Elections BC

VLQA 2004/05
April 2005 Results

April 2005
(Updated August 2005)

BRITISH COLUMBIA

BC STATS

EXECUTIVE SUMMARY

This report presents the findings of the third launch of the Voters List Quality Audit for Elections BC. The purpose of the audit was to assess the coverage and currency of the BC Voters List.

The coverage rate was 89.8%

The coverage estimate was conducted using April 14th, 2005 as the demarcation date. The coverage rate of 89.8% was calculated by comparing the number of registered voters to the estimated population of eligible voters.

The final currency rate, with imputation of non-responses, was 72.2% (±2.0%)

Using the multiple imputation statistical approach, responses were imputed for each of the non-responses, providing a higher level of certainty about their disposition. The findings from the imputation, taken together with the confirmed responses, provided a currency rate of 72.2% (±2.0%, 19 times out of 20). This rate is higher than the currency rates generated from the previous two rounds of the audit.

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INTRODUCTION

This report presents the findings of the third launch of the Voters List Quality Audit conducted by BC STATS on behalf of Elections BC. The purpose of the audit was to assess the coverage and currency of the BC Voters List.

For the currency audit, two survey instruments were designed to solicit responses from a sample of individuals on the voters list: a telephone survey and a mail survey.   Both surveys asked respondents to verify their vital details in the BC Voters List – specifically, name, address, date of birth and citizenship.   The currency audit was conducted over the period of April 19th to May 3rd, 2005.

Report Outline

The remainder of this report includes the following sections:

- RESULTS: findings from the currency audit and coverage estimate calculation.

- APPENDIX I: methodology used to create the coverage estimate.

- APPENDIX II: details regarding the design of the surveys, the sample selection and size for each survey, the administration of the surveys and the decision rules used in data collection and analysis.

- APPENDIX III: the imputation process used for the currency audit.

- APPENDIX IV: a copy of the telephone survey script.

- APPENDIX V: a copy of the mail survey form.

RESULTS

COVERAGE ESTIMATE

The coverage estimate was conducted using April 14th, 2005 as the demarcation date. The population of registered voters in the Elections BC database as of this date was compared to the estimated population of eligible BC voters as determined by BC STATS Population Statistics section. For a discussion of the methodology used to create the estimate, please see Appendix I.

The population of registered voters was: 2,752,062

The estimated population of eligible voters was: 3,048,295[1]

The calculation of coverage is:

$$\frac{\text{Registered Voters}}{\text{Estimated Eligible Voters}} \quad = \quad \text{Coverage (\%)}$$

$$\frac{2,752,062}{3,048,295} \quad = \quad \textbf{90.282\%}$$

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[1] This population differs from that used in the currency estimate as it represents all registered voters, while the population for the currency estimate contains only those registered voters who are allocated to a specific electoral district.

CURRENCY AUDIT

There are 1702 confirmed responses out of the sample of 1996, giving a confirmed response rate of 85.3%.

Confirmed Findings

There were two sets of findings: confirmed findings and imputed response findings. The confirmed findings represent only the data which were collected by BC STATS. As shown in Table 1 below, 75.1% of the confirmed responses indicated that the BC Voters List record was correct.

Table 1: Confirmed Response Rates

Response	Detail	N[2]	% of Confirmed Responses	Total %
YES, my record is correct	Confirmed Yes (Mail)	292	17.2%	**75.1%**
	Confirmed Yes (Phone)	987	58.0%	
NO, my record is not correct	Confirmed No (Mail)	96	5.6%	**24.9%**
	Confirmed No (Phone)	327	19.2%	

Imputed Responses Findings

The imputed response findings represent the statistical analysis of the non-responses in combination with the confirmed findings. Two approaches were used to analyze the non-responses. The "worst-case" scenario was created by assuming that every non-response was equivalent to a "No, my record is not correct." Using this approach, the currency rate was calculated at 64.1% (±2.2%, 19 times out of 20).

A multiple imputation approach was also employed to analyze the non-responses. This approach assumes that the missing data are missing at random and are predictable from other variables in the dataset. Using the multiple imputation approach, the final currency rate was calculated at 72.2% (±2.0%, 19 times out of 20). As shown in Table 2, this rate has increased, in comparison to the rates generated from the last two rounds.

Table 2: Percentage of Correct, Incorrect, and Unconfirmed Responses over the Last Three Audits

Audit	"Worst Care" Scenario			Imputed	N
	Yes	No	Unconfirmed	Yes	
September 2004	60.0%	21.2%	18.8%	70.8%	2,000
November 2004	57.4%	25.1%	17.5%	67.1%	4,000
April 2004	64.1%	22.0%	13.9%	72.2%	1,996

For more on the imputation and statistical analysis, refer to Appendix III.

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[2] N = number of confirmed responses.

APPENDIX I: ESTIMATING ELIGIBLE VOTER POPULATION

There are four steps to estimating the number of eligible voters in British Columbia.

