2010 Winter Games
Labour Supply and Gap Analysis

Presented to:

2010 Winter Games Human Resources Planning Committee

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This technical report was prepared for the 2010 Winter Games Human Resources Planning Committee. Any errors or omissions in this report are the responsibility of Roslyn Kunin & Associates, Inc. (RKA). The Committee has formally accepted this report, but it does not necessarily agree with all of its conclusions, interpretations, recommendations, etc.

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Executive Summary

This paper is to analyze and identify the projected labour supply in British Columbia during the period 2003-2015 in relation to the base and incremental demand estimated in the Roslyn Kunin & Associates, Inc. (RKA)'s Labour Demand Analysis Report. Specifically, it aims to provide:

- Estimates of labour supply during 2003-2015, particularly by occupation, regions, labour force groups;
- Identification of factors that will affect labour supply trends and the nature of their impacts;
- Potential pressure areas in terms of industries, occupations, skills and regions, and in the short term (2003-2007);
- Analysis of implications and opportunities for labour forces among First Nations and in the Downtown Eastside; and
- Identification of implications of estimated labour supply for public policy levers and private sector responses.

Throughout this study, the projection of labour supply refers to the projection of the increment of new workers into the workforce, in addition to those who are already working. In other words, we project the *flow*, but not the *stock* of existing labour supply.

The present paper looks at various sources of incremental labour supply, i.e. workers and potential workers, in the occupations previously identified in the Labour Demand Analysis and examines the differences between demand and supply to determine surpluses and gaps.

Primary sources of supply are school (all levels) leavers and workers coming to BC from other provinces and countries. Only those sources of unemployed workers whose movements into the workforce could be quantified have been included in the model. Including the larger pool of unemployed would have resulted in significant double counting. Given this, and additional complexities around measuring career change choices, they have not been included in the model. Future planning work with sectors should make attempts to analyze peoples in these groups and establish job-readiness and targeted skill-training programs to allow them to take advantage of Games-and-concurrent-projects openings. Similar recommendations are made with respect to First Nations, disabled people and residents of inner city neighbourhoods.

Due to time and data limitations, our results provide general indications only. We are dealing with the fairly aggregate three digit level occupations. Data in person years does not allow for part-time and part positions and the extra bodies they will require.

For jobs lasting more than one year, the same person can do more than one person year of work.

Due to measurement difficulties, inter-occupational mobility is assumed to be zero, but workers within given occupations are assumed to be perfectly mobile within the province. In reality, this will not be the case. Inter-occupational mobility will affect some occupations more substantively than others, and worker mobility will be limited by personal choice, finances, available housing etc. Future work to reveal the extent of these limitations will have to be done on a sector by sector basis, and may be more qualitative than quantitative. Other caveats are mentioned in the report which also provides suggestions for dealing with these limitations.

Nevertheless, this report and its companion on labour demand provide useful information to governments and other organizations that wish to ensure that British Columbia has an appropriately skilled labour force to meet the needs of the Games and concurrent projects and that British Columbians, including those facing special labour force challenges, have an opportunity to benefit from the employment generated.

Our recommendations indicate steps that can be taken by workers, employers, professional and trade organizations, unions, educational institutions, governments and others to enhance our labour supply where necessary and eliminate gaps. They also indicate areas for further research so that collectively, government and the private sector can make better informed decisions in the future.

Background and Purpose of Report

This report was commissioned in June 2003 by the 2010 Winter Games Human Resources Planning Committee. This study follows a demand study commissioned by the Committee and completed by RKA in April 2003.

… Purpose of demand study …

The purpose of the demand study was to provide occupational detail of demand – total openings in the base model, and incremental labour likely to be demanded by the 2010 Winter Games, as well as that associated with the Richmond-Airport-Vancouver rapid transit line ("RAV"), the Vancouver Convention and Exhibition Centre ("VCEC") and the Sea-to-Sky Highway expansion ("STSH") in the period leading up to the Games and thereafter. We refer to this demand as additional demand in this report.

… Purpose of supply study …

The purpose of this supply study is to gather information and report on incremental labour supply by primary source and assess likely gaps between additional labour demand and incremental supply in order to inform and assist in human resource planning and training for the Games.

Summary of Population Trends

… Population growth is low and the population is ageing …

In general, population growth is low and the population is ageing. Between 2003 and 2015, population growth in BC is expected to be 1.34% per year. The effect of the ageing population will be a reduction in the labour force participation rate from 72.8% in 2001 to nearly 67% in 2015. This is a remarkable decrease, considering that in 1991 the labour force participation rate was 77.1%. BC will still have greater projected population growth than other provinces, however.

… Immigration is expected to reduce in importance yet remain the main driver of population growth …

Population growth is expected to increase from the 2002 rate of 0.89% to 1.41% in 2009, and then fall thereafter to 1.31% by 2015. By component, immigration is expected to reduce in importance from its 2002 contribution of 84% of the total 37,000 population increase in 2002, to 60.3% of the 63,800 population increase expected in 2010. However, immigration will still be a significant source of new workers into BC, and even at 60% of population growth will remain the main driver of population growth and its largest component.

… As BC's economy grows, migration is expected to over-take natural gain …

In recent years, BC has experienced a net outflow of people to other provinces, which has been buffered somewhat by positive gains in the natural increase (births-deaths). By 2005 net migration is expected to strongly overtake the natural increase.

Gap Analysis Summary and Sources of Labour Supply

… This study is a "Gap Analysis" …

The purpose of this report has been to undertake a gap analysis between additional labour demand by occupation (at the 3-digit level of detail) as described in the demand report recently completed by RKA, and potential incremental supply of labour expected during the same 2003 to 2015 period. In the demand report we focused on the top 25 likely "gainers". Similarly, in this report, we also focus on these top 25 occupations.

Note, however, that those occupations that we have not concentrated on in this study can equally be important. While the largest "gainers" have been chosen, there is additional work that can be done by sectors on the remaining occupations, particularly those occupations with specialized skills where the labour market balance can easily be thrown off by small volume shortages changes in supply or demand.

… We have included eight (8) sources of incremental labour supply in the empirical model …

The term "*incremental labour supply*" we have used throughout the report refers to the *new* streams of workers coming into employment each year, *in addition to* those who are already in the workforce.

To assess *potential incremental* labour supply during this period, we have gathered as much data as the time has permitted from eight (8) potential sources of incremental labour supply over the coming years:[1]

1. University graduates
2. College graduates
3. High school graduates
4. Private training institute students
5. Apprentices
6. Immigration
7. In-migration
8. Former Income Assistance recipients

PALS 2001 (Statistics Canada, *Participation and Activity Limitation Survey*, 2001) will provide useful information on workers with disabilities from its employment sub-study when available in the near future. Of course, additional sources of labour supply exist, however these are not quantified and measured in such a manner that they can be reliably included in the model. Including the large pool of unemployed will result in significant double counting of supply, and detailed data on the pool of EI recipients was not available at the time of this report. More significantly, inter-occupational mobility could not be included, as no sources of data exist – either nationally or provincially. Some occupations, particularly management and supervisory positions will be influenced more substantively by this omission. Where specific movements into the workforce can be measured, they have been included. At this time, this represents one of the most comprehensive assessments of labour supply done to date in BC. Also, in reality, inter-occupational mobility will result in supply adjustments to many occupations where supply gaps are projected.

… In aggregate there will be enough labour …

In aggregate, potential labour supply appears sufficient to meet incremental demand due to the 2010 Winter Games and concurrent projects including the STSH, the RAV, and the VCEC, as well as total openings in the base model.

[1] Because there is no data readily available on such labour force groups as Persons with Disabilities and other under-represented groups, we have not counted them as a valid source of incremental labour supply. In this regard, we note that data from Statistics Canada's Participation and Activity Limitation Survey will soon be available, which may assist in understanding the extent of labour force participation of the persons with disabilities. We further note that the sources of incremental labour supply we discuss in the report would have included some of the individuals from these labour force groups.

… However, seven (7) of twenty-five (25) occupations are expected to experience potential gaps meaning demand will exceed supply unless appropriate measures are taken …

More detailed analysis, at the occupational level, reveals potential for worker deficits in seven (7) of the twenty-five (25) occupations in focus. In three categories, potential worker deficits could be severe. In the remaining four, the potential is likely not as severe as in the first three but nonetheless is substantial. Furthermore, it should not be assumed that labour market pressures would be felt equally among all occupations within the group.

