

Elections BC 2009 Voters List Quality Measurement Final Report

October 2009



BCStats

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1.0 EXECUTIVE SUMMARY

This report presents the overall findings of the 2009 Voters List Quality Measurement for Elections BC. The purpose of the measurements was to assess the coverage and currency of the B.C. Voters List at four points in time:

- January 13, 2009 (Round 1) - pre-enumeration measurement
- April 6, 2009 (Round 2) - post-enumeration measurement
- April 28, 2009 (Round 3) - measurement following the close of voter registration
- May 12, 2009 (Round 4)- General Voting Day measurement

Voter list currency was estimated through two different processes:

- Through a mail, phone and web survey of voters in January (Round 1) and April 2009 (Round 2).
- By mapping the additions, deletions and changes to the active voter database between April 6 and April 28, 2009 (Round 2 compared to Round 3) and then subsequently between April 28 and May 12, 2009 (Round 3 compared to Round 4).

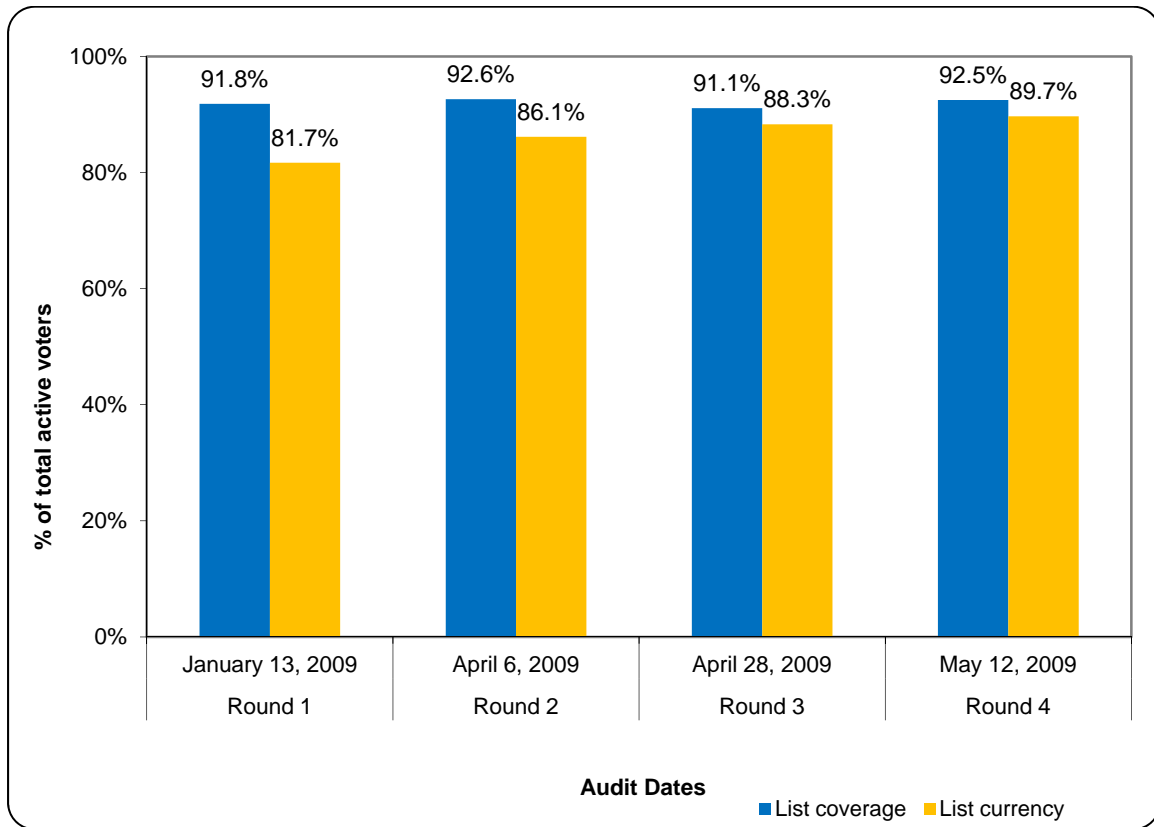
Table 1 and Figure 1 summarize the coverage and currency results of the 2009 Voters List Quality Measurement. From January 13, 2009 to May 12, 2009, coverage increased 0.7 percentage points (ppt) and currency increased 8.0 ppts, representing a percent change of 0.8% and 9.8% respectively.

