

Random Selection for the 2012 Merit Performance Audit

PREPARED FOR THE OFFICE OF THE MERIT COMMISSIONER
BY BC STATS – JUNE 2013

Authors: Julie Hawkins

Contact: BC Stats, 250-356-0025

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Background

The Office of the Merit Commissioner was established by legislation in August 2001. Under this legislation, the Merit Commissioner is responsible for performing audits of public service appointments, as part of a program of monitoring the application of the merit principle under section 8 of the *Public Service Act*. The results of the audits are reported to the Executive of ministries and other organizations. The aggregate results are also communicated to the Legislative Assembly.

The Office of the Merit Commissioner is legislated to perform random audits of public service appointments.

The audits are designed to assess whether recruitment and selection practices have resulted in appointments based on merit, and whether individuals possess the required qualifications for the position to which they were appointed. This requires a close study of the details of each appointment audited by an expert in staffing processes. In 2011, the Office of the Merit Commissioner identified the need for refinements to the audit program and adjustments were introduced.

To support the audit process, BC Stats developed a sampling solution to ensure that the cases selected for the audit were both random and representative. This report describes the appointments that occurred within the 2012 calendar year, and explains the method that was used to make an audit selection from these appointments.

Between 2001 and 2005, the resources available for auditing were limited and the number of appointments audited were constrained accordingly. With the 2006 appointment of the first Merit Commissioner as an independent Officer of the Legislature, the annual audit increased in size. The sample rate was increased such that it was robust enough to generalize the audit results to the population of appointments for a hiring year with greater certainty. The increase in the sampling rate was maintained for both the 2007 and 2009 audit years. The 2010 audit was a partial year audit, covering appointments from September 1, 2010 to December 31, 2010. The 2011 audit allowed for continued generalization of the audit results to its population of appointments. In the 2012 audit, 256 appointments were audited from an adjusted population of 3,928 appointments¹, which allowed for continued generalization of the audit results to the population of appointments for the 2012 calendar year.

¹ See “Random Selection of Cases” for a full discussion of the number of appointments originally put forward for audit. A certain proportion, upon review, was deemed out of scope and this proportion was then estimated back into the original population.

Table 1(a) summarizes the in-scope population and sample counts across audit years *prior to* the establishment of the Office of the Merit Commissioner as an independent office.

TABLE 1(A): YEAR-OVER-YEAR COMPARISON OF IN-SCOPE POPULATION AND SAMPLE COUNTS

Year	Number of Appointments	Number of Audits	Sampling Rate
2001	1,481	39	2.6%
2002	1,835	30	1.6%
2002	2,772	40	1.4%
2003	2,904	39	1.3%
2004	2,871	70	2.4%
2005	1,481	39	2.6%

Table 1(b) summarizes the in-scope population and sample counts across audit years *following* the establishment of the Office of the Merit Commissioner as an independent office.

TABLE 1(B): YEAR-OVER-YEAR COMPARISON OF IN-SCOPE POPULATION AND SAMPLE COUNTS

Year	Number of Appointments	Number of Audits	Sampling Rate
2006	3,754	308	8.2%
2007	5,508	531	9.6%
2008 ¹	n/a	n/a	n/a
2009	2,429	302	12.4%
2010 ²	942	183	19.4%
2011	3,942	222	5.6%
2012	3,928	256	5.8%

Note 1: An audit was not conducted in 2008 and, as a result, a count of appointments occurring within the 2008 calendar year was not obtained for this study.

Note 2: The 2010 audit was a partial year audit, covering appointments from September 1, 2010 to December 31, 2010.

2012 Appointment Demographics

The Office of the Merit Commissioner defined the population of appointments for the 2012 audit according to two key factors: the type of appointment and the timeframe in which the appointment occurred. The 2012 audit timeframe was January 1, 2012 to December 31, 2012. The types of appointments to be audited included direct appointments, permanent appointments and temporary appointments for more than seven months. The remaining appointments within the Merit Commissioner’s jurisdiction of appointments made under section 8 of the *Public Service Act* (i.e., auxiliary appointments and temporary appointments of seven months or less), were excluded from the audit population. Based on these query parameters, a final population of 4,258 appointments was identified.

A high level demographic and geographic analysis indicated that appointments occurring in the 2012 calendar year tended to cluster around a relatively small number of occupations, organizations and geographies.