Severity of Potential Gaps and Recommended "Watch List"

… The overall potential gaps are compared with additional demand to gauge the severity of the gap expected …

To put potential gaps in context and gauge severity, we calculated the overall potential gap across all years and express that as a percentage of overall demand for the same number of years. Overall potential gap is compared with demand to get a sense of how much higher supply would have to be to close the gap.

… Some occupations that are not expected to experience excess demand will still have some potential gaps of supply, especially during the Games year, and should be monitored ("Watch List") …

There are several occupations for which potential gaps appear to be only in the Games year or the years leading to it. For example, *NOC 513 Creative and Performing Artists* has a shortfall of 120 in 2010. Given job openings (additional demand) in 2010 is expected to be about 1,073, the shortfall is (*120/1,073)* or about 11% of openings. There are four occupations out of 25 in which such gaps are expected.

… Seven (7) of twenty-five (25) occupational groups are expected to experience excess demand during the period 2003 to 2015. Among the remaining occupational groups, at least four (4) are recommended for inclusion on a "Watch List" for periodic monitoring …

In Summary Table I, we detail, for each of the 25 occupational groups we focus on in this study, the expected number of openings (from the base model, and incremental demand due to the Games, STSH, RAV, and VCEC) between 2003 and 2015, the potential gap when expected additional demand is compared with incremental supply of labour, as well as the extent of such gaps. We also indicate in the Table whether demand is mainly driven by the Games, the Games concurrent projects, or the base model, and identify the pattern of peak potential gaps. Finally, we provide comments on the extent of potential gaps and our recommendations on those occupational groups requiring on-going monitoring.

Summary Table I: Supply, Demand and Gap Findings for 25 Top Occupations, 2003 to 2015

NOC	Occupations	Gap as % of Openings	Projected Openings	Gap (-) / Surplus (+)	Peak Pattern	Demand Driver	Comments
062	Managers in Retail Trade	-15%	24,269	-3,613	Deficit 2003-07, 2010	Base	Potential med. gap: overall shortage 15% of demand. Gap somewhat overestimated due to lack of interoccupational data.
063	Managers in Food Service & Acc'n	-36%	23,713	-8,601	Deficit basically whole period 2003-15	Games and Games concurrent projects	Potential severe gap: overall shortage 36% of demand. Gap somewhat overestimated due to lack of interoccupational data.
071	Managers in Construction & Transportation	-59%	11,375	-6,731	Deficit whole period of analysis	Games concurrent projects	Potential severe gap: overall shortage 59% of estimated demand
111	Auditors / Accountants / Investment Professionals	-11%	28,706	-3,291	Deficit 2003-2010	Base	Potential medium gap: overall shortage 11% of estimated demand
122	Administrative & Regulatory Occ's	-4%	20,953	-839	Deficit 2003-06, 2008, 2010	Base	Potential medium gap: overall shortage 4% of estimated demand
143	Finance & Insurance Clerks	74%	20,058	14,749	Large surplus 2003 and 2010	Base	
216	Mathematicians / Analysts / Programmers	58%	30,260	17,544	Large surplus 2008, 2010-11	Base	
414	Secondary / Elementary School Teachers &	73%	25,321	18,377	Large surplus 2007, 2012-15	Base	
513	Creative & Performing Artists	55%	7,834	4,302	Deficit 2010	Games and Games concurrent projects	On "Watch List"
525	Athletes, Coaches, Referees & Related Occ's	7%	8,283	543	Deficit 2009-10	Games and Games concurrent projects	
624	Chefs & Cooks	39%	25,491	9,838	Deficit 2009-10	Games and Games concurrent projects	On "Watch List"
642	Retail Salespersons & Sales Clerks	123%	33,384	41,092	Large surplus 2007-15	Base	
643	Occ's in Travel & Accommodation	141%	6,715	9,476	Large surplus throughout 2003-15, except in 2010	Games and Games concurrent projects	
645	Occ's in Food & Beverage Service	104%	24,947	25,824	Deficit in 2010	Games and Games concurrent projects	On "Watch List"
647	Childcare & Home Support Workers	137%	21,891	29,994	Large surplus throughout 2003-15	Base	
661	Cashiers	142%	20,254	28,842	Large surplus throughout 2004-15	Games proper	
664	Food Counter Attendants & Helpers	138%	22,598	31,122	Deficit in 2007	Games and Games concurrent projects	
666	Cleaners	124%	30,517	37,782	Large surplus throughout 2003-15, except in 2005 & 2007	Base and Games proper	
667	Travel / Accommodation / Recreation Attendants	107%	3,644	3,889	Large surplus in 2006-08	Games and Games concurrent projects	
721	Contractors & Supervisors, Trades & Related	-69%	15,700	-10,857	Deficit throughout whole period of analysis	Games concurrent projects	Potential severe gap: overall shortage 70% of estimated demand
727	Carpenters & Cabinetmakers	94%	10,669	10,001	Large surplus 2011-15	Games concurrent projects	
729	Other Construction Trades	141%	6,541	9,254	Large surplus 2009-15	Games concurrent projects	
741	Motor Vehicle & Transit Drivers	-15%	37,749	-5,700	Moderate deficit basically throughout 2004-15	Base and Games proper	Potential medium gap: overall shortage 15% of estimated demand
761	Trades Helpers & Labourers	308%	5,255	16,186	Large surplus throughout 2003-15	Games concurrent projects	
945	Machine Operators: Fabric / Fur / Leather	7%	3,312	229	Decifit in 2006, 2008-10	Games and Games concurrent projects	On "Watch List"
All 25 Occupations		57%	469,439	269,411			

Summary of Findings

Top Seven Potential Gaps:

1. The most severe potential gap appears to be in **NOC 721 Contractors and Supervisors, Trades and Related Occupations**. Many, though not all, trades contractors are currently certified through apprenticeship training programs, and many experienced tradespersons become certified by "challenging" the examinations required to gain certification. It may be advisable to assess what training programs could be used (or established) to draw additional workers into relevant trades. Candidates for trades training and certification are numerous but obvious candidates include high school graduates who enter the work force rather than pursue higher education, uncertified but otherwise capable and experienced tradespersons already in the economy, migrants from other provinces as well as immigrants who may be capable but are not formally certified.

   The potential gaps are expected to be felt throughout the period of analysis, 2003-2015, and they are driven mostly by the Games concurrent projects. In addition to increasing training opportunities, the potential gaps could also be alleviated by upgrading and promoting trades workers.

2. Another problem area appears to be in **NOC 063 Managers in Food Service and Accommodation**. The potential gap is expected to exist throughout the whole period of analysis, 2003-2015, and is likely to be mainly driven by the Games and other Games concurrent projects. Those in this occupational group are likely to be drawn from the existing pool of food service workers as well as relatively uneducated people entering the work force in the coming years and working their way up the occupational ladder in this sector. There may be an opportunity to leverage existing entry channels for this work, in particular the larger restaurant and hotel chains, to build up the pool of candidates as the Games date draws near. Incentives may have to be established (or expanded, where already in place) to encourage these businesses to in-take, train and promote individuals who will become candidate-managers in these areas in future.

   It should be noted that the potential gaps could be over-estimated given the lack of data on inter-occupational movement of workers, which could increase the level of labour supply to this occupational group.

3. **NOC 071 Managers in Construction and Transportation** appear to be in deficit during the entire period of analysis, from 2003 through 2015. This is also an occupational group where potential openings are more likely filled by internal candidates than by pure school graduates. Relevant construction and transport companies could perhaps be provided incentives to train existing

workers for managerial roles, and/or in-take more lesser experienced people and provide training to supplement the potential labour supply pool.

The potential gaps are expected to be driven by the Games concurrent projects, in addition to demand in the base model.

4. **NOC 062 Managers in Retail Trade** appear to be in deficit in the current year and through 2010, and have only small surpluses beyond 2010. While denoted as a “medium severity” category, the persistence of potential gaps and small surpluses, where estimated, means this is a category requiring regular monitoring.

   The potential gaps in this occupational group are expected to be driven by the demand from the base model. However, the Games and other Games concurrent projects are expected to generate increased level of tourism and other consumer activities, which could in turn put pressure to the already tight demand for these workers during the Games year and the years leading to it.

   On the other hand, it should also be noted that the potential gaps could be over-estimated given the lack of data on inter-occupational movement of workers, which could increase the level of labour supply to this occupational group.

5. **NOC 111 Auditors, Accountants and Investment Professionals** as a group have been growing quite rapidly between the 1991, 1996 and 2001 Census years. Given the events of the past three years concerning corporate governance and related issues, we expect increased interest in these occupations is being felt by post-secondary educational institutions and professional associations (CA, CGA, CMA, CFA, others). One approach to augment supply may be to encourage professional firms, banks, credit unions and investment managers, small and large, to in-take additional trainees as the Games date draws closer. To the extent requirements differ, it may also be useful to assess the differences between BC’s and other provinces’ relevant certifications and licensing processes, with a view to allowing otherwise ineligible workers from other provinces to participate in these occupations in BC.