Table 1. Summary of Coverage and Currency Estimates

Round	Date	Eligible Voter Population	Total Registered Voters	Coverage	Currency
1	January 13, 2009	3,218,480	2,955,853	91.8%	81.7%*
2	April 6, 2009	3,226,440	2,989,006	92.6%	86.1%*
3	April 28, 2009	3,236,176	2,948,175	91.1%	88.3%
4	May 12, 2009	3,238,737	2,995,465	92.5%	89.7%

*Currency values for Round 1 and 2 represent re-based estimates and as a result, differ from the estimates provided in the 2009 Voters List Quality Measurement interim reports.

Figure 1. Currency and Coverage of the B.C. Voters List at Four Points in Time



2.0 INTRODUCTION

This report presents the overall findings of the 2009 Voters List Quality Measurement for Elections BC. The purpose of the measurements was to assess the coverage and currency of the B.C. Voters List at four points in time:

- January 13, 2009 (Round 1) pre-enumeration measurement
- April 6, 2009 (Round 2) post-enumeration measurement
- April 28, 2009 (Round 3) measurement following the close of voter registration
- May 12, 2009 (Round 4) General Voting Day measurement

3.0 RESULTS

3.1. Coverage Estimate

Voter list coverage was calculated at four dates by comparing the population of registered voters in the Elections BC database and the estimated population of eligible B.C. voters as determined by BC Stats' Population Statistics section.

For each round, voter list coverage was estimated as follows:

$$\frac{\text{Registered voters}}{\text{Estimated eligible voters}} = \text{Coverage (\%)}$$

Table 2 summarizes the coverage estimates for each round of the 2009 Voters List Quality Measurement. For a discussion of the methodology used to create the estimate, please refer to the 2009 Voters List Quality Measurement interim reports.¹

Table 2. Summary of Voter List Coverage Estimates

Round	Date	Eligible Voter Population	Total Registered Voters	Coverage
1	January 13, 2009	3,218,480	2,955,853	91.8%
2	April 6, 2009	3,226,440	2,989,006	92.6%
3	April 28, 2009	3,236,176	2,948,175	91.1%
4	May 12, 2009	3,238,737	2,995,465	92.5%

¹ BC Stats (2009). *2009 Pre-Enumeration Voters List Quality Measurement Report prepared for Elections BC*. BC Stats (2009). *2009 Post-Enumeration Voters List Quality Measurement Report prepared for Elections BC*.

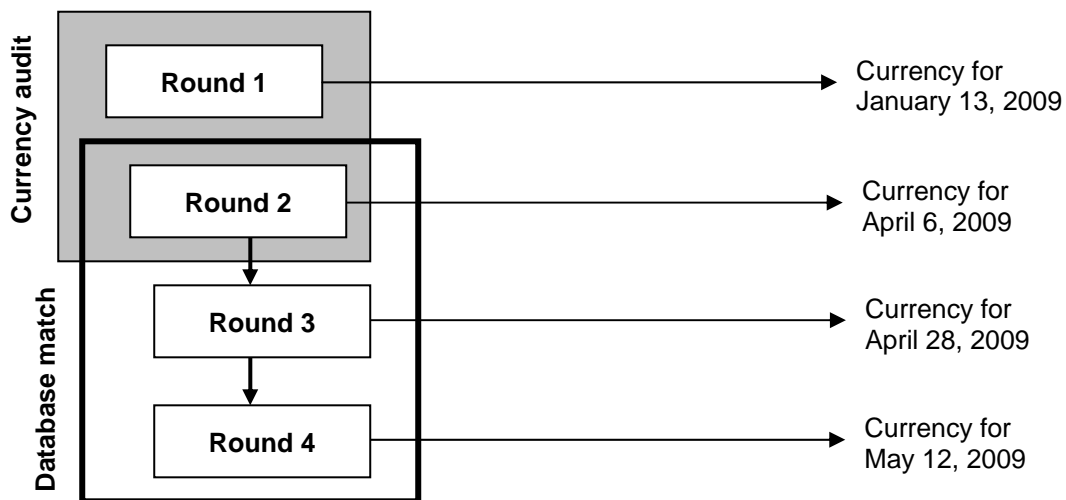
3.2. Currency Estimates

3.2.1. Estimation Methods

Voter list currency was determined using two methods (Figure 2):