Four job classifications within the 2012 audit population comprised over one-quarter (28%) of the total population of 4,258 appointments. Similar to the 2009, 2010 and 2011 audit populations, the job classification with the highest incident in 2012 was “Business Leadership” with 439 appointments. A summary of the top four job classifications for 2012 is provided in Table 2. The change from the 2011 audit population was the replacement in fourth place of “Community Program Officer (EAW) R15” by “Clerk R11” in the 2012 audit population.

‘Business Leadership’ continues as the job classification with the highest percentage of public service appointments.

TABLE 2: TOP FOUR JOB CLASSIFICATIONS BY NUMBER OF APPOINTMENTS

Job Description	Number of Appointments	Percentage of All Appointments
Business Leadership	439	10.3%
Clerk R9	315	7.4%
Applied Leadership	259	6.1%
Clerk R11	180	4.2%

At the organization or ministry level, the frequency of appointments was higher for those organizations with larger populations. Five organizations accounted for half (49.6%) of the total number of appointments in 2012. Since 2011, the top five organizations have shuffled places, the Ministry of Forests, Lands & Natural Resource Operations (a new ministry) has been added to the top five, and the Ministry of Transportation & Infrastructure is no longer in the top five. Table 3 provides a summary of the top five organizations' results.

TABLE 3: TOP FIVE ORGANIZATIONS BY NUMBER OF APPOINTMENTS

Ministry	Number of Appointments	Percentage of All Appointments
Forests Lands Natural Res Ops	524	12.3%
Justice AG	468	11.0%
Justice SG	435	10.2%
Social Development	345	8.1%
Child & Family Development	338	7.9%

Note: Ministries in effect at time of appointment.

Looking at the appointment population on a geographic level revealed that nearly half (47%) of the appointments are in Victoria, with the remaining appointments in the Greater Vancouver Regional District (GVRD) and the rest of the province (25% and 28%, respectively). A breakdown of these results can be found in Table 4.

TABLE 4: BROAD GEOGRAPHIES BY NUMBER OF APPOINTMENTS

City	Number of Appointments	Percentage of All Appointments
Victoria	2001	47.0%
GVRD	1072	25.2%
Other	1185	27.8%

The 'Ministry of Forests, Lands and Natural Resources Operations' is the organization with the highest percentage of public service appointments.

'Victoria' continues as having the highest percentage of public service appointments.

Random Selection of Cases

The objective of the Office of the Merit Commissioner's merit performance audit is to randomly sample all permanent new hires and promotions, and temporary appointments greater than seven months, in order to obtain an unbiased picture of the application of the merit principle under the *Public Service Act*. However, while a random sample offers a generally unbiased representation of an overall population, the sample's representativeness for specific groups within the population may be limited due to constraints imposed by the size of the population and the sample. For this reason, the population was stratified prior to sample selection to ensure adequate representation in the final sample. The data stratification process is described later in this report.

The samples for the 2012 audit were selected at three intervals within the 2012 calendar year: appointments that took place between January 1, 2012 to June 30, 2012, and then quarterly (July 1, 2012 to September 30, 2012 and October 1, 2012 to December 31, 2012). Appointments within the Liquor Distribution Branch (LDB) and Forensic Psychiatric and Riverview Hospitals (BC Mental Health and Addiction Services) were sampled twice from their own source data for appointments that took place between January 1, 2012 to June 30, 2012 and July 1, 2012 to December 31, 2012.

In September 2011, the sampling requirements were adjusted to meet the demands of constrained resources in the Office of the Merit Commissioner. The resulting adjusted sampling rate culminated in a 5.6% overall sample rate for the 2011 calendar year. Once the population was known for the first half of the 2012 calendar year, the same overall sampling rate was applied to the first sample (of appointments from January 1, 2012 to June 30, 2012). At that point, the number of appointments for the second half of the year was estimated to be the same as in the first half of the year. However, a strict BC provincial government-wide constraint was imposed on hiring in September 2012; the number of appointments in the second half of the calendar year was significantly less than that in the first half of 2012.

For each sampling window, a cumulative list of appointments made from January 1, 2012 to the date of the pull, was provided to BC Stats. The list was filtered to distinguish appointments that had already appeared in any previous sampling window. In addition to identifying new appointments, the filtering process was also used to identify unique appointments for employees with multiple entries in the cumulative list.