   Although the potential gaps are driven mainly by demand in the base model, we note that occupational pressure will rise as a result of the incremental demand due to the Games and other Games concurrent projects. For example, accountants will be tied to supply chain management functions, additional payroll responsibility, and investment management for new development projects.

6. **NOC 741 Motor Vehicle and Transit Drivers** appear to be in deficit in almost all the years throughout our period of analysis, the exceptions being in 2003 and 2005. Although the magnitude of potential gaps is not as severe as

that for those occupational groups mentioned earlier, such potential gaps are severe enough to warrant on-going monitoring. Given the relatively low skill level required to enter this occupational group, it will be useful to make such labour market information as widely available as possible, especially to the pool of the unemployed and those who have left income assistance, to benefit those most in need.

The potential gaps are expected to be mainly driven by demand in the base model. However, the Games are also expected to contribute to increasing the additional demand, given that without them, those attending the Games cannot be mobile. As such, it is important to ensure that a large enough pool of labour supply be made ready, especially in the Games year.

7. **NOC 122 Administrative and Regulatory Occupations** also appear to be in deficit in the Games year and the years leading to it. Given that those in this occupational group such as Administrative Officer, Personnel and Recruitment Officers, Purchasing Agents and Officers, Conference and Event Planners are critical in all the years preparing for the Games, it may be necessary to increase training seats in the training institutions, and to make the labour market information as widely available as possible.

Watch List for 2010:

8. **NOC 513 Creative and Performing Artists** This category exhibits a *medium* potential gap during 2010. Recommendations include creating a registration process and database of Creative and Performing Artists, and inviting expressions of interest, to monitor likely number of attendees for the Games. Clearly, interest will be stirred and final approximate numbers of participants/attendees should be clearer as the Games date draws nearer. Liaising with university and college performing arts departments, professional providers of such entertainment, and guilds/societies should enable a free flow of information and stimulate interest as the Games date draws closer. In general, Creative and Performing Artists will be in demand for relatively short periods during the Games and will likely come to BC for the Games. Consequently BC's local supply of this occupational category will be augmented during the Games events.

9. **NOC 624 Chefs and Cooks** also appear to face some deficit in 2009, but quite a large one in the Games year. (About 36 per cent short of estimated demand.) Given the importance of this occupational group in the overall tourism related industry, it may be necessary to take measures to encourage those who are not currently certified to take proper certification, or alternatively, to attract qualified persons from out of the province to meet the needs in the Games year.

10. **NOC 645 Occupations in Food and Beverage Service** is on the watch list because, while the potential gap of about 800 workers in 2010 appears relatively low to other watch-list occupations, this potential gap amounts to about 17% of estimated demand. More importantly, *NOC 063 Managers in Food Service and Accommodation*, a closely related occupation, is expected to be in severe potential gap, and personnel in *NOC 645* jobs are obvious candidates for training and promotion to *NOC 063* managerial positions. Without adequate supply of workers in *NOC 645* (and related) occupations, there will be an inadequate pool of potential managers from which to draw.

11. **NOC 945 Machine Operators, Fabric, Fur and Leather** includes certain personnel needed to manufacture goods for coverings, clothing, equipment and other goods needed for the Games and concurrent projects. The expected potential gaps are in year 2006 and from 2008 to 2010 and as such this is an occupational category that also requires monitoring.

Recommendations on Further Research/Analysis

1. Unemployed workers may not be considered to be immediately job-ready for the kinds of openings that the Games and projects would be generating. We have not included them in this study, mainly to avoid potential double counting in the source of labour supply. Given the potential contribution from and the need for viable employment among this group there would appear to be an opportunity to involve the relevant government departments in labour supply issues. For example, data mining of EI recipients and matching against labour requirements may yield a potentially useful pool of labour for certain occupational categories. To the extent companies experience difficulties in hiring workers, they could be encouraged to utilize EI offices as advertising “distribution channels” for work opportunities for EI recipients. Targeted skills programs and upgrading should be provided where necessary.

2. Because of the lack of data on inter-occupational mobility, we have not been able to consider such movements in our analysis of potential labour supply. As such it is possible that some of the potential gaps we have identified would be somewhat over-estimated. We recommend better collection of data and establishing a model to analyze inter-occupational mobility be conducted in the future.

3. In both the demand study completed previously and in this study, the lack of suitably detailed information about intra-provincial/inter-regional occupational counts, movements and “churn” has been evident. While in some regions and in some categories, sampling issues will prevent short- and medium-term improvements in detailed estimation and information availability, further work is required to shed light on intra-provincial/inter-regional occupational detail.

4. It is strongly recommended that further analysis of labour supply and demand be conducted at appropriate periodic intervals over the period during which the projects commence and in the years preceding the Games. Further study should certainly be undertaken when the detailed labour force 2001 Census results are available and when the Census 2006 results are published. More sub-provincial analysis and additional occupations should be included in future work.

5. Because the pressures identified cannot be assumed to be felt equally among all the occupations within the 3-digit group, some disaggregation to the four digit level (or finer) and examined using quantitative analysis if possible or qualitatively by interviewing those knowledgeable in the industries, etc. should be conducted. Specific potential gaps thus identified can be dealt with via dedicated training programs provided publicly and/or through private trainers, or through other strategies such as recruitment and retention initiatives.

6. Continued refinements of the supply/demand model, including more analysis of seasonality and the conversion of person years into actual worker requirements over periods longer than a year needs to be undertaken.

7. Work with industry sectors in the future to collect qualitative information where quantitative data is limited and develop strategies to equip workers with the needed skills in order to alleviate potential shortages.

8. Additional sources of useful data on labour supply need to be identified and developed. These would include qualitative and well as quantitative sources. Longitudinal information should be used to develop sensitivity indicators of labour supply reactions to changing conditions of demand.

9. Research on possibility for crowding out to anticipate potential for “drain” of workers from the “heartlands”, and develop strategies to mitigate.

10. Readers are referred to Section 2.3 Demand Study Recommendations below, and the demand study itself, for further specific recommendations. Those recommendations relate to trades training, dissemination of employment training and opportunities, liaising with First Nations about training initiatives and tailoring those initiatives to match known or anticipated skilled labour shortages, building upon the Ference Weicker recommendation to prepare an employment strategy for residents of the inner-city neighbourhoods, the first step for which should be conducting a more detailed look at the employability characteristics of the neighbourhoods’ populations, and other areas.

Section 1: Introduction - Mandate and Purpose of Study

The 2010 Winter Games Human Resources Planning Committee met on May 1 2003 to conduct Committee business and to agree on a Terms of Reference for consulting services to address potential labour supply for the 2003 through 2015 period from a broad range of potential sources. Sources considered included high school students, university and college graduates, students of private training institutes, trades apprentices, expected net gains in the BC population attributable to migration and immigration, recipients of income assistance, the unemployed, and Aboriginals/First Nations.

The essential purpose of the Terms of Reference was to gain an understanding of incremental growth in the *potential* labour supply from the present up to the date of the Winter Games and thereafter, to compare this potential for incremental labour supply with demand estimated from earlier studies, and to identify gaps between potential supply and demand in order to inform policy and planning over the next few years in preparation for the Games. Roslyn Kunin and Associates, Inc. (RKA), the author of the demand study, was retained to complete this research. This document reports on the results of the research and contains a number of recommendations to assist in closing the occupational gaps, as identified in this report.

Conceptual Framework

The Demand Report referred to below provided estimates of the number of workers that will be needed in key occupations in the BC economy to 2015, delineating the demand generated by the 2010 Winter Games and concurrent projects, as well as the number of openings in the base model.

The present report looks at issues affecting potential supply for the 25 occupations determined to be of most importance in the Demand Report. By comparing the demand and supply in an occupation, potential shortages and surpluses can be determined.

Throughout the study, the projection of labour supply refers to the projection of the increment of new workers into the workforce, in addition to those who are already working. In other words, we project the *flow*, but not the *stock* of existing labour supply.

Supply in any given occupation can be estimated by disaggregating from demographic projections or by building up from increments to the labour force such as school leavers. Both these approaches have been used in this report.