Step 1: Estimating Total Population

Statistics Canada produces estimates of the total population for Canada and the Provinces. The reference date for these estimates is the first day of each month and are produced using a component model with the 2001 Census adjusted for net census undercount forming the base. The population counts are released by Statistics Canada quarterly, approximately 3 months after the end of each quarter.

If available, the total population estimated by Statistics Canada is used. However, if the reference date for the eligible voter calculation is outside the published range of Statistics Canada, a forecast of the total provincial population is prepared by BC STATS using a standard component cohort-survival model. As the dates from the model will not match the voting dates, an interpolation between the closest estimated/forecasted quarterly data is performed to produce a total population count for the voting date.

Step 2: Removing the Population aged 0 to 17

Age specific estimates of the provincial population are prepared by Statistics Canada each year with a reference date of July 1. The proportion of the British Columbia population aged 18 and over from the latest Statistics Canada estimate is applied to the total population in Step 1 to produce an estimate of the population 18 years of age and over.

Step 3: Removing Persons in BC Less than 6 Months

An estimate of inter-provincial in-migrants aged 18 years and older for a six month period prior to the reference date is removed from the population estimated in Step 2. The estimate of inter-provincial in-migrants is taken either from Statistics Canada's most recent quarterly estimates, or if the reference period is outside the range published by Statistics Canada, the most recent estimate or forecast of quarterly inter-provincial in-migration prepared by BC STATS.

Step 4: Removing Non Canadian Citizens

To take in to account the resident British Columbia population who are not Canadian citizens the following three components are removed from the population estimated in Step 3.

    a. The 18 and over immigrant population that were counted in the 2001 Census, had arrived in Canada prior to 1991 and are not citizens, is subtracted from

the population estimated in Step 3. It is assumed that immigrants in Canada for more that 10 years who have not become a Canadian citizen will likely never become a citizen of Canada.

b. The immigrant population from the last five years who would be 18 or over as of the reference date are subtracted from the population estimated in Step 3.[3] Given that residency requirements and processing time for citizenship takes a minimum of approximately 4 ½ years, it was considered reasonable to reduce the eligible estimate by the immigrant population for at least that period of time.

c. Non-permanent Residents aged 18 years and over (i.e. persons in BC on a Student Visa, Work or Ministerial Permit, or are Refugee Claimants), are removed from the population estimated in Step 3. As the number of Non-permanent Residents in BC has been relatively stable for the past year, the most recent estimate published by Statistics Canada is used. The population derived in Step 4 is taken as the number of eligible voters as of the reference date.

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[3] The immigrant population for the last five years is based on actual immigrant landings (not census). [Sources: Statistics Canada (quarterly components of population change) and Citizenship and Immigration Canada (personal communication)]

APPENDIX II: CURRENCY AUDIT – METHODOLOGY

SURVEY DESIGN

Data were collected by either a telephone survey or a mail survey (see Appendix II and III). Both surveys asked respondents to confirm the correctness of five details, as stated in the BC Voters List:

- Name
- Date of Birth (DOB)
- Citizenship
- Mailing address
- Residential address

The phone survey allowed respondents to state yes or no to each of the above-mentioned details. Whereas, the mail survey form allowed only the following responses to the correctness of the entire record (i.e. all five details):

- Yes, my record is correct
- No, my record is **not** correct

SAMPLE & SURVEY ADMINISTRATION

Sample selection was done by a random selection stratified by electoral district in order to facilitate statistical analysis. The sample of 2000 voters was drawn from an extract of the EBC Voters List. Four records were later removed from the sample because they duplicate records (4 records). Subsequently, the sample size for this audit was 1996. Sixteen records that had a date of birth as 18000101 were not used in the survey; rather, they were considered as incorrect records for the purposes of estimating the rate of currency.

If no telephone number was easily attributed to the address, then the respondent was sent a survey form letter by Canada Post Xpresspost™ mail. In total 480 letters were mailed.[4] Respondents were asked to return their completed form by April 27th, 2005. Responses (including undeliverable returns) were recorded until May 3rd, 2005.
It is important to note that the methodology for this audit contrasts with that of the second audit, conducted in November 2004.

If there was a sourceable telephone number for the respondent's address, the respondent was contacted by telephone. From April 19th to May 3rd, 2005, attempts were made to contact 1503 individuals.

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[4] Three (3) of the records among the mail survey frame were later discovered to contain a date of birth as 18000101. These records, as well as 13 records among the telephone survey frame, were removed from the sample frame.

For the second audit, respondents who had a sourceable telephone number were sent a survey by regular mail. Respondents, who did not return their completed mail forms by a certain date, were contacted by telephone to verify their vital details. If no telephone number was easily attributed to the address, then they were sent a survey form by Canada Post Xpresspost mail.

DECISION RULES

There were several decision rules in place to guide the data collection and analysis.