1. **Currency audit:** Surveying two samples of voters by mail, phone and web to determine whether the information stored in the Elections BC database was correct at specific reference dates (January 13, 2009 and April 6, 2009). For more information on the audit process, please refer to the 2009 Voters List Quality Measurement interim reports.²
2. **Database match:** Mapping additions, deletions and changes to records in the voter database after the close of voter registration (between April 6 and April 28, 2009) and after new registrants were added to the database on General Voting Day (between April 28 and May 12, 2009). For more information on the database matching process, please refer to Appendix A.

Figure 2. Methods Used to Estimate Currency of Registered Voter List



² BC Stats (2009). *2009 Pre-Enumeration Voters List Quality Measurement Report prepared for Elections BC*. BC Stats (2009). *2009 Post-Enumeration Voters List Quality Measurement Report prepared for Elections BC*.

3.2.2. Adjustment to Currency Estimates

The estimates from the currency audit and database matching process were adjusted by re-basing the currency estimate against the total population of registered voters.³

In the database of registered voters, there were two types of records:

- **Type 1:** Records where there was a known error (i.e., records where the electoral district was incorrect, where the address was known to be incorrect, etc.)
- **Type 2:** Records where the proportion of error was unknown.

The purpose of the audit was to determine the proportion of error within records with unknown error ('how current is the voter list?'). Therefore, the population for the mail/phone surveys was drawn from the Type 2 records.

In the interim reports, the list currency was calculated using the survey population. However, coverage was calculated based on the total number of registered voters, not the survey population. Currency was re-based against the total number of registered voters to accurately represent overall list currency.

The following example uses the 2009 Post-Enumeration Voters List Quality Measurement (Round 2 - April 6, 2009) results:

In Round 2, there were 2,989,006 registered voters. The target survey population for the audit was 2,932,552 (the number of records with unknown error within the population of registered voters).

In Round 2, survey currency was 87.8%. Therefore, 2,574,732 records were current.

$$\begin{array}{rclcl} \text{Survey currency} & \times & \text{Survey population} & = & \text{Current records} \\ 87.8\% & & 2,932,552 & & 2,574,732 \end{array}$$

To calculate overall currency for Round 2, the currency estimate from the audit survey was re-based against all registered voters. The number of current records (calculated above) was divided by the total number of registered voters to determine overall currency (86.1%).

$$\frac{\text{Current records } 2,574,732}{\text{Registered voters } 2,989,006} = \text{Overall currency } 86.1\%$$

³ In 2005, the currency estimates were also adjusted for accuracy (i.e., minor spelling errors in the name or address or incorrect identification information would mean that the record was not completely accurate). Currency has not been adjusted for accuracy in the 2009 estimates because the precision of the survey questions enabled BC Stats to identify accuracy errors in a voter's record, thereby making the accuracy adjustment unnecessary.

Figure 3 provides an overview of the adjustment process using the Round 2 calculations as an example. Please note though, that the size of the “Survey currency” and “Overall currency” columns in Figure 3 are not to scale.