Certain factors need to be kept in mind in using this report:

- First, the assumptions that we have used concerning population growth, participation rates, international and inter-provincial migration, etc., are widely used and generally accepted in British Columbia. Nevertheless, they are assumptions and could be wrong. Preliminary sensitivity analysis suggests that unrealistically large changes would have to occur to materially effect the results in this study.
- Second, the propensity to enter given occupations may change. People may choose to enter different occupations as they become aware of growing demand or they may avoid given occupations for fear that the demand will be only short term. Accurate and available labour market information could yield positive changes.
- Third, since people are not all equally qualified, are occupationally mobile and the different sources of labour supply are often overlapping, it is possible to undercount or overcount the numbers of workers available. Analysts, cooks or trades workers may not have up-to-date skills leading to an over estimate of the talent pool. The same person may be counted as a school leaver, as unemployed and as an income assistance recipient. Workers may acquire skills through informal training. Since in any functioning labour market, those unemployed are likely to be the least qualified and most marginal workers, RKA has been asked to examine potential supply excluding this pool of workers.
- Fourth, the BC labour market could be influenced by changes in labour demand in other provinces and countries. Major construction projects occurring elsewhere during the time period under consideration could attract our potential workforce. A widespread economic slowdown could ease worker availability.
- Fifth, because of data availability, we look at occupations at the three-digit level of aggregation. In some three-digit groups such as *NOC 111 Auditors, Accountants and Investment Professionals*, only subsets of the group (auditors and accountants) will be in demand. Those planning training programs should be aware of this.
- Sixth, the data we use measures person years. Where jobs last less than one year this will result in an undercount of the number of people needed at peak times. Where jobs last more than one year, person years results in an overcount of the workers needed. We have attempted to adjust for this in the report.
- Finally, although we have paid attention to the occupations that we think are most important, other occupations lower down the list of demand could possibly generate problems or bottlenecks. A watching brief should be kept on them. Security personnel are one group that could be a bottleneck during the time of the Games themselves. In the report we note other occupations that will have high demands during or close to the actual time of the Games.

Layout of the Report

The general layout of this report is as follows. In Section 2, we summarize the major findings and recommendations contained in the Labour Demand Analysis by RKA earlier, and in Section 3 we outline the methodology with which we provide analysis of potential gaps by major occupation. Section 4 describes projected population growth in British Columbia during our period of analysis 2003-2015. Section 5 provides a description of student outcome analysis which has specific training implications. Then in Section 6 we provide in-depth analysis of potential gaps as a result of the comparison of incremental labour supply and additional labour demand in major occupations. We devote Section 7 to discuss occupational distribution and training issues related to the First Nations people. In Section 8, we further identify factors that can contribute to influencing the results of this study. Finally, in Section 9, we present the conclusions of this study and make recommendations for further research and analysis.

Section 2: Summary Overview of Demand Report

The purpose of the demand study was to provide occupational detail of incremental labour likely to be demanded by the 2010 Winter Games, as well as that associated with the Richmond-Airport-Vancouver Rapid Transit Line ("RAV"), the Vancouver Convention and Exhibition Centre ("VCEC") and the Sea-to-Sky Highway expansion ("STSH") in the period leading up to the Games and thereafter. Such incrementality is over and above the number of openings in the base model. (Throughout the rest of this report, we refer to such overall demand as the additional demand.)

The Vancouver/ Whistler 2010 Olympic Games will generate a significant increase in the demand for labour in British Columbia, starting now (2003) and continuing to 2015 and beyond. Concurrent and complementary projects such as the Sea-to-Sky Highway upgrade (STS), Richmond-Airport-Vancouver Rapid Transit Project (RAV) and Vancouver Convention and Exhibition Centre (VCEC) expansion will also create the need for additional workers, though these projects are coincident with and supportive of, rather than directly dependent upon, the Olympic Games.

The Olympic Bid Secretariat is developing an Economic Opportunity Strategy to maximize the returns from hosting the 2010 Winter Olympics in collaboration with the federal government and key agencies. In support of that Strategy, RKA was retained by the 2010 Winter Games Human Resources Planning Committee ("Committee") in February 2003 to break down total labour demand from the Olympics and concurrent projects in terms of sectoral, occupational, regional, temporal and other factors, as a first step in identifying potential demand/supply gaps and training implications, and development of plans and strategies to address the expected incremental demand.

In April 2003 RKA submitted its report *2010 Winter Games Labour Demand Analysis*. A key recommendation contained in the report was to analyze labour supply in order to identify those occupations with the greatest potential supply gap given the demand analysis already completed, and to recommend policies that could enhance labour supply and assist to close the gaps, where largest. Table 1 contains summary results of the labour demand analysis.

2.1 Summary of Demand Estimates

Table 1: Summary Demand Results, 2010 Winter Games Labour Demand Analysis

	2003-2009	2010	2011-2015	All Years	% over Base	Self-employed

Base openings	510,178	65,506	337,601	913,285		138,819
2010 Games	26,717	30,382	19,714	76,813	8.4%	10,614
VCEC expansion	11,139	2,500	17,021	30,660	3.4%	4,771
Sea-to-Sky Hwy	9,449	--	--	9,449	1.0%	1,929
RAV transit (low)	11,957	--	--	11,957	1.3%	2,221
RAV transit (high)	14,877	--	--	14,877	1.6%	2,704
Total Demand (low)	569,440	98,388	374,336	1,042,164		158,354
Total Demand (high)	572,360	As above	As above	1,045,084		158,834
Incremental (low)	59,262	32,822	36,735	128,879	14.1%	19,535
Incremental (high)	62,182	As above	As above	131,799	14.4%	20,018
Source: RKA Estimates						

The demand study found that:

- **No Games or Projects**: Base labour demand without the Games and Projects is expected to be 913,285 person-years of employment;
- **Games Effect**: The Games are expected to generate 76,813 person-years of employment, or 8.4% more than Base demand;
- **Projects Effect**: The VCEC, STS and RAV projects are expected to generate between 52,066 and 54,986 person-years of employment, or 5.7 to 6.0% more than Base demand;
- **Total Additional Demand**: Total demand is expected to fall in the range 1,042,164 to 1,045,084 person years of employment, making the average of low and high estimates of incremental demand over and above Base demand about 130,339 person-years of employment;
- **Self-Employment**: Using Census 2001 data on self-employment by occupation, self-employment is expected to rise to approximately 158,000 person-years of employment - about 15.2% of total demand between 2003 and 2015 - making growth in self-employment about 20,000 person-years during the period, approximately half of which is attributable to the Games themselves; and
- **Tourism**: While activities related to the Games and projects will be concentrated near Vancouver and the Island, the induced tourism impact is expected to generate about 54,000 person-years of employment, 57.3% of which will be in the Mainland/Southwest, 17.9% in the Island and Coast regions, 12.9% in Thompson/Okanagan, and the remaining 11.8% distributed in Kootenay (4.1%), Cariboo (3.4%), Northeast (2.1%), North Coast (1.5%) and Nechako (0.7%).
- **Volunteers:** The Demand Study estimated a minimum count for Vancouver-Whistler of 25,000–30,000 volunteers. The Vancouver 2010 Bid Corporation

has estimated 21,500 volunteers, roughly 17,800 for the Olympic Games and 3,700 for the Paralympics, with overlap difficult to predict.

2.2 Comparison With Historical Trend

In comparison with historical labour force growth, the changes expected in the 2003 to 2015 period do not deviate substantially from trend however, the concentration of the effects in a small proportion of all occupations in the southwest part of the Province and intensively focused during the period just prior to and after the Games raises concerns about relevant worker shortages.

The 913,285 openings projected in the Base model between 2003 and 2015 include 354,990 net new openings (openings to meet labour demand from increased economic activities) and 558,295 replacement jobs. During the past 13 years, net employment growth for BC, from Labour Force Survey data, amounted to 464,500. Attrition detail is not available[2] but it is almost certain that replacement job openings in the future will be greater than those in the past because the population is ageing.

Net growth from the Base model, combined with incremental employment growth due to the Games and concurrent projects, will generate approximately 485,000 new openings between 2003 and 2015, excluding replacement jobs. This is slightly more than the growth of 464,500 jobs in the previous 13 years, however there are three main reasons for concern:

- Incremental employment demand due to the Games and concurrent projects will be concentrated around the Games year and in a few industries, thus creating pressure for these industries to recruit sufficiently early to ensure their needs will be met;
- Incremental employment growth here (130,000) is expressed in person years however given the nature of occupations expected to be effected there are going to be many more openings than person-years of employment because some jobs will be part-time or part-year especially during 2010; and
- As the workforce ages, simply filling the replacement jobs will become more difficult the further we move into the projection period.