1. The primary analysis would be data completed by the respondent, but proxies would be allowed, in a few cases:

    a. *Phone proxies:* due to the timelines, if information could be gathered from other sources (e.g. family member), then that information would be collected and recorded as a confirmed response.

    b. *Canada Post Xpresspost™ mail proxies:* As a signature was required for authentication purposes and to track delivery of the letters, the signature was considered a proxy in either one of two ways:
    - If the signature looked like either the name of the addressee or the name of a person with the same last name of the addressee (e.g. a relative), then it was considered as a proxy for a correct address and name. While the correct spelling of the person's name, his or her date of birth and citizenship could not be confirmed, the percentage of these types of proxies accounts for less than 3% of the records.
    - If the signature did **not** look like the name of the addressee nor a person with the same last name of the addressee, then it was considered as an incorrect proxy.

    These proxies only applied to cases where no response was received from the addressee prior to the May 3rd cut-off date.

    c. *Mail undeliverable proxies:* if the mail was undeliverable as determined by Canada Post, the returns were considered either as an incorrect proxy or unconfirmed, depending on the reason that the letter was not successfully delivered:
    - The following tracking details were considered as an incorrect proxy: no such address; address incomplete; moved/unknown; no such post office; and item was redirected to receiver's new address.
    - Records were considered as unconfirmed, if the mail tracking details stated unclaimed; attempted delivery but no pick up; item was picked

up but without a recorded signature; item not in Canada Post possession but without a recorded signature; and, item refused by addressee.

2. Partial data may be analyzed for correctness of vital information. Such data were collected from secondary sources during the telephone data collection, including: acknowledgement from other residents that there is someone of that name living at that address; answering machine messages using the respondent's name, etc.

    Although there were no places on the mail forms for respondents to correct the information, some respondents did, and so where available, a differentiation was made between corrections made to the name/address or citizenship.

SECOND DRAFT

**PRELIMINARY FINDINGS OF
THE THIRD BC VOTERS LIST QUALITY AUDIT**[*]

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PRELIMINARY FINDINGS OF
THE THIRD BC VOTERS LIST QUALITY AUDIT

Introduction

The 2004-05 British Columbia Voters List Quality Audit (VLQA) was designed to evaluate the quality of the provincial voters list. The project was funded by Elections British Columbia (EBC), and BC STATS conducted the audit. The project consisted of three independent surveys conducted between September 2004 and April 2005. In each of the surveys, selected voters were asked to verify whether their information on the voters list is correct and current. The rate of currency is defined as the percent of correct and current information for a given provincial electoral district (PED) or the province as a whole. The third audit was conducted in April 2005, which included a provincial random sample of 2,000 respondents.

The objective of this paper is to report the preliminary findings for the third audit. The reminder of the report is divided into four sections: 1) sample design, 2) missing data, 3) findings, and 4) summary.

Sample Design

The target population for the VLQA included all BC eligible electors who appear on the EBC voters list, which is termed *sampling frame* in the statistical literature. The sampling frame for the third audit contained a total of 79 PEDs and 2,667,593 BC electors (see Table 1).[5]

In order to provide PED-level estimates, the sampling frame is divided into 79 sub-frames or strata (PEDs), from which independent and systemic samples are selected. This sampling method is called *stratified sampling*. Because sampling elements (voters) tend to be more homogenous within strata than across strata, stratified sampling can produce a smaller bound in the error of estimation than other sampling strategies (Cochran, 1977). As a result, stratified sampling requires a smaller sample size to obtain estimates with the same level of precision as other sampling designs (e.g., simple random sampling). Using stratified sampling design, 2,000 voters were initially selected from the sampling frame. After removing duplications and ineligible voters (4 cases), the final study sample includes 1,996 eligible voters. The distribution of the sample allocation is shown in Table 1 (see Wu, 2004 for details).

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[5] This number is less than the complete voters list, as it only includes those who had an attributable PED.

Table 1. Proportion of Correct, Incorrect, and Unconfirmed Cases by Electoral District: Voters List Quality Audit 3, April 2005