This filtering process provided a final population of appointments from which independent samples could be drawn.

In total, seven samples were drawn for the 2012 audit. A summary of the seven sampling windows and their associated sampling rates are provided in Table 5.

TABLE 5: 2012 SAMPLING AND POPULATION CHARACTERISTICS

Organizations	Sampling Window	Occupation Group	Population	Sample Size	Systematic Sampling Rate	Actual Sampling rate
BC Public Service	Jan 1 – June 30	Admin Staff	519	28	4.7%	5.4%
		Non-Admin Staff	2,143	98	4.7%	4.6%
	July 1 – Sep 30	Admin Staff	300	19	4.7%	6.3%
		Non-Admin Staff	874	37	4.7%	4.2%
	Oct 1 – Dec 31	Admin Staff	59	14	18.8%	23.7%
		Non-Admin Staff	234	41	18.8%	17.5%
Liquor Distribution Branch	Jan 1 – June 30	All Staff	58	7	4.7%	12.1%
	July 1 – Dec 31	All Staff	44	6	4.7%	13.6%
Forensic Psychiatric & Riverview Hospitals	Jan 1 – June 30	All Staff	16	3	4.7%	18.8%
	July 1 – Dec 31	All Staff	11	3	4.7%	27.3%
TOTAL			4,258	256	-	-

Note: The systematic sampling rate represents the initial rate at which sample points were drawn from a sample window. As none of the population sizes were evenly divisible by their respective systematic sample rate, in addition to the influence of random start counts, the actual sampling rates slightly differed from the systematic rates.

Based on the sampling plan summarized in Table 5, a final sample size of 256 appointments was drawn from the total population of 4,258 appointments.

As in previous years, three key categories were selected to stratify the data, based on their relative importance. Using a set of category definitions similar to those used in previous annual audits, the 2012 appointments were stratified by their bargaining unit status and appointment type. Due to the statistical complexities² arising from an overly stratified sample, a previously-used ministry/organization *type* stratum was replaced in favour of a ministry/organization *size* stratum for the 2009 audit. The three categories chosen for 2009, and again in 2010, 2011 and 2012, were defined as follows:

- Ministry/organization size - Smaller than 200 employees, 200 to 499 employees, 500 to 1000 employees, larger than 1000 employees;
- Appointment type - Permanent appointment, temporary appointment of more than seven months, direct appointment; and
- Bargaining unit status – Included, excluded.

A 4x3x2 matrix was built to reflect the number of possibilities in each of the above three categories, providing a total of 24 “cells” into which appointments could be sorted.

In 2012, as in 2011, certain portions of the population were under-sampled so as to better optimize the distribution of the full sample. A post stratification weighting adjustment ensured that any bias introduced by disproportionate sampling was largely minimized in the final population estimates.

Of the 256 randomly-sampled appointments, the Office of the Merit Commissioner identified 28 cases as being out-of-scope, primarily due to coding errors in the source data. These 28 cases were removed from the sample, leaving 228 appointments that were audited.

However, since 28 records represented a significant fraction of the sample size (i.e., 11%), BC Stats used the strata information to estimate back into the original population how many cases would likely be deemed out-of-scope if the entire population of cases had been audited. The statistics presented in the rest of the report are based on this reduced population (228/3,928). In summary, random sampling was used to ensure

As before, public service appointments were stratified by organization size, appointment type, and bargaining unit status.

² The ministry/organization type stratification used prior to the 2009 audit presented two concerns. First, to account for the possibility of organizational restructuring, an ongoing sampling plan stratified by individual organizations was determined to be unfeasible (i.e., samples drawn before and after the restructuring would have limited comparability). Second, as high levels of stratification can lead to inflated standard error estimates, this would be particularly problematic given the low incidence of certain merit findings. With over 30 organizations included in the audit, the resulting number of cells in the stratification plan would likely lead to over-stratification, even for large samples.

broad-based auditing of all appointments. Sampling independently in the above-mentioned categories ensured correct proportional coverage of:

- a range of differently-sized organizations/ministries;
- permanent, temporary and direct appointments; and
- bargaining unit status (included versus excluded) appointments.

As a final note regarding the stratification plan, the calculation of sample weights was not limited to the sample strata, but included information from the differing sample rates for administrative and non-administrative appointments. In total, a set of 44 unique weights were created to adjust for bias in the overall sample.