Figure 3. Moving from Audit Currency to Overall Currency in Round 2

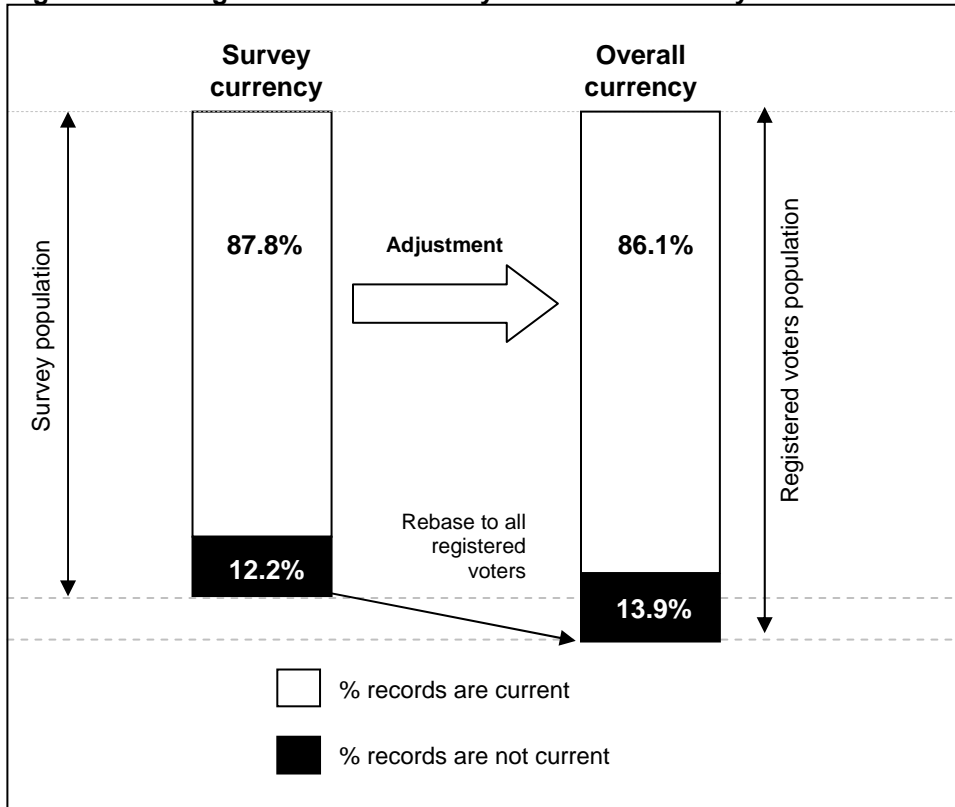


Table 3 presents the final currency estimates for the four rounds by electoral district. Note that the currency estimates by electoral district from Round 2 cascade through the calculations for Round 3 and Round 4. The number of correct records in Round 2 was used as the base during the database matching process to calculate the currency for Round 3. Then the number of correct records for Round 3 was used as a base to calculate the currency for Round 4.

Care should be taken when interpreting the electoral district currency values, as the confidence intervals for all ED's were statistically large (ranging from $\pm 6.2\%$ to $\pm 26.7\%$, 19 times out of 20).

Table 3. Final Currency Estimates for Round 1 to Round 4

Electoral District	Round 1** January 13, 2009	Round 2** April 6, 2009	Round 3 April 28, 2009	Round 4 May 12, 2009
ABM*	81.1%	86.1%	87.2%	88.3%
ABS*	74.9%	83.8%	84.5%	85.8%
ABW*	80.2%	89.2%	90.6%	91.8%
APR*	80.4%	87.5%	88.4%	89.5%
BDS*	79.8%	63.3%	63.9%	65.8%
BND*	73.7%	93.5%	94.6%	95.9%
BNE*	89.8%	86.3%	87.2%	88.6%
BNL*	81.3%	85.0%	85.9%	87.3%
BNN*	89.8%	85.5%	86.6%	87.9%
CBC*	80.6%	74.1%	73.8%	76.1%
CBN*	80.0%	74.4%	75.0%	76.5%
CHC	81.2%	90.9%	92.6%	93.5%
CHH*	81.0%	85.9%	86.9%	88.0%
CLR*	77.0%	75.1%	76.0%	77.2%
CMX*	85.0%	90.2%	91.4%	92.2%
CQB*	87.9%	88.4%	89.3%	90.3%
CQM*	86.4%	87.1%	87.9%	89.0%
CWV	86.7%	96.3%	97.5%	98.4%
DLN*	88.5%	87.7%	88.6%	89.8%
DLS	88.3%	94.3%	95.4%	96.0%
ESR*	83.5%	89.5%	91.3%	93.0%
FLA*	89.5%	86.7%	87.7%	88.8%
FRN*	78.1%	78.4%	78.2%	80.4%
JDF*	85.5%	72.7%	73.7%	75.3%
KAN*	84.7%	80.4%	81.1%	82.5%
KAS*	77.9%	88.4%	90.0%	91.6%
KLA*	83.6%	72.9%	74.4%	75.6%
KMI*	77.4%	82.4%	84.2%	85.4%