No. (1)	Provincial Electoral District (2)	PED (3)	Population[a] (4)	n[b] (5)	Yes (%)[c] (6)	No (%)[d] (7)	Uncfm (%)[d] (8)
1	Abbotsford-Clayburn	ABC	29,962	22	50.00	27.27	22.73
2	Abbotsford-Mount Lehman	ABM	32,552	24	58.33	20.83	20.83
3	Alberni-Qualicumt	ALQ	36,533	27	70.37	18.52	11.11
4	Bulkley Valley-Stikine	BLS	16,210	12	41.67	33.33	25.00
5	Burnaby-Edmonds	BNE	36,016	27	55.56	25.93	18.52
6	Burnaby North	BNN	36,449	27	59.26	29.63	11.11
7	Burnaby-Willingdon	BNW	33,122	25	52.00	28.00	20.00
8	Burquitlam	BUR	34,113	26	57.69	26.92	15.38
9	Cariboo North	CBN	22,591	17	58.82	29.41	11.76
10	Cariboo South	CBS	21,004	16	56.25	43.75	0.00
11	Chilliwack-Kent	CHK	32,504	24	66.67	33.33	0.00
12	Chilliwack-Sumas	CHS	33,355	25	76.00	20.00	4.00
13	Columbia River-Revelstoke	CLR	21,474	16	81.25	18.75	0.00
14	Comox Valley	CMX	42,393	32	68.75	21.88	9.38
15	Coquitlam-Maillardville	CQM	33,642	25	64.00	32.00	4.00
16	Cowichan-Ladysmith	CWL	36,399	27	74.07	14.81	11.11
17	Delta North	DLN	32,808	25	76.00	16.00	8.00
18	Delta South	DLS	33,280	24	66.67	25.00	8.33
19	East Kootenay	EKT	26,240	19	78.95	10.53	10.53
20	Esquimalt-Metchosin	ESM	35,708	27	62.96	29.63	7.41
21	Fort Langley-Aldergrove	FLA	38,494	29	62.07	10.34	27.59
22	Kamloops	KAM	36,113	27	70.37	22.22	7.41
23	Kamloops-North Thompson	KAT	33,162	24	70.83	25.00	4.17
24	Kelowna-Lake Country	KLL	42,776	32	78.13	15.63	6.25
25	Kelowna-Mission	KLM	43,200	32	46.88	34.38	18.75
26	Langley	LLY	38,291	29	65.52	13.79	20.69
27	Malahat-Juan de Fuca	MJF	36,502	27	77.78	18.52	3.70
28	Maple Ridge-Mission	MRM	41,097	31	64.52	19.35	16.13
29	Maple Ridge-Pitt Meadows	MRP	37,920	28	67.86	21.43	10.71
30	Nanaimo	NAN	38,302	29	62.07	17.24	20.69
31	Nanaimo-Parksville	NAP	44,113	33	66.67	21.21	12.12
32	Nelson-Creston	NEL	29,675	22	68.18	18.18	13.64
33	New Westminster	NEW	37,835	28	57.14	17.86	25.00
34	North Coast	NOC	16,027	12	66.67	25.00	8.33
35	North Island	NOI	35,380	27	66.67	25.93	7.41
36	North Vancouver-Lonsdale	NVL	29,891	22	59.09	40.91	0.00
37	North Vancouver-Seymour	NVS	30,531	23	86.96	13.04	0.00
38	Oak Bay-Gordon Head	OBG	36,925	27	66.67	33.33	0.00
39	Okanagan-Vernon	OKV	42,251	32	75.00	18.75	6.25
40	Okanagan-Westside	OKW	34,793	27	81.48	11.11	7.41
41	Peace River North	PCN	17,843	13	76.92	15.38	7.69
42	Peace River South	PCS	15,632	12	83.33	8.33	8.33
43	Penticton-Okanagan Valley	PEN	40,915	31	80.65	6.45	12.90
44	Port Coquitlam-Burke Mountain	PKM	36,446	27	48.15	14.81	37.04
45	Port Moody-Westwood	PMW	41,323	31	64.52	19.35	16.13
46	Powell River-Sunshine Coast	POR	32,808	25	80.00	16.00	4.00

Table 1 Continued

No. (1)	Proviincial Electoral District (2)	PED (3)	Population[a] (4)	n[b] (5)	Yes (%)[c] (6)	No (%)[d] (7)	Uncfm (%)[d] (8)
47	Prince George-Mount Robson	PRM	23,560	18	50.00	38.89	11.11
48	Prince George North	PRN	23,842	18	66.67	16.67	16.67
49	Prince George-Omineca	PRO	24,041	18	44.44	44.44	11.11
50	Richmond Centre	RCC	36,264	27	62.96	25.93	11.11
51	Richmond East	RCE	36,971	28	46.43	21.43	32.14
52	Richmond-Steveston	RCS	37,591	28	46.43	21.43	32.14
53	Saanich North and the Islands	SAN	41,130	31	87.10	3.23	9.68
54	Saanich South	SAS	37,461	28	71.43	14.29	14.29
55	Shuswap	SHU	34,238	26	65.38	19.23	15.38
56	Skeena	SKN	19,152	14	71.43	14.29	14.29
57	Surrey-Cloverdale	SRC	38,824	29	72.41	20.69	6.90
58	Surrey-Green Timbers	SRG	30,075	23	69.57	4.35	26.09
59	Surrey-Newton	SRN	28,768	22	54.55	31.82	13.64
60	Surrey-Panorama Ridge	SRP	33,433	25	56.00	28.00	16.00
61	Surrey-Tynehead	SRT	37,820	28	64.29	25.00	10.71
62	Surrey-Whalley	SWH	28,004	21	61.90	14.29	23.81
63	Surrey-White Rock	SWR	40,603	30	83.33	10.00	6.67
64	Vancouver-Burrard	VBU	51,056	39	46.15	28.21	25.64
65	Vancouver-Fairview	VFA	43,305	31	58.06	29.03	12.90
66	Vancouver-Fraserview	VFV	33,985	25	64.00	24.00	12.00
67	Vancouver-Hastings	VHA	36,221	27	55.56	25.93	18.52
68	Vancouver-Kensington	VKE	34,355	25	44.00	28.00	28.00
69	Vancouver-Kingsway	VKI	34,546	26	57.69	19.23	23.08
70	Vancouver-Langara	VLA	34,988	26	50.00	38.46	11.54
71	Vancouver-Mount Pleasant	VMP	36,024	27	40.74	22.22	37.04
72	Vancouver-Point Grey	VPG	41,864	32	50.00	28.13	21.88
73	Vancouver-Quilchena	VQL	38,183	29	62.07	17.24	20.69
74	Victoria-Beacon Hill	VTB	41,451	31	61.29	29.03	9.68
75	Victoria-Hillside	VTH	36,952	28	75.00	14.29	10.71
76	West Kootenay-Boundary	WKB	30,140	23	73.91	26.09	0.00
77	West Vancouver-Capilano	WVC	30,292	23	65.22	21.74	13.04
78	West Vancouver-Garibaldi	WVG	35,290	26	69.23	11.54	19.23
79	Yale-Lillooet	YAL	22,564	17	47.06	35.29	17.65
	Total		2,667,593	1,996	64.1%	22.0%	13.9%