For these reasons, the demand report recommended adoption of a pro-active and coordinated human resource planning strategy to ensure that demand can be met. This strategy should focus on the gap analysis contained in this report.

[2] The Labour Force Survey does not provide estimates of replacement jobs.

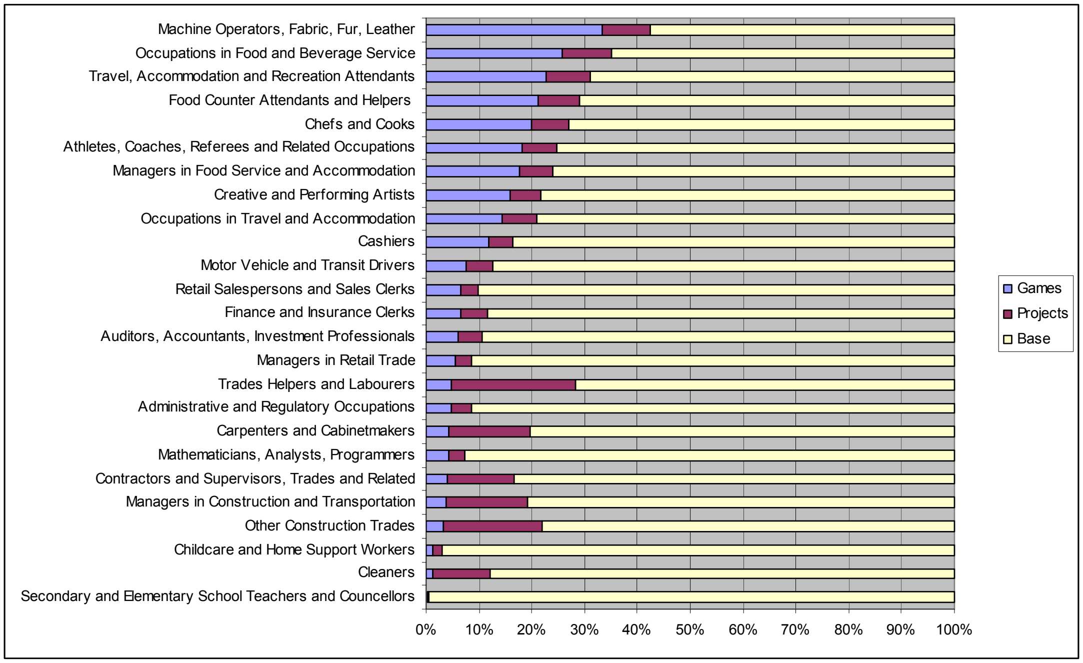
Top 25 Occupational Groups

Table 2: Occupations with the Largest Number of Openings, 2003 – 2015						
No.	NOC Code	Occupational Category	Demand Increment (Base)	Demand Increment (Games + Projects)	Demand Increment (Total)	Games % of Total
1	741	Motor Vehicle and Transit Drivers	32,940	4,809	37,749	7.7%
2	642	Retail Salespersons and Sales Clerks	30,128	3,256	33,384	6.6%
3	666	Cleaners	26,798	3,719	30,517	1.2%
4	216	Mathematicians, Analysts, Programmers	28,062	2,198	30,260	4.2%
5	111	Auditors, Accountants, Investment Professionals	25,661	3,045	28,706	6.1%
6	624	Chefs and Cooks	18,623	6,868	25,491	19.8%
7	414	School Teachers and Counsellors	25,176	145	25,321	0.4%
8	645	Occupations in Food and Beverage Service	16,213	8,734	24,947	25.8%
9	062	Managers in Retail Trade	22,206	2,063	24,269	5.7%
10	063	Managers in Food Service and Accommodation	18,019	5,694	23,713	17.6%
11	664	Food Counter Attendants and Helpers	16,055	6,543	22,598	21.2%
12	647	Childcare and Home Support Workers	21,227	664	21,891	1.2%
13	122	Administrative and Regulatory Occupations	19,159	1,798	20,953	4.7%
14	661	Cashiers	16,906	3,348	20,254	11.8%
15	143	Finance and Insurance Clerks	17,731	2,327	20,058	6.5%
16	945	Machine Operators, Fabric, Fur, Leather	1,905	1,407	3,312	33.4%
17	667	Travel, Accommodation, Recreation Attendants	2,515	1,129	3,644	22.7%
18	761	Trades Helpers and Labourers	3,767	1,488	5,255	4.9%
19	525	Athletes, Coaches, Referees and Related	6,237	2,046	8,283	18.1%
20	729	Other Construction Trades	5,111	1,430	6,541	3.4%
21	513	Creative and Performing Artists	6,127	1,707	7,834	15.9%
22	643	Occupations in Travel and Accommodation	5,311	1,404	6,715	14.4%
23	727	Carpenters and Cabinetmakers	8,566	2,103	10,669	4.4%
24	071	Managers in Construction and Transportation	9,197	2,178	11,375	3.8%
25	721	Contractors and Supervisors, Trades & Related	13,083	2,617	15,700	4.1%
Top 25 Occupations			396,723	72,717	469,439	9.2%
All Occupations			913,285	130,340	1,043,625	7.4%
Source: RKA Demand Report. Nos. 1 to 15 from Summary Figure II, pp. vii; Nos. 16 to 25 from Figure 23, pp. 61.						

Table 2 provides detail of Base demand calculated by the Canadian Occupational Projection System (first column), incremental demand attributable to the 2010 Games and the three major projects (second column) and total additional demand between 2003 and 2015. These 25 occupations are ones the demand study found likely to experience highest demand and collectively comprise nearly 45% of total additional demand (all occupations). Consequently, this Gap Analysis focuses on gaps between potential incremental labour supply and demand among these 25 categories. Other occupations that are numerically less significant may generate bottlenecks and a watching brief should be kept on such occupations.

Figure 1 shows the allocation of additional demand among the Games, Projects, and Base to highlight differences.

Figure 1: Distribution of Additional Demand by Games, Projects and Base



2.3 Demand Study Recommendations

The demand report made a number of recommendations beginning in Chapter 3: For the convenience of the reader, all the recommendations of the demand study are included here.

Chapter 3: Labour Supply Analysis and Need for Regional Models

Undertake as part of the Human Resource Planning Committee's subsequent study of labour supply issues, a detailed quantitative analysis of labour supply (the focus of this study);

Develop regional employment projection models for development regions of BC

Chapter 5: Training Programs

Start training programs now involving all players, governments, unions, employers, educational institutions and First Nations.

Chapter 6: First Nations

Ensure full participation and consultation with First Nations in developing and implementing any programs that flow from the Games and concurrent projects, to ensure applicability, and to integrate with extensive and well-developed plans and strategies already in place.

Conduct a search for examples of successful practices in creating opportunities for First Nations and Indigenous people, in literature about past Games and similar events.

Continue to facilitate the acquisition of seats for trades training. Some First Nations (e.g. Squamish) have already acquired seats for equipment operators, but there would probably be a decision to target other kinds of skills too.

Determine the needed level and put in place adequate adult education training and career choice assistance for First Nations.

Chapter 7: Vancouver Inner-City Neighbourhoods

Use the demand information presented in Chapters 3 through 5, applying it to develop a continuum of programs and policies to facilitate preparing the unemployed (including the long-term unemployed) to be able to access employment opportunities.

Build upon the Ference Weicker recommendation for work following this study: "Prepare an employment strategy for residents of the inner-city neighbourhoods," including a more detailed look at the employability characteristics of the neighbourhoods' populations, either as a group or individually, in light of the detailed analysis of demand/supply.

Chapter 8: Games Volunteers

Recognize the crucial strategic importance of volunteers, and recognize volunteer jobs as a valuable resource to be allocated amongst communities, much in the way the paid jobs are.

Learn from key strategies of other Games:

(i) the strategy of mixing volunteers at all levels with highly qualified leaders; and

(ii) the strategy of minimizing the distinction between paid and unpaid staff, with a view to maximizing responsibility and accountability of volunteers (but keeping in mind the need to observe the distinction that is important to unions in certain sectors).

Ensure proper leadership, instruction, support and recognition for volunteers.

Use the Salt Lake City Transfer of Knowledge CD's (available in Bid Corporation library) when detailed information is needed on staffing, jobs, work descriptions. (This source is the most complete, detailed, and compact of any on Olympic Winter Games Human Resources.)

Chapter 9: Labour Supply

The main supply options for meeting the labour demand are:

- Drawing on an existing labour force, including unemployed people, new entrants to the labour force, qualified people who choose to return to work (perhaps because of the major projects), etc.
- Drawing on existing workers, but via lateral moves (upgrading skills or re-training workers for new skills to work in new areas).
- Training people (this can include formal or institutional training, and also learning that takes place in the job situation).
- Recognizing credentials (e.g. workers with foreign credentials or experience).
- Drawing upon migration, either from the rest of Canada, or foreign workers from other countries.