Electoral District	Round 1** January 13, 2009	Round 2** April 6, 2009	Round 3 April 28, 2009	Round 4 May 12, 2009
KOE*	79.6%	84.1%	85.7%	86.5%
KOW*	71.2%	82.5%	83.5%	84.6%
LLY*	80.5%	87.4%	88.2%	89.5%
MRM*	84.4%	89.8%	90.4%	91.5%
MRP*	90.6%	85.9%	86.9%	88.0%
NAN*	86.8%	89.8%	91.6%	93.3%
NCW*	78.4%	81.9%	83.0%	84.5%
NEC*	79.2%	82.9%	80.5%	82.0%
NEL*	81.4%	79.2%	80.5%	81.9%
NEW*	78.5%	87.3%	88.6%	90.2%
NOC*	73.4%	84.3%	83.9%	85.4%
NOI*	74.4%	89.0%	89.8%	90.8%
NVL*	90.9%	89.4%	90.8%	92.6%
NVS	85.6%	91.2%	92.6%	93.7%
OBG*	79.9%	86.0%	87.3%	89.6%
PAQ	85.7%	93.4%	95.1%	96.1%
PCN*	57.5%	88.7%	89.4%	90.4%
PCS*	78.7%	86.7%	87.8%	88.8%
PEN*	88.9%	86.0%	87.7%	88.7%
POC	87.3%	94.9%	96.0%	97.0%
POM	85.4%	94.2%	95.3%	96.5%
POR*	74.5%	74.5%	75.2%	76.6%
PRM*	84.2%	87.3%	88.7%	90.3%
PRV*	79.2%	73.4%	74.5%	76.3%
RCC*	79.6%	83.3%	84.1%	84.9%
RCE*	89.5%	90.8%	91.7%	92.5%
RCS	90.2%	94.2%	95.3%	96.0%
SAN*	91.7%	89.5%	91.0%	92.1%
SAS	83.2%	91.1%	92.6%	94.0%
SHU*	76.3%	86.1%	87.2%	88.2%
SKE*	80.2%	75.0%	75.7%	77.0%
SKN*	85.1%	77.1%	76.7%	79.1%
SRC	78.9%	93.0%	93.8%	94.7%
SRF*	84.0%	83.0%	83.5%	84.9%
SRG*	84.0%	88.9%	89.4%	91.2%
SRN	81.2%	93.2%	93.6%	95.2%
SRP	90.2%	97.0%	97.7%	98.9%
SRT*	79.5%	84.4%	85.2%	86.5%
SWH*	76.4%	90.0%	90.7%	92.2%

Electoral District	Round 1**	Round 2**	Round 3	Round 4
	January 13, 2009	April 6, 2009	April 28, 2009	May 12, 2009
SWR*	88.3%	83.7%	85.0%	86.1%
VFA	74.6%	90.7%	91.8%	94.0%
VFC*	73.5%	83.7%	84.5%	86.9%
VFV*	87.6%	85.0%	85.6%	87.0%
VHA*	79.9%	88.7%	90.1%	92.1%
VKE	84.4%	96.2%	97.3%	99.0%
VKI*	86.8%	89.2%	89.8%	91.4%
VLA*	84.3%	95.2%	96.3%	97.6%
VMP*	76.7%	74.1%	75.3%	78.3%
VNP*	75.0%	83.0%	84.7%	87.3%
VNQ	82.0%	91.4%	93.1%	94.5%
VNW*	74.0%	83.6%	84.9%	87.3%
VRM*	87.8%	92.3%	93.7%	94.6%
VTB*	76.4%	81.0%	82.8%	85.5%
VTS*	84.8%	91.8%	93.2%	95.5%
WCA*	86.9%	86.4%	87.6%	88.7%
WSS*	73.1%	82.7%	84.0%	85.5%
WTK*	71.3%	81.4%	83.3%	84.5%
Total	81.7%	86.1%	88.3%	89.7%

**Currency values for Round 1 and 2 represent re-based estimates and as a result, differ from the estimates provided in the 2009 Voters List Quality Measurement interim reports.