[a] Estimated population of eligible voters (with an attributable PED) in British Columbia.
[b] Optimal sample allocation.
[c] Weighted percent of correct cases including the cases based on proxy response.
[d] Weighted percent of incorrect cases.
[e] Weighted percent of unconfirmed cases.

Missing Data

In virtually all large-scale surveys, there are cases where respondents could not be located, refused (or were unable) to participate, or dropped out before the interview was completed. Cases that are missing for these or other similar reasons are known as *unit nonresponses*. However, sometimes respondents who cooperate for much of a

survey may refuse (or be unable) to answer some particular questions. Cases where only partial information is available are called *item nonresponses* (Maxim, 1999). Because the provincial voters database contains several pieces of information about each voter in the database (e.g., name, gender, age, address, etc.), potential missing cases in the VLQA would fall under the category of *item nonresponses*.

To handle missing data (unconfirmed voters) in the audit, multiple imputation (MI) techniques were employed (Rubin, 1987). The MI method assumes that missing data are *missing at random* (MAR), which means that, although incomplete data may be different from those with complete data (not *missing at complete random*), the pattern of missing data are predictable from other variables in the dataset. For example, in the 2003 Audit, we found that the likelihood of nonresponse is related to age and place of residence (PED). In addition to the MAR assumption, MI also assumes a multivariate normal distribution for the data (the incomplete and complete data).

The basic idea of MI is simple. Unlike single (deterministic) imputation methods, such as the "hot-deck" method, which imputes a single value for each missing value, MI replaces each missing value with a set of m values (a random sample of missing values), which represent the uncertainty about the correct value to impute (Rubin, 1987).

There are three distinct steps in this process of imputation.

1) The imputation process is repeated m times to generate m complete datasets.
2) The m datasets are analyzed using conventional statistical tools.
3) The results from the m datasets are combined into a summary set of findings.

Although it is time-intensive to impute m data matrices, in most cases, as few as 3-5 imputations are adequate (Rubin, 1996). The method is also well understood and fairly robust to violations of normality of the data used in the imputation (Schafer, 1997).

In this round of audit, 5 data matrices were computed, using six selected variables (including the target variable), which are correlated with the rate of currency. These variables are: age, gender, driver license, residing in a multi-unit complex, social insurance number, and currency. With the exception of age, they are all coded as dichotomous variables with 1 = male or yes, 0 = otherwise. The means of the (five) estimates were computed and their standard errors were estimated. The data were analyzed using the MI procedure in SAS 8.2.

Findings

Table 1 presents the weighted distribution of correct (confirmed) voters' information (column 6), incorrect information (column 7), and unconfirmed voters (missing data, column 8) by electoral district. The "correct" category also includes the cases that were confirmed through proxy response. The rate of currency and the rate of unconfirmed

voters vary widely across the electoral districts. Indeed, the currency rate ranges from as low as 41% in Vancouver-Mount Pleasant to as high as 87% in North Vancouver-Seymour, and in Saanich North and the Islands. The rate of unconfirmed voters also ranges from 0 in seven PEDs (e.g., Cariboo South and Chilliwack-Kent) to 37% in Vancouver-Mount Pleasant. Overall, the rate of currency is 64.1%, the rate of incorrect information is 21.0%, and the rate of unconfirmed voters is 13.9%. The comparable figures for the first audit are 60%, 21.2%, and 18.8%, and 57.4%, 25.1%, and 17.5% for the second audit (see Table 2).

Table 2. Percentage of Correct, Incorrect, and Unconfirmed Cases: Voters List Quality Audits 1 - 3, September 2004 - April 2005

		Currency			
Audit	Yes	No	Unconfirmed	Yes (with impuation)	N
One	60.0%	21.2%	18.8%	70.8%	2,000
Two	57.4%	25.1%	17.5%	67.1%	4,000
Three	64.1%	22.0%	13.9%	72.2%	1,996

Table 3 presents the proportion of weighted currency rate (column 3), and revised rate after imputation (column 7). Standard errors for these estimates and the 95% confidence intervals are also presented. At the provincial level, the overall rate is 64.1% with a margin of error of 2.2% (0.011 × 1.96), 19 out of 20 times. This figure represents the "worse case" scenario, that is, all unconfirmed cases are treated as having incorrect voters' information. This is, of course, unrealistic.

