1 – September 30, 2023;
- October 1 – December 31, 2023; and,
- January 1 – March 31, 2024.

Lists of appointments for organizations subject to audit for the relevant time period are obtained from the BC Public Service Agency (BCPSA) and from the BC Liquor Distribution Branch (LDB), which retains appointment details independently. The appointment population is provided to the Office by both organizations shortly after the end of each interval. Depending on when appointment information is added to the system, this can result in some appointments not being captured in the appropriate interval. Each year our office completes an analysis of these “missed” appointments to ensure the sample reflects the majority of appointments made.

This year, to verify if the “missed” appointments remain within an acceptable margin, the Office completed an analysis of samples 1 and 2 in winter 2024. The intention of this analysis was to determine if there was an increase in the number of missed appointments, and if the data collection timeline should be moved later to capture more accurate data. The results of this mid-year analysis revealed a gentle decline in missed appointments, so it was determined that the current timeline of data collection is appropriate.

Prior to selecting the sample for each interval sample, the appointment population lists are closely reviewed to identify duplicate appointments. These entries are investigated to determine whether they represent unique and



eligible appointments for the audit. Duplicate entries and any appointments deemed ineligible are removed from the population list. For each sampling interval, the lists from the BCPSA and the LDB are combined to form a single appointment population list from which the sample can be drawn. As of March 31, 2024, the end of the fiscal year, the total population of appointments was 11,467.

Sample Selection

The Office selected a simple random sample of permanent appointments and long-term (over 7 months) temporary appointments. A simple random sample is a statistically representative sample of the population of appointments from which results can be generalized to the total population of appointments¹. For an overview of how the sample compares to the population of appointments, see the section titled “Distribution of Audits.” The sample that is selected each year is representative of the total population of appointments, which the Office can reasonably use to extrapolate the sample results to the total population of appointments. The weighted extrapolation of the population is shown in Table 6. As a result, the sample may be generalized to all permanent appointments and long-term temporary appointments that were made between April 1, 2023, and March 31, 2024.

Prior to 2016/17, the Office selected a percentage of the appointments from the population to audit. This meant that the number of appointments audited each year fluctuated according to the size of the population. In 2016/17, for operational reasons, the practice changed to select a fixed number of appointments from the population each year. The set sample size of 284 appointments provides meaningful statistical information as:

- The degree of precision for the confidence level is set to a maximum of 95% with a margin of error for the confidence interval at $\pm 6\%$ for the “merit not applied” finding.
- For a population of 12,000 appointments or less, the sample size required is 261.

The 2023/24 appointment population was 11,467 and the initial sample was 284 appointments. Of these appointments, 12 were out of scope- a rate of 4%. Out-of-scope appointments can refer to short-term temporary appointments, or voluntary demotions. This out-of-scope rate is identical to that reported in the 2022/23 report and is similar to previous years.

A higher number of appointments than required is selected to allow for out-of-scope appointments which are included in the initial appointment lists. In the 2023/24 fiscal year, the Office began to select a larger sample of 71 per quarter, for a total sampling rate of 284. This is to address the increased number of appointments made in the public service and will maintain the statistical confidence level.

The sample was stratified by four quarters over the 2023/24 fiscal year. A random number generator was used to randomize and select the appointments to audit for each of the three-month intervals noted above. This approach allowed the Office to collect and audit appointments close to the time that they occurred. It has been the experience of the Office that by stratifying the sample by these time periods, it makes it easier for hiring managers

¹ See section titled “Estimates and Confidence Intervals” for more details about the precision of results from this audit.



to be available and recall the process. It also allows the Office to issue individual audit reports sooner, providing timely and constructive information to those who receive the reports. Since each interval includes a different number of appointments, this results in a different proportion of each interval being represented in the overall sample. Table 1 summarizes these four independent samples.

Table 1: 2023/24 Population, Sample Size, and Proportion Sampled			
Sampling interval	Population	Sample size	Proportion sampled
Apr 1 – Jun 30, 2023	3,201	71	2.2%
Jul 1 – Sep 30, 2023	2,935	71	2.4%
Oct 1 – Dec 31, 2023	2,634	71	2.7%
Jan 1 – Mar 31, 2024	2,697	71	2.6%
Total	11,467	284	2.5%

To minimize any bias introduced by the varying proportions sampled in the final population estimates, a post-stratification weighting adjustment was applied, that is, four unique weights were created to adjust for bias in the overall sample.

Twelve appointments from the sample were identified as out of scope and removed, leaving 272 in-scope appointments which were subsequently audited. The Office used this information to estimate back to the original population how many appointments would likely be in scope if the entire population of appointments were audited. The result was an adjusted in-scope population of 10,969. The statistics presented in the last two sections of this report are based on the in-scope population. Table 2 shows the adjusted populations with the proportions of the population sampled since 2016/17.