Conduct a comprehensive labour supply analysis, to identify the available supply for the occupations showing the highest incremental labour demand, but also for the "base growth" of Chapter 3. In addition, examine key occupations that show high average annual growth rates (even if actual numbers are small). A more detailed description of the work is given in Chapter 9 Labour Supply of the Demand Study.

Put in place a framework for apprenticeship programs that will attract and retain to completion sufficient numbers of workers to meet current and future growth as well as replace workers who retire or leave a trade.

Use the opportunity of the Olympics and concurrent projects to promote skilled trades as a career and attract people into the skilled trades — actions for both government and industry.

Ensure that maximum efforts are made to "share the wealth" and promote opportunities for workers in areas outside the Lower Mainland. — From Key Informants, Government and Organizations

Keep a watching brief for major projects in other parts of Canada and elsewhere between now and 2010, which will compete with the BC projects for labour, not only making it more difficult for BC to attract workers from outside the province, but possibly drawing BC workers away.

Chapter 10: Potential Demand-Supply Gaps

Ensure planning and consultation across the economy towards maximizing the efficiency of labour force transactions, and for leveraging programs that bring different parts of the labour market into planning/analyzing mode. (The Provincial Government's Human Resource Strategy initiative is one example, as is the Federal Government's Industrial Adjustment Strategy.)

Take measures to facilitate the recognition of credentials of qualified immigrant workers and others who are already in BC, and to ensure that licensing bodies are using criteria that are sufficiently flexible.

Take steps now to establish needed training structures and to inform workers and potential workers about opportunities for learning and employment.

Section 3: Data Sources and Methodology

In this Section, we will describe the source of data and basic models used to produce the estimates which lay the foundation of our analysis throughout the report. We will also describe the research approach we adopt to piece together all information and data to produce this report. To start with, we will describe the basic approach for the estimation of labour supply.

For the purposes of this report, we attempt to identify potential sources of incremental labour supply in the market. These include: graduates from universities, colleges, high schools, and private training institutions each year who pursue employment, as well as apprentices who have completed their training and successfully obtained certificates of qualification. Although we will also look at the pool of the unemployed we have been requested to consider what the potential supply would be excluding this group, given that the data we use could contribute to substantial double counting in the supply of labour. We will also look at the pool of those who have left income assistance to pursue work. Finally, we will study migration patterns of the population in order to gain an insight of sources of workers from outside the province, concentrating on in-migration only. We assume that out migration will diminish in the tighter labour markets generated by the Games and concurrent projects. We will describe each of these potential sources of labour supply in turn.

Once we have identified these elements of labour supply using available data, we will combine them to project the supply through our period of analysis in order to compare with additional demand. The role of the population projections is to enable us to push forward the current scenarios of each of the present-day supply estimates. In the latter part of this Section, we will describe the British Columbia population projections model, as well as some limitations and caveats to keep in mind in understanding the results of this study.

3.1 Graduates from Universities, Colleges, High Schools and Private Training Institutions

University Graduate Survey

Since 1995, British Columbia's public universities have been contacting baccalaureate graduates, both two and five years after graduation, through University Baccalaureate Graduates Surveys (UBGS). The reports resulting from the interviews provide information on the graduates' further education, employment and occupations, current job earnings, financing of university education and satisfaction with their education. All five universities are currently participating in the project, which are the University of British Columbia, Simon Fraser University, the University of Victoria, the University of Northern BC, and Royal Roads University.

The universities, together with The University Presidents' Council of BC (TUPC) and the BC Ministry of Advanced Education, collaborate and participate on the project. The project is funded by the Ministry of Advanced Education and managed by the Centre for Education Information Standards and Services (CEISS) under contract with the council.

For the purposes of this report, we have relied upon data of the 2002 Survey of 2000 Graduates, provided by TUPC. The data obtained detail the number of graduates employed by occupation (3-digit NOC codes) by program areas (6-digit CIP codes).

In total, there were 10,481 graduates from these five universities in 2000 were selected for the survey. A total of 6,357, or 61 per cent, of the total number of graduates participated in the survey. Of these who participated with the survey, 5,328 former graduates reported employed and appropriate occupational classification codes were assigned.

In this report, we assume that the employment and occupational distribution of those who did not participate in the survey follow a similar pattern to that of those participating in the survey. The corresponding number of former students assumed to be employed in 2002 was 8,759.

We are not able to measure possible changes in the program mix at universities. To the extent that program spaces are added in the demand occupations, supply will be increased. Widespread information about future openings will also have the effect of increasing supply.

College Graduates

The BC College and Institute Student Outcomes project collects and distributes information about former students' level of satisfaction with their educational experiences and their subsequent career and education outcomes. The data are collected approximately 9-15 months after students complete all, or a significant portion, of their program. BC has collected college and institute student outcomes information since 1988.

The Centre for Education Information Standards and Services (CEISS) manages the collection of student outcomes information on behalf of the Outcomes Working Group (OWG). The OWG represents the interests of the Ministry of Advanced Education (AVED), participating colleges and institutes and other system organizations. The student outcomes data is collected annually.

For the purposes of this report, we have relied upon data of the 2001 Survey of 2000 Graduates, provided by CEISS. The data obtained detail the number of graduates employed by occupation (3-digit NOC codes) by program areas (6-digit CIP codes).

In total, there were 30,457 graduates from participating colleges and institutes in 2000 were selected for the survey. A total of 18,567, or 61 per cent, of the total number of graduates participated in the survey. Of these who participated with the survey, 14,220 former students reported employed and appropriate occupational classification codes were assigned.

As with the data from the university graduate outcomes, we assume that the employment and occupational distribution of those who did not participate in the survey follow a similar pattern to that of those participating in the survey in this report. The corresponding number of former students assumed to be employed in 2001 was 23,115. Again, any change in programs offered would have to be factored in and publicity about opportunities could increase supply.

High School Graduates

In 2001 and 2002, the Ministry of Education contracted R.A. Malatest and Associates Ltd. to conduct surveys of graduates from the previous school year, in order to examine transition to post-secondary education and employment. Both surveys were administered by telephone. In 2001, 1025 graduates were contacted. In 2002, 903 graduates were contacted. In the *Ministry of Education Graduate Transition Survey* released in the Fall 2002, it was stated that, in 2002, 32.7 per cent of graduates reported working (full or part time) as their main activity during the past year. For the year 2001, 37.9 per cent of graduates reported working during the past year.

Based on Ministry of Education's estimate of the number of high school graduates in 1999/2000 and 2000/01 school years, we have been able to calculate that the estimated total number of graduates working in 2001 would be 37,488x0.379=14,208 and 38,282x0.327=12,518 in 2002.[3] This is based on the assumption that those who were not surveyed would have followed a similar employment pattern to those who participated in the survey.

However, the survey itself did not provide any information on the occupation distribution for those participated in the survey. Given that those high school graduates who were able to find work were most likely first-time labour market entrants, we have assumed that most of them (70 per cent) would have been in skill level D occupations.[4] In addition, we have assumed that the other 30 per

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[3] Available from http://www.bced.gov.bc.ca/k12datareports/02sldtxt/1562.txt

[4] Skill level C occupations in the National Occupational Classification systems are those considered intermediate occupations, requiring high school, plus some training courses or on-the-job training. In NOC codes, skill level C occupations are those with a second digit in "4"s or "5"s. Skill level D occupations are those considered labouring and elemental occupations, requiring up to two years of secondary school plus some on-the-job training. In NOC codes, skill level D occupations are those with the second digit in "6"s.

cent of them would have been in skill level C occupations. We have relied upon estimates of employed by occupation in year 2001 and 2002, available from the Canadian Occupation Projection System (COPS), to calculate each skill level D occupation's share. By applying these shares to the estimated number of employed high school graduates, we can arrive at the estimates of high school graduates in these occupations in year 2001 and 2002.

Graduates from Private Training Institutions

The December 2000 report on findings from the *On Track - Private Training Outcomes Survey* project is the source of information for graduates of private training institutions in BC. The survey was administered to graduates of private training institutions in BC, and former students who completed at least 75 percent of their program. Approximately six months after leaving the institution, graduates and former students are surveyed, by telephone, to obtain their views on the training they received and collect information on their employment status.