Using the MI method, the missing data were computed with the means of the MI estimates (see column 7). As expected, at the provincial level, the overall rate of currency increases to 72.2% with a margin of error of 2%, 19 out of 20 times. In other words, the true percent of currency falls between 70.2% and 74.2% (19 out of 20 times). At the electoral district level, except for the PEDs where the rate of unconfirmed votes is 0, the rate has increased in all PEDs. Because of small samples at the district level, standard errors tend to be large, and confidence intervals wider. Hence, caution must be exercised in interpreting these findings. Overall, the figures after imputation represent arguably the "best case" scenario. The reason is that there is likely a selection bias, that is, missing cases are more likely to fall under the "no" category than the "yes" category, and the bias may not be entirely accounted for by the variables used in the MI procedure.

Table 3. Proportion of Confirmed Respondents by Electoral District: Voters List Quality Audit 3, April 2005

No.	PED	p1[a]	S.E.	95% CI		p2[b]	S.E.	95% CI	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	ABC	0.500	0.109	0.714	0.714	0.638	0.105	0.433	0.844
2	ABM	0.583	0.103	0.785	0.785	0.714	0.094	0.529	0.898
3	ALQ	0.704	0.090	0.879	0.879	0.776	0.082	0.616	0.936
4	BLS	0.417	0.149	0.708	0.708	0.547	0.150	0.253	0.841
5	BNE	0.556	0.097	0.746	0.746	0.660	0.093	0.478	0.842
6	BNN	0.593	0.096	0.781	0.781	0.646	0.094	0.462	0.829
7	BNW	0.520	0.102	0.720	0.720	0.623	0.099	0.429	0.816
8	BUR	0.577	0.099	0.771	0.771	0.677	0.093	0.494	0.860
9	CBN	0.588	0.123	0.829	0.829	0.658	0.119	0.425	0.890
10	CBS	0.563	0.128	0.813	0.813	0.563	0.128	0.312	0.813
11	CHK	0.667	0.098	0.859	0.859	0.667	0.098	0.474	0.859
12	CHS	0.760	0.087	0.931	0.931	0.786	0.084	0.623	0.950
13	CLR	0.813	0.101	1.000	1.010	0.813	0.101	0.615	1.000
14	CMX	0.688	0.083	0.851	0.851	0.741	0.079	0.587	0.896
15	CQM	0.640	0.098	0.832	0.832	0.669	0.096	0.481	0.858
16	CWL	0.741	0.086	0.909	0.909	0.797	0.079	0.642	0.952
17	DLN	0.760	0.087	0.931	0.931	0.813	0.080	0.657	0.969
18	DLS	0.667	0.098	0.859	0.859	0.706	0.095	0.520	0.892
19	EKT	0.789	0.096	0.978	0.978	0.855	0.083	0.692	1.000
20	ESM	0.630	0.095	0.815	0.815	0.672	0.092	0.492	0.852
21	FLA	0.621	0.092	0.800	0.800	0.769	0.080	0.612	0.925
22	KAM	0.704	0.090	0.879	0.879	0.744	0.086	0.576	0.911
23	KAT	0.708	0.095	0.894	0.894	0.737	0.092	0.557	0.917
24	KLL	0.781	0.074	0.927	0.927	0.811	0.070	0.674	0.949
25	KLM	0.469	0.090	0.644	0.644	0.585	0.088	0.412	0.759
26	LLY	0.655	0.090	0.831	0.831	0.768	0.080	0.612	0.924
27	MJF	0.778	0.082	0.938	0.938	0.791	0.080	0.635	0.947
28	MRM	0.645	0.087	0.816	0.816	0.741	0.080	0.585	0.898
29	MRP	0.679	0.090	0.855	0.855	0.737	0.085	0.571	0.903
30	NAN	0.621	0.092	0.800	0.800	0.752	0.082	0.592	0.912
31	NAP	0.667	0.083	0.830	0.830	0.737	0.078	0.585	0.890
32	NEL	0.682	0.102	0.881	0.881	0.767	0.092	0.586	0.948
33	NEW	0.571	0.095	0.758	0.758	0.715	0.087	0.545	0.885
34	NOC	0.667	0.142	0.945	0.945	0.704	0.138	0.434	0.974
35	NOI	0.667	0.092	0.848	0.848	0.713	0.089	0.539	0.887
36	NVL	0.591	0.107	0.801	0.801	0.591	0.107	0.381	0.801
37	NVS	0.870	0.072	1.000	1.010	0.870	0.072	0.729	1.000
38	OBG	0.667	0.092	0.848	0.848	0.667	0.092	0.486	0.848
39	OKV	0.750	0.078	0.902	0.902	0.783	0.074	0.639	0.928
40	OKW	0.815	0.076	0.964	0.964	0.846	0.071	0.707	0.984
41	PCN	0.769	0.122	1.000	1.008	0.819	0.111	0.601	1.000
42	PCS	0.833	0.112	1.000	1.053	0.880	0.098	0.689	1.000
43	PEN	0.806	0.072	0.948	0.948	0.893	0.056	0.782	1.000
44	PKM	0.481	0.098	0.673	0.673	0.696	0.090	0.520	0.873
45	PMW	0.645	0.087	0.816	0.816	0.751	0.079	0.596	0.906
46	POR	0.800	0.082	0.960	0.960	0.827	0.077	0.676	0.978