Table 2: Year-Over-Year Comparison of In-Scope Population and Sample Size			
Year	Number of appointments	Number of audits	Proportion of population sampled
Fiscal 2016/17	5,685	257	4.5%
Fiscal 2017/18	6,269	259	4.1%
Fiscal 2018/19	7,363	273	3.7%
Fiscal 2019/20	7,413	267	3.6%
Fiscal 2020/21	5,445	269	4.9%
Fiscal 2021/22	7,534	269	3.6%
Fiscal 2022/23	10,525	268	2.5%
Fiscal 2023/24	10,969	272	2.5%



Distribution of Audits

The sample of 272 appointments was reviewed to confirm that this sample was representative of the population of appointments from which it was drawn. This included comparing the distribution of the sample and the population appointments by three variables: appointment types, organization sizes, and job classification groups.

There was a small difference in values ($\pm 6\%$) between the sample and population percentages. This finding indicates that even though the sample was not stratified by these variables, the 2023/24 sample was proportionately representative of the total population of appointments for the same period. Tables 3, 4 and 5 show this year's findings by variable of comparison.

For these comparisons, the 272 in-scope appointments from the sample and a population number of 11,455 which is all of the 11,467 appointments that occurred over the fiscal year minus the 12 appointments known to be out of scope. The extrapolated in-scope population was found to be 10,969 for this fiscal year.

This fiscal year, in tables three, four, and five, the differences between the sample size and the audited appointments all fell between $\pm 5\%$.

Table 3: Audits by Appointment Type

Appointment type	Total number of appointments	Percent of all appointments	Number of audits	Percent of all audits
Permanent	10541	91.9%	266	93.7%
Temporary over 7 months	926	8.1%	18	6.3%

Table 4: Audits by Organization Size

Organization size	Total number of appointments	Percent of all appointments	Number of audits	Percent of all audits
Large (> 1,000 employees)	9458	82.5%	241	84.9%
Small ($\leq 1,000$ employees)	2009	17.5%	43	15.1%



Table 5: Audits by Job Type

Job classification group	Total number of appointments	Percent of all appointments	Number of audits	Percent of all audits
Admin Support	2191	19.1%	55	19.4%
Enforcement & Corrections	345	3.0%	12	4.2%
Executive	8	0.1%	0	0%
Finance & Economics	483	4.2%	11	3.9%
Health, Education & Social Work	1361	11.9%	37	13.0%
Information Technology	562	4.9%	14	4.9%
Legal Counsel	184	1.6%	2	0.7%
Management Band	1901	16.6%	46	16.2%
Science & Technical Officers	1296	11.3%	29	10.2%
Senior Admin & Research	2748	24.0%	69	24.3%
Trades & Operations	14	0.1%	0	0%

Note: Percentages may not add to 100%, due to rounding.

Estimates and Confidence Intervals

To determine the probability that the sample audit findings (i.e., “merit”, “merit not applied”, and “merit with exception”) would be replicated in the population of appointments, the Office applied confidence intervals to the estimates for the 2023/24 audit. The Poisson distribution method was used, which is appropriate for generating estimates of independent but rare events. For the purposes of the audit, a rare event is the “merit not applied” finding which occurs least frequently. The Poisson distribution method of estimation since the 2010 merit performance audit.

Although the sampling variation across each sampling interval was small, the micro-data prior was weighted to generating the population estimates and confidence intervals to minimize sample bias and to produce the best estimates.

A 95% confidence interval means that with repeated sampling, the true population value of that finding would lie within the upper and lower limits of that interval 95 times out of 100. Therefore, in Table 6, the true population value for each of the “merit not applied,” “merit with exception,” and “merit” findings were within the lower and upper limits of the respective confidence intervals 95 times out of 100.



Table 6: Extrapolated Estimates – Audit Findings and Confidence Intervals

Audit	Audit finding	Sample appointments audited	Estimate (weighted)	95% Confidence interval	
				Lower	Upper
2023/24 Audit	Merit not applied	28	10.2%	6.7%	14.2%
	Merit applied	161	59.9%	50.9%	69.3%
	Merit with exception	83	30.0%	23.8%	36.8%

Note: Percentages may not add to 100%, due to rounding.

In the 2023/24 audit, the appointments with a “merit not applied” finding made up 10.2% of all appointments. According to the confidence intervals, the true proportion of appointments with a “merit not applied” finding may be as low as 6.7% and as high as 14.2% of the total population, with a “merit” finding may be as low as 50.9% and as high as 69.3% and a “merit with exception” finding may be as low as 23.8% and as high as 36.8%.

As in the two previous fiscal year audits, the weighted estimates for the audit findings in Table 6 are very similar to the sample findings, suggesting there was very little bias introduced into the sample as a result of the sampling methodology.

Uses and Limitations of Audit Results

There is always some variability (i.e., errors, irregularity) associated with sampling and with any resulting statistics. The Office accounts for this expected variation by using a confidence interval around statistics of interest. The confidence interval provides a level of precision as a percentage range around (above and below) the estimated population value for each of the findings.