This December 2000 report presented a summary of findings collected during the 13-month period from March 1999 to March 2000 from former students who graduated (or would have graduated for those who left prior to completion) between September 1998 and February 1999. In total, 4,541 graduates and former students of 267 institutions participated in the survey, achieving a response rate of 60 percent.

On the other hand, there are limitations to the dataset as presented in the report which prevented us from deriving a more comprehensive picture of the employment by occupation of all students trained in private institutions in BC. These limitations include:

- Although the report stated that 4,541 graduates and former students of 267 institutions participated in the survey, there was no estimate of the total number of private training institutes in the province.
- Although the report provided fairly detailed outcome analysis for graduates and former students in 15 program areas, there were no program specific response rates which would allow us to derive the overall cohort population studied in each program area.
- In terms of employment outcomes for graduates and former students in each program area, only limited occupational distribution was identified for those who reported finding new/different work as a result of the training, but there was no information on those who found work in the same occupations as they were prior to taking up training.

In whole, we have been able to identify 1,237 out of 2,726 graduates and/or former students (who reported to have found new/different work as a result of training) with specific occupation details. We recognize that this will be an undercount of all graduates from private training institutes. However, given the limitations of the dataset, we will focus only on the estimate of roughly 1,200 graduates from private training institutes per year as a source of labour supply.

3.2 Apprenticeship Completers

Data on the number of apprenticeship completions from 1990 to 2000, available from the Registered Apprenticeship Information System (RAIS), was provided to us by the Ministry of Advanced Education. RAIS data is collected and administered by Statistics Canada, and completions are shown under trades areas.

We converted apprenticeship completion data by trades area into specific 4-digit NOC occupations. Subsequently, appropriate 4-digit occupations were grouped into 3-digit ones. Using data from 1990 to 2000, we estimate that an average of 2,800 apprentices per year successfully complete training program and obtain certification.

The registered apprenticeship completion data from Statistics Canada only covers completions by registered apprentices, but Statistics Canada does not have data on completions by “non-apprentices” who receive trades certification (those known as Trades Qualification Challengers who are approved to write and successfully pass an interprovincial Red Seal or provincial trade qualification exam). Certifications of “non-apprentices” provide an additional significant source of new qualified tradespersons next to apprenticeship completions in BC During the 1990’s, the number of non-apprentices in B.C. receiving certification averaged about 2,500 per year, compared to an average of about 2,800 per year in apprenticeship completions, according to information provided to us by the Ministry of Advanced Education.

Given that there are no occupation specific details of these Trades Qualification Challengers, we have assumed that they are of the same distribution as that of the registered apprentices.

3.3 Unemployed and Off Income Assistance

Unemployed

Data on the number of unemployed by occupation in BC was obtained from a custom cross-tabulation by Statistics Canada. They are 2001 Census data, detailing the number of unemployed in the experienced labour force by Standard Occupation Classification (SOC). We subsequently converted the data to conform to the NOC. Since many unemployed workers are out of work because they have lower skills, experience or personal suitability compared to the employed labour force, we have considered this group as a potential source of workers only, requiring upgrading in order to make a better contribution to the labour force.

Unemployed workers have the possibility of becoming sources of labour for the Games and concurrent projects. They also could benefit from volunteer opportunities. However, the fact that they have not yet been successful in obtaining works indicates that they are less likely to have the level of skills, experience, personal qualifications, etc. that those currently working possess. Also, the data available could represent substantial double counting of labour supply. Therefore, it is best not consider this pool as a work-ready source of supply unless and until steps are taken to measure their current qualifications (both hard such as technical skills and soft e.g. health, work-readiness and people skills). Steps would then need to be taken to determine which deficiencies could be corrected and appropriate programs implemented to do so.

Off Income Assistance

We have been able to obtain monthly data on the number of leavers from the BC Income Assistance system between October 1993 and March 2003, provided by the Ministry of Human Resources. During the past 36 months, the average number of income assistance leavers per month was 8,900 in 2001, 8,600 in 2002 and 7,600 in 2003, representing an average annual decline rate of 7.7 per cent. On the other hand, given that the number of income assistance cases continued to decline over the past two years, it is not realistic to expect that the number of leavers will continue to decline at the same rate. For the purposes of this report, we have assumed that the monthly number of income assistance leaver will average 5,000 per month as a source of the pool of labour supply. It should be noted that policy changes could impact this number on a one-time or on-going basis depending on the nature of the change in policy, as it has in the past year or two.

We have also relied upon information from the report *MHR Exit Survey – Fall 2002*, produced by the Economic Analysis Branch of the Ministry of Human Resources, to estimate the number of “employable” income assistance recipients. It is stated in the report that between 60 and 70 per cent of leavers stay off income assistance for at least six months. Further, approximately 67 per cent of those staying off income assistance for at least six months reported employment and appropriate NOC codes were assigned.

3.4 Interprovincial and International Migration

Data on the number of interprovincial and international in-migrants by occupation in BC was obtained from a custom cross-tabulation by Statistics Canada. They are 2001 Census data, detailing the number of migrants in the experienced labour force during the previous five years by Standard Occupation Classification (SOC). We have calculated the average number of migrants per year and converted the data to conform to the NOC.

The basic model we will use to project for the 2003-2015 period is the population projection model by BC Stats. In the following section, we will provide an overview of this model. Note that different projections of population and migration would yield different results. Since patterns of movement into and out of BC, especially with respect to inter-provincial migration, have changed dramatically over the decades, it may be useful to do some sensitivity analysis on changing levels of migration. One step this report takes in this regard is to consider only in-migration assuming out-migration of workers in demand will be minimal during the tight labour markets generated by the Games and the concurrent projects. This assumption would be weakened if there are major projects outside of BC during the relevant years.

3.5 BC Population Projection Model

BC Stats maintains the provincial population projection system and has produced a series of population forecasts on an annual basis. The forecast series that we have relied upon in this report is Forecast 02/05, produced in May 2002. This model is widely used by both the public and private sectors for planning purposes.

Forecast 02/05 provides forecasts of the size as well as age and sex structure of the population of British Columbia from 2002 to the year 2031. The forecast is the result of the application of a "Component/Cohort-Survival" population model to assumptions dealing with fertility, mortality and migration.

The Component/Cohort-Survival method requires separate forecasts of each of the components of population change, namely fertility, mortality and migration. With this information, and with a base year age-specific estimate of population, a forecast for any subsequent year is made by promoting each age group in the preceding year to the next highest age group, while at the same time taking into account the effects of net migration, deaths and births.

The base population adopted for this forecast was the July 1, 2001 preliminary postcensal population estimate by sex and single year of age for British Columbia, prepared by Statistics Canada. Forecast of each of the components of population change is in turn dependent upon a different set of variables.

In general, all assumptions relating to migration, births and deaths are based on past conditions, modified wherever possible to take into consideration possible future changes. Consequently, the resulting population projections are not necessarily what will be, but rather what could be given the realization of these conditions. It is certainly possible that unforeseen changes in factors such as government policy, economic development, land use and zoning will affect future populations. Consequently, the projections should be regarded as only one possible scenario of the future size and age/sex structure of the population.

In the remaining parts of the report, we will combine our estimates of individual sources of labour supply and the projected population growth rates to provide an idea of the labour supply over the 2003-15 period. This is summarized in the following Table 3.

Table 3: Sources of Labour Supply	
Source	Population Growth Rates Applied
University Graduates	Age 15-64 cohort
College Graduates	Age 15-64 cohort
High School Graduates	Age 15-24 cohort
Graduates from Private Training Institutes	Age 15-64 cohort
Unemployed	Age 15-64 cohort
Off Income Assistance	Age 15-64 cohort
Inter-provincial Migration	In-migration cohort
Net International Migration (Immigration)	Net immigration cohort

It should be noted that we use the age group 15-64 as the base population for post-secondary graduates. This is because life-long learning has become much more the norm in the 21st century than has been the case in the past. Many post-secondary educational programs now draw heavily on upon mature adults with prior work experience, especially in the more applied programs related to the occupations we are discussing here. The technology of distributed learning is enhancing this trend.

The only exception to this method of forecast is with the number of apprentices for the 2003-15 period, on the basis that the number of completions in the future is more likely to be a function of economic conditions, as opposed to merely natural population growth. For this source, we calculate the average annual growth rates for each area of the registered apprentices and apply them to the level of completion in these occupations in 2000. For all apprentices, the average annual growth rate is 1.3 per cent. We also assume that the number of Trades Qualification Challengers will grow at a rate of 1.3 per cent as well. Once the total in each year is calculated, we further allocate it to each trades area using the same distribution as registered apprentices.