* Indicates EDs with 2009 VLQM Post-Enumeration Survey confidence intervals greater than $\pm 10\%$ (19 times out of 20).

4.0 APPENDIX: DATABASE MATCHING PROCESS

During the lead up to the May 12, 2009 provincial election, voters were asked to register and update their address with Elections BC. On April 21, 2009, voter registration closed to allow Elections BC to prepare the voter lists and materials required at voting stations on General Voting Day (May 12, 2009).

To determine the currency of the voter list on the close of registrations, records in the April 6 database and the April 28 database (records processed following the close of registration) were matched to determine the number of:

- New records added to the active voter list
- Net changes to existing records on the active voter list (where voters updated their addresses between electoral districts⁴)
- Records removed from the active voter list

To calculate currency on April 28, the calculation used the net current for Round 2 to estimate the number of correct records on April 6 for each electoral district. The currency of the April 28 voter list was calculated as follows:

For each electoral district,

$$\frac{\begin{array}{l} \text{Number of correct records on **April 6**} \\ + \text{new records added to the voter list} \\ + \text{net changes (add to ED - delete from ED)} \end{array}}{\text{Total registered voters on **April 28**}} = \% \text{ current on **April 28**}$$

This process was repeated to determine the currency of the voters list on May 12, 2009 (General Voting Day). Using the proportion of correct records in the April 28 database, the currency for May 12 was calculated as follows:

For each electoral district,

$$\frac{\begin{array}{l} \text{Number of correct records on **April 28**} \\ + \text{new records added to the voter list} \\ + \text{net changes (add to ED - delete from ED)} \end{array}}{\text{Total registered voters on **May 12**}} = \% \text{ current on **May 12**}$$

⁴ Address changes or updates within an electoral district were not considered in this analysis.

4.1.1. *Limitations and Bias*

As both the pre- and post-enumeration's currency estimates were generated at the electoral district (ED) level, the resulting confidence intervals and standard errors were also constrained to the province's 85 EDs. As a result, the small ED-level sample sizes led to relatively large confidence intervals, which in turn made any sub-ED level analysis statistically problematic. For this reason, "within ED" address changes or updates were not incorporated into the database matching process. While this decision was statistically sound, it likely led to a moderate biasing of the ED-level currency estimates, which in turn may have influenced the provincial measure.

However, the impact of "within ED" address changes to the overall ED level currency measures would likely have been small. The reason for this is that the post-enumeration currency estimates provided the largest contribution to the extrapolated April 28, 2009 and May 12, 2009 estimates. As any address changes and updates that were recorded between April 6, 2009 and May 12, 2009 were not randomly sampled during the database match, they were assumed to be sampled with certainty. In other words, where as a sample point from the post-enumeration survey may have represented anywhere from 387 to 1799 people within an ED's population, voters who updated their information between April 6, 2009 and May 12, 2009 would have only represented themselves in the adjusted currency estimates.

While the exclusion of "within ED" migration may have affected the adjusted currency measures, the inclusion of "between ED" migration introduced a separate set of biases into the adjusted estimates. Much like the within ED address changes, the extent of bias associated with "between ED" migration is unclear, but in all likelihood, relatively minimal. As such, the adjusted ED level currency estimates still offer useful (albeit rough) indicators of how many voters within each ED have voter registrations that are current to a particular riding.

Despite its limitations, the adjustment methodology provides estimates that are reasonably accurate at the ED level, while offering a precise measure of currency for the entire province. As a similar matching process was used for the 2005 Voters List Quality Audit, comparisons between elections cycles are also possible.

While the scope of 2009 Voters List Quality Measurement's final adjustment was limited to a "between ED" migration analysis, it is possible to develop a more detailed estimation methodology for future quality measurements. In addition to incorporating "within ED" level changes, methods for correcting estimation bias and generating sub-ED level measurements are avenues for future research. In order to implement these forms of analysis, it would likely be necessary to develop a functional model of currency for the province based on a combination of survey results and administrative data. This could then be used to both provide more detailed measurements of the 2009 election cycle, as well as estimates for the years leading up to and including the 2013 provincial election.