The appointments selected for audit are a random sample from a list of appointments occurring between April 1, 2023, and March 31, 2024.

In terms of year-over-year comparisons, the number of audits conducted in the 2023/24 fiscal year was very close to the rate that was seen in the 2022/23 (268) fiscal year, 2021/22 fiscal year (269), 2020/21 (269), 2019/20 (267), 2018/19 (273) and, 2017/18 (259) due to the fixed sample size approach now used. Due to the significant changes implemented in the sampling approach in 2016/17, caution should be used when comparing results to samples prior to 2016/17.

This year only included a minor change to sampling, and a change in approach, as outlined in the *2023/24 Merit Performance Audit Report*. However, changes in approach to sampling and audit have been necessary to maintain data integrity and improve the quality of the audit. A brief summary of these changes is as follows:

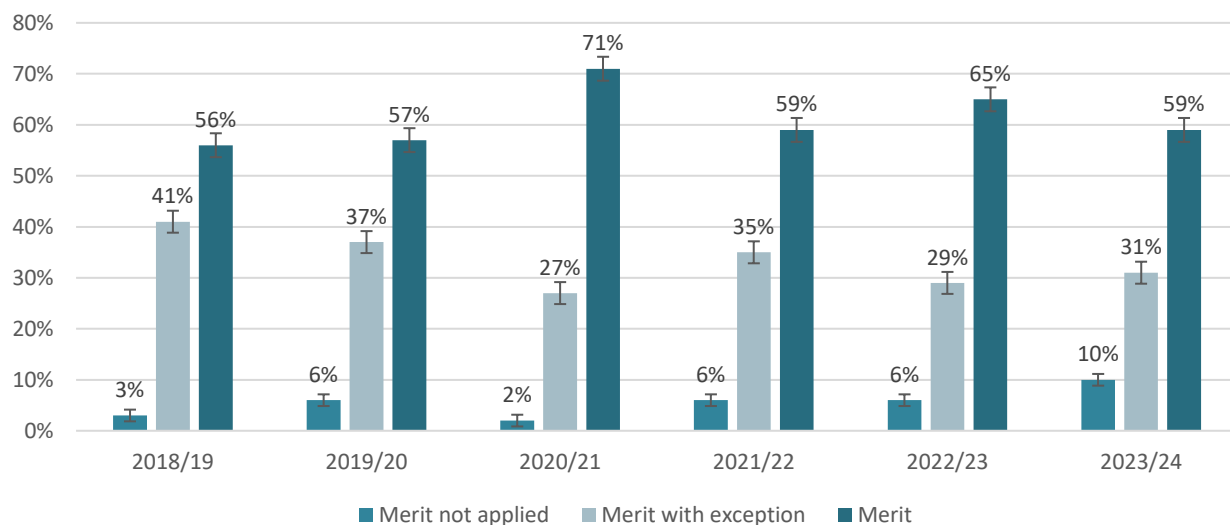
- In 2016/17 a fixed sample size of 70 per quarter was established. To review this change in detail, review [Appendix B of the 2016/17 audit report here](#).
- In 2017/18, the Office changed [how inventory errors are identified](#).



- In 2018/19 there was a change in how errors were tallied. [This is detailed in Appendix B of the 2018/19 Audit Report.](#)
- An unanticipated error during the first interval of the 2018/19 audit resulted in the need for stratification in the third and fourth intervals. Those samples were further stratified by source list (core government versus Liquor Distribution Branch) and employee status (“new” versus “existing”). [This is outlined in appendix B of the 2018/19 Merit Performance Audit.](#)
- In 2023/24, the sampling rate was increased from 280 to 284 to ensure that there is a large enough sample to accurately represent the increasing number of hires in the fiscal year.
- In 2023/24 with the implementation of a new database software, the categories of appointment phases, where process and errors are tracked, was modified slightly to more accurately represent the phases in an audit appointment. This information is detailed in the *2023/24 Merit Performance Audit Report*.
- In the fiscal year 2024/25, a new random sampling method was implemented with the support of Statistics Canada. As opposed to a simple random sampling approach, the Office has implemented stratified random sampling. The methodology and rationale will be outlined in detail in 2024/25’s methodology and extrapolation report.

Chart 1 illustrates the estimated year-over-year merit performance audit results for the population of public service appointments, with confidence intervals shown as error bars.

Chart 1: Population Estimates for the Recruitment and Selection Process Findings



Notes:

- Error bars depict 95 % confidence intervals around each population estimate.

Considering the sample sizes used and the consistently-applied sampling methodology, the results from the 2023/24 merit performance audit offered a good degree of comparability to previous years’ audit findings. Given the precision of the estimates, the samples and subsequent audit findings can be stated to be of reasonable statistical strength.