Table 3 Continued

No. (1)	PED (2)	p1[a] (3)	S.E. (4)	95% CI (5)	(6)	p2[b] (7)	S.E. (8)	95% CI (9)	(10)
47	PRM	0.500	0.121	0.262	0.738	0.556	0.120	0.320	0.792
48	PRN	0.667	0.114	0.443	0.891	0.762	0.103	0.560	0.964
49	PRO	0.444	0.120	0.208	0.681	0.497	0.121	0.259	0.735
50	RCC	0.630	0.095	0.444	0.815	0.695	0.090	0.518	0.872
51	RCE	0.464	0.096	0.276	0.652	0.643	0.092	0.462	0.824
52	RCS	0.464	0.096	0.276	0.652	0.664	0.091	0.486	0.842
53	SAN	0.871	0.061	0.751	0.991	0.933	0.046	0.844	1.000
54	SAS	0.714	0.087	0.544	0.885	0.801	0.077	0.650	0.952
55	SHU	0.654	0.095	0.467	0.840	0.749	0.087	0.580	0.919
56	SKN	0.714	0.125	0.469	0.960	0.794	0.112	0.574	1.000
57	SRC	0.724	0.084	0.559	0.890	0.758	0.081	0.599	0.916
58	SRG	0.696	0.098	0.503	0.888	0.843	0.077	0.691	0.995
59	SRN	0.545	0.109	0.333	0.758	0.629	0.105	0.423	0.836
60	SRP	0.560	0.101	0.361	0.759	0.639	0.098	0.446	0.831
61	SRT	0.643	0.092	0.462	0.824	0.718	0.087	0.548	0.888
62	SWH	0.619	0.109	0.406	0.832	0.757	0.096	0.570	0.945
63	SWR	0.833	0.069	0.698	0.969	0.879	0.060	0.761	0.998
64	VBU	0.462	0.081	0.303	0.620	0.618	0.079	0.463	0.772
65	VFA	0.581	0.090	0.404	0.757	0.659	0.087	0.489	0.829
66	VFV	0.640	0.098	0.448	0.832	0.713	0.092	0.532	0.894
67	VHA	0.556	0.097	0.365	0.746	0.665	0.093	0.484	0.846
68	VKE	0.440	0.101	0.241	0.639	0.608	0.100	0.413	0.803
69	VKI	0.577	0.099	0.383	0.771	0.705	0.091	0.526	0.884
70	VLA	0.500	0.100	0.304	0.696	0.578	0.099	0.384	0.771
71	VMP	0.407	0.096	0.219	0.596	0.621	0.095	0.435	0.807
72	VPG	0.500	0.090	0.324	0.676	0.631	0.087	0.461	0.801
73	VQL	0.621	0.092	0.441	0.800	0.732	0.084	0.568	0.896
74	VTB	0.613	0.089	0.439	0.787	0.662	0.086	0.493	0.831
75	VTH	0.750	0.083	0.587	0.913	0.815	0.075	0.668	0.961
76	WKB	0.739	0.094	0.556	0.923	0.739	0.094	0.556	0.923
77	WVC	0.652	0.102	0.453	0.851	0.734	0.094	0.550	0.919
78	WVG	0.692	0.092	0.511	0.873	0.806	0.079	0.651	0.961
79	YAL	0.471	0.125	0.226	0.715	0.563	0.124	0.320	0.806
	Total	0.641	0.011	0.620	0.662	0.722	0.010	0.702	0.742

[a] Weighted proportion of correct cases including the cases based on proxy response.
[b] Weighted proportion of p1 with unconfirmed cases imputed using the MI procedure.

Summary

This paper provides a brief report of preliminary findings of the third BC Voters List Quality Audit, conducted in April 2005. It includes a province-wide random sample of 1,996 voters from the Election BC's voters list. The findings of the survey show that the rate of currency varies widely across the BC electoral districts. If the unconfirmed cases are classified as having incorrect information, then the overall rate of currency is

estimated at 64.1% with a margin of error of 2.2% (19 out of 20 times). When the unconfirmed cases are imputed with the mean estimates using the multiple imputation method, the rate of currency increases to 72.2% with a margin of error of 2.0% (19 out of 20 times). Caution must be exercised when interpreting district-level estimates due to small sample sizes.

References

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Schafer, J. L. (1997) *Analysis of Incomplete Multivariate Data.* London: Chapman & Hall.

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APPENDIX IV: TELEPHONE SURVEY SCRIPT

VENTURE CODE – Mail address different to residential address?
No... 1
Yes 2

INTRODUCTION

Hello may I speak with <Given Name > <Surname >. My name is ___. I am calling on behalf of Elections BC, a non-partisan Office of the Legislature, responsible for administering the Election Act. We are measuring the quality of the provincial voters list. A record from this address has been selected for confirmation. This quality improvement initiative is important to ensure that voters receive necessary voting information.
May I continue?