Distribution of Audits

The following three tables show how the audits are distributed according to various characteristics of appointments. The tables (appointment type, bargaining unit status and ministry/organization size) represent the categories that were used in sample stratifications for earlier iterations of the study. In all cases, percentages were rounded to the first decimal place, and sum to 100%.

The match between the sample percentages and the corresponding percentages among all appointments is close, suggesting that the sample is reasonably representative of the whole. As discussed above, unique weights were created to adjust for bias in the overall sample.

The 2012 audit samples are reasonably representative of the year's population of public service appointments as a whole.

TABLE 6: AUDITS BY APPOINTMENT TYPE

Appointment Type	Adjusted Number of Appointments	Percent of All Appointments	Number of Audits	Percent of All Audits
Direct Appointment	12	0.3%	9	3.9%
Temporary > 7 Months	357	9.1%	36	15.8%
Permanent Hire	3,559	90.6%	183	80.3%

TABLE 7: AUDITS BY BARGAINING UNIT STATUS

Bargaining Unit Status	Adjusted Number of Appointments	Percent of All Appointments	Number of Audits	Percent of All Audits
Excluded	931	23.7%	69	30.3%
Included	2,997	76.3%	159	69.7%

TABLE 8: AUDITS BY ORGANIZATION SIZE

Organization Size	Adjusted Number of Appointments	Percent of All Appointments	Number of Audits	Percent of All Audits
Large	2,982	75.9%	149	65.4%
Small	946	24.1%	79	34.6%

Note: Organization size was based on total regular employment at the start of the study period. In this table, organizations with more than 1,000 employees were deemed large, and organizations with 1,000 employees or less were deemed small (i.e., combines three sizes in the stratum: 500 to 1000 employees; 200 to 499 employees; and fewer than 200 employees).

Uses and Limitations of Audit Results

Sampling is used to control costs and minimize respondent burden. Auditing competition files after the competitions have closed is both expensive and time-consuming. As each file in an audit must be reviewed with the same degree of diligence, there are limited cost savings for conducting a larger sample. The appointments selected for auditing provided a random and representative sample of all appointments that occurred between January 1, 2012 and December 31, 2012 and, as a result, the audit selection was unbiased in regards to the sampling framework.

In terms of year-over-year comparisons, while the number of audits conducted in 2012 (228) was less than in 2009 (302), the number was more than in 2010 (183) which was a result of a shorter timeframe of four months versus a full calendar year, and virtually the same as in 2011 (222). The number of audits conducted in 2012 was a result of constrained resources, a change in sampling requirements in September 2011, and the advent of hiring constraints reducing the number of overall appointments in the final quarter of the calendar year. Results from the 2012 audit continue to offer a high degree of assurance about the application of merit in the appointment process. Given the precision of the estimates, and the representativeness of the sample, a high level of confidence can be placed in the accuracy of the 2012 merit findings.³

A high level of confidence can be placed in the accuracy of the 2012 merit findings.

³ See the Appendix, page 11 of this report, for a summary of the estimated audit findings and their associated confidence intervals.

Appendix: Estimates and Confidence Intervals for 2012 Appointment Audit Data

In order to apply confidence intervals to the estimates for the 2012 Merit Performance Audit, BC Stats employed a methodology that was similar to what was used in the 2010 and 2011 audits. As with the 2010 and 2011 audits, the confidence intervals in 2012 were based on a Poisson distribution, whereas the intervals from previous years employed an F-distribution. While both methods provided accurate estimates, the Poisson offered a greater degree of flexibility, particularly for generating estimates for rare events.

- In order to minimize sample bias and produce the best estimates, the micro data was weighted prior to generating the estimates.
- As the sample size (228) relative to the rate of ‘Merit Not Applied’ findings was so low, a normal approximation to the binomial could not be used. As a result, a more exact calculation was made through a Poisson distribution. This in turn produced asymmetric confidence intervals around the estimates.
- Due to year-over-year changes in sampling strategies (e.g., differing stratification schemes and sampling rates) and adjustments to the audit program, extreme caution should be used when interpreting the cumulative audit results.
- The interpretation of the 95% interval is that there is less than one chance in 20 (less than 5% probability) that the true population percentage lies outside the interval.