Continue - correct person.. 01	=> Q1	
Correct name & number - call back anytime.. 20	=> /INT3	
Correct name & number - specific call back 21	=> /INT3	
Not at this number/ address.. 22	=> /INT2	
Correct name & number - refused 23	=> /INT2	
Refused - would not confirm if it was the correct person 02	=> /END	
Call-back - no answer 03	=> /END	
Line busy 04	=> /END	
Not in service 05	=> /END	
Deceased 06	=> /END	
Language difficulties 07	=> /END	
No phone number 15	=> /END	

INT2

Proxy end
Thank you for your time, and have a good day/ afternoon/ evening.
Not at this number/ address.. 22 => /END
Correct name & number - refused .... 23 => /END

INT3

Call back end
Thank you. We will call back at <Date and Time >. Have a good day/ afternoon/ evening.
Correct name & number call back anytime... 20 => /END
Correct name & number specific call back... 21 => /CB

Q1

Is your date of birth <DOB >?
Yes 1
No... 2 => /INT4
Refused... 3

Q2

And are you a Canadian citizen?

Yes 1
No.. 2   => /INT4
Refused 3

Q3

IF ANY ARE WRONG THEN CHOOSE "NO"

Is your current mailing address: Address 1
Unit/ Apt -
Building Number
Street
Street Type
Direction (East/West/North/South)
City/ Town
Province
Postal Code?

Yes 1
No.. 2   => /INT4
Refused 3

Q4

Is your current mailing address a residential address?

Yes 1
No.. 2   => /INT4
Refused 3

Q5

=> INT4 if   VENTC=1

IF ANY ARE WRONG THEN CHOOSE "NO"

Do you currently reside at:
Unit/ Apt -
Building Number
Street
Street Type
Direction (East/West/North/South)
City/ Town
Province
Postal Code?

Yes 1   => /INT
No.. 2   => /INT4
Refused 3   => /INT

INT4

=> INT if   NOT (Q1=2 OR Q2=2 OR Q3=2 OR Q4=2 OR Q5=2)

Completed with incorrect information end
On behalf of Elections BC, I would like to thank you very much for your time today.
If you have any further questions about the survey, or would like to correct your
information, please contact Elections BC toll-free at 1-800-661-8683, or go online
to www.elections.bc.ca
Again, thank you for your time, and have a good afternoon/ evening/ day.
Completed – information incorrect 24   => /END

INT

End
On behalf of Elections BC, I would like to thank you very much for your time today.
If you have any further questions about the survey, please contact Elections BC
toll-free at 1-800-661-8683, or go online to www.elections.bc.ca
Again, thank you for your time, and have a good afternoon/ evening/ day.
Completed – information is correct (or refused).. 01   => /END
Refused - would not confirm if it was the correct person 02   => /END
Call-back no answer... 03   => /END
Line busy 04   => /END
Not in service 05   => /END
Deceased 06   => /END
Language difficulties 07   => /END
No phone number 15   => /END

APPENDIX V: MAIL SURVEY FORM

Personal and Confidential

	Mailing Address: PO Box 9275 Stn Prov Govt Victoria BC V8W 9J6	Phone: (250) 387-5305 Toll Free: 1-800-661-8683 (TTY) 1-888-456-5448
ELECTIONS BC Province of British Columbia	Location: 333 Quebec Street, Victoria BC	Email: electionsbc@gems3.gov.bc.ca Web Site: http://www.elections.bc.ca/

Mailing Address and Voter Name in Full   Residential address if different

Jane Doe
#123 – 456 7th St.
Smalltown, BC

Date of Birth: July 1, 1965
Citizenship: Canadian

April 18, 2005

Dear Jane Doe:

Elections BC is a non-partisan Office of the Legislature, responsible for administering the *Election Act.* We are measuring the quality of the provincial voters list, and your record has been selected for confirmation.

We would appreciate your help in advising us whether the voting registration information above is correct (your full name, address, date of birth, and citizenship). If it is correct, please check the "Yes, my record is correct" box below. If the information is incorrect, please check the "No, my record is **not** correct" box, and call us toll-free at 1-800-661-8683 to update your registration record. Whether or not the record is correct, please complete and return this letter in the enclosed pre-paid reply envelope TODAY or before April 27, 2005.

The information that you provide is important and will guide us in improving how we maintain the voters list. Thank you for your assistance. If you would like more information about this survey, please visit our Web site at www.elections.bc.ca/reg/enum.htm, or call us at 1-800-661-8683.

Sincerely,

Harry Neufeld
Harry Neufeld
Chief Electoral Officer

Is the voter registration information above correct?

Yes, my record is correct   ☐

No, my record is **not** correct   ☐

IMPORTANT – PLEASE COMPLETE AND RETURN TO ELECTIONS BC NO LATER THAN APRIL 27, 2005
THANK YOU!