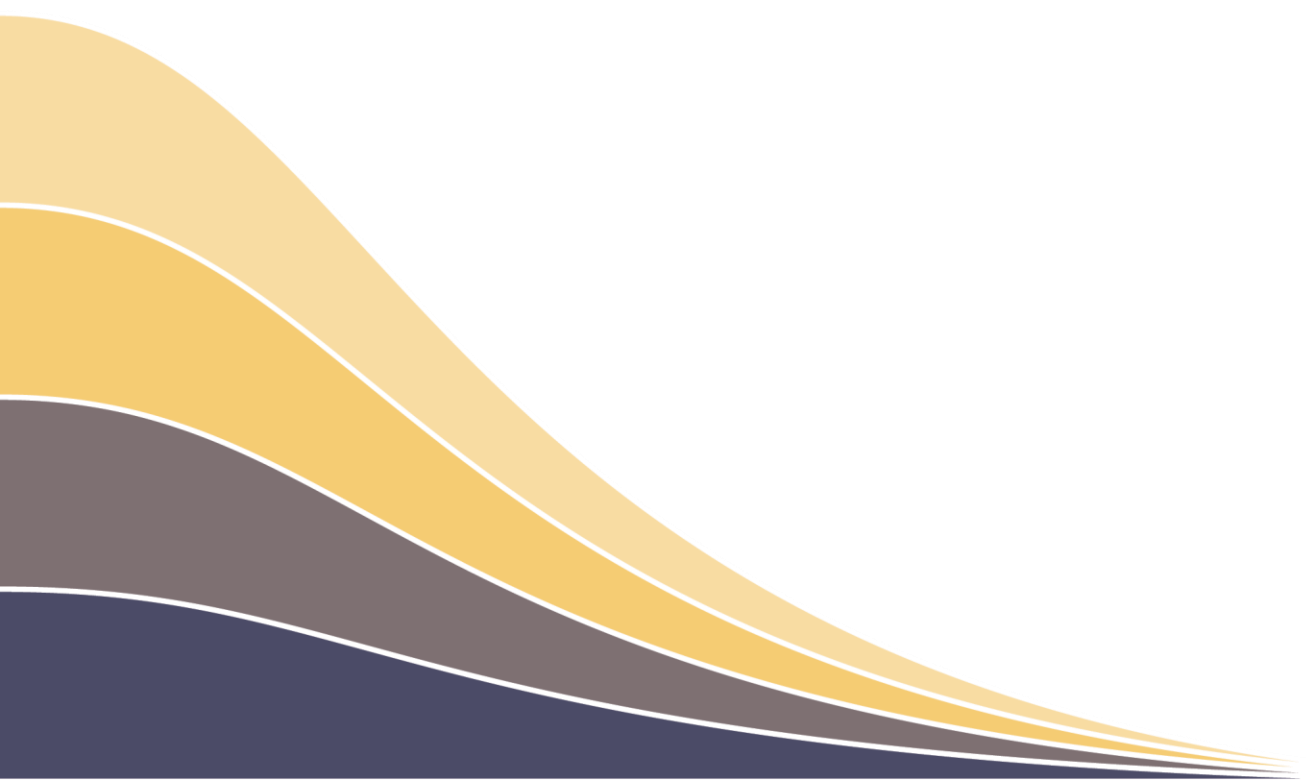
TABLE 9: ESTIMATED AUDIT FINDINGS AND CONFIDENCE INTERVALS

Audit	Audit Finding	Estimate (weighted)	95% Confidence Interval	
			Lower	Upper
All Audits (2001 – 2012)	Merit Not Applied	3.9%	2.9%	4.6%
	Unable to Determine	1.6%	1.1%	2.2%
2012 Audit	Merit Not Applied	5.6%	2.9%	8.9%
	Unable to Determine	2.0%	0.6%	4.2%
	Merit With Exception	37.4%	29.8%	45.6%
	Total	45.0%	36.7%	54.1%

Note: As appointments for the 2010 audit were only drawn from a four month review, rather than the full 2010 calendar year, the 2010 merit results were not incorporated into the cumulative year-over-year results.



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Web: www.bestats.gov.bc.ca
Twitter: @BCStats
Phone: 250-387-0327
Email: BC.Stats@gov.bc.ca

BC Stats
Box 9410 Stn Prov Govt
Victoria, B.C.
V8V 9V1