3.6 Limitations and Caveats

While the approach we take in this study in encompassing sources of labour supply uses data available to describe each of these sources, it should be kept in mind that there are limitations to this approach.

- Overlapping – each of the sources of supply we described in this section is from a separate data source. As each data source collects information using a different time reference, the same individual could be counted twice. An example of this would be a worker coming to BC to take a college program and being counted as both an in-migrant and a college graduate. To the extent that some overlapping and therefore double-counting occurs, there will be some over-estimation for the overall labour supply, and possibly more so for certain occupations.
- Long-term Projection Risks – we have implicitly assumed that the capacity of the supply sources (e.g. colleges, schools) will match the projections that are developed in this report, and that behavioral choices such as choice to move between provinces will continue to follow the patterns observed historically. To the extent that this may not be the case in our period of analysis, resulting gaps represent either over-estimates or under-estimates.
- Regional Dis-aggregation – all the sources of labour supply data that we utilize for the purposes of this report apply to the province as a whole, and do not entail any specifics on regional distribution. In this regard, we note that there is yet to be developed a labour supply model that could capture the dynamics of changes in labour supply within the province.
- Inter-occupational Mobility – due to the shortage of time and data available, this is a topic which has not been addressed in this study. Although this does not affect the overall level of labour supply, it does contribute to some under-estimation of supply in certain occupations. It is very common, for example in the hospitality industries, that a person starts with an entry-level job, progresses through a series of different positions, and eventually moves to a supervisory position. We recognize the limitations of the data in this respect, try to point them out wherever possible and caution readers to use their own judgment.
- Data in Person-years – measuring data in person years underestimates the numbers of workers needed when jobs generally last for less than one year and similarly over-estimates the individual workers needed when jobs last more than one year. We indicate the likely implications in Section 6 below.

Section 4: Population Trends and Forecasts

Population Forecast

Population forecasts used in this report have been gathered from BC Stats. Historical data and long-range forecasts done by BC Stats also include detail of expected age distributions, and population growth attributable to net international immigration, net inter-provincial migration, and population growth due to natural increase.

Figure 2: Population Forecast

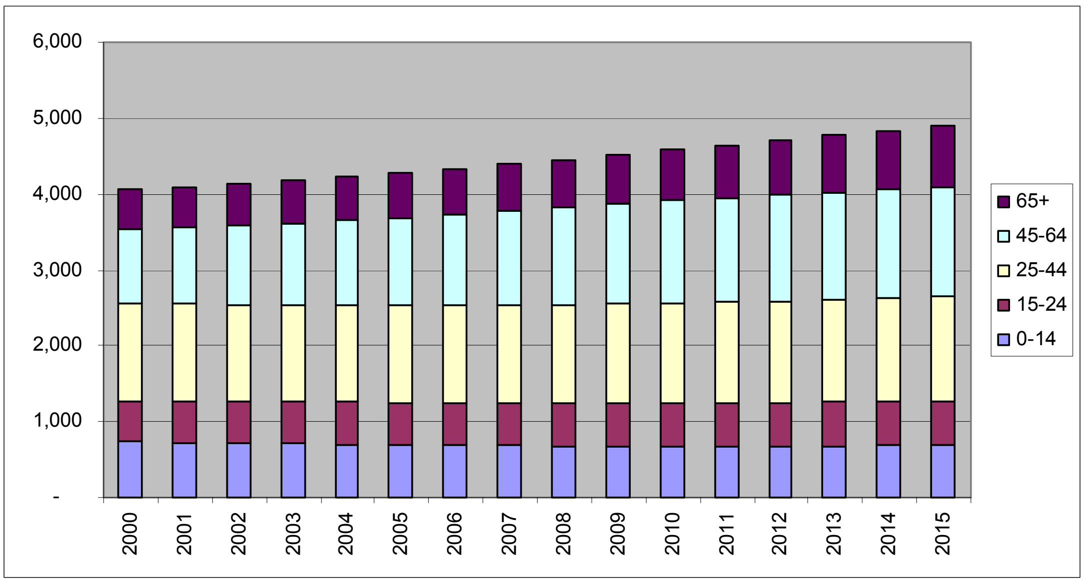
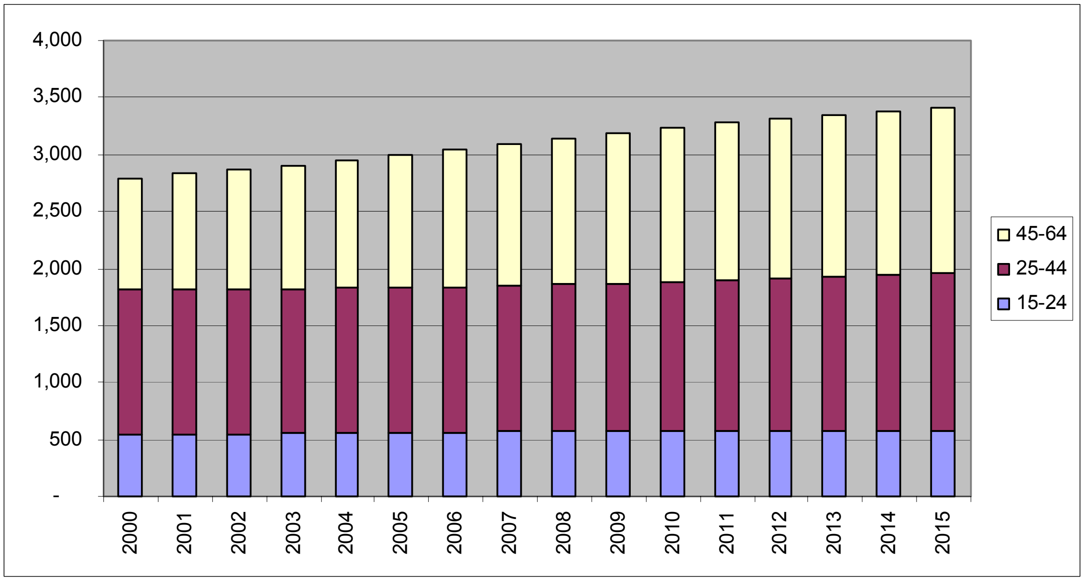


Figure 2 illustrates BC Stats' population forecast to 2015 by major age groups. We have focused on the 15-24, 25-44 and 45-64 age groups in order to assess population growth expected among young workers, an important source of labour supply for many of the unskilled occupations that will be needed for the Games, and to show the trend aging of the BC workforce highlighted in the demand report. As Figure 2 illustrates, at the end of 2002 there were about 4.13 million people in the Province and this total is expected to increase to about 4.6 million in 2010 and 4.9 million in 2015. Examination of the chart and underlying data show that the current population growth rate of about 0.9% in 2002 is expected to increase to about 1.4% in 2008 and 2009, after which growth is expected to fall to about 1.3% per annum by 2015.

With 30.8% of the population in 2002, the 25-44 age group is the largest age cohort of the population and currently leads the 25.3% share held by the 45-64 age cohort. These positions are expected to equal by 2008, with the 25-44 and

45-64 age groups holding 28.9% and 28.8% respectively, after which older workers will be the largest age cohort in the BC population.

Figure 3: Working Age Population



This reversal in positions of the older and younger working age population reveals the already well-known ageing of the labour force. Figure 3 shows that the number of population aged 15-24 is expected to remain relatively stable, the number of population aged 25-44 will grow slightly, and the number of population aged 45-64 (and 65+ age group) will grow relatively quickly over the forecast horizon. This ageing of the working age population and increase in the number of retirees will decrease the labour force participation rate. The 2001 Census indicates that in 2001, the BC labour force numbered about 2.06 million workers and the working age population numbered about 2.8 million, yielding a participation rate of 72.8%. Preliminary projections indicate that by 2015 the BC labour force should increase to 2.29 million and the working age population should reach about 3.4 million, yielding a participation rate of about 67.3%.

Table 4: Population Age Cohorts and Compound Annual Growth Rate, 2002-2015					
Age Cohort (data in '000s)	2002	2006	2010	2015	CAGR
Population aged 0-14	715.4	686.8	674.7	689.4	-0.3%
Population aged 15-24	549.0	563.6	575.6	568.9	0.3%
Population aged 25-44	1,272.7	1,274.9	1,307.8	1,384.3	0.6%
Population aged 45-64	1,043.6	1,201.6	1,351.8	1,449.4	2.6%
Population aged 65+	552.2	603.5	669.7	807.3	3.0%
Total Population	4,132.9	4,330.3	4,579.5	4,899.3	1.3%
Working Age Population	2,865.3	3,040.0	3,235.1	3,402.7	1.3%
Labour Force	2,077.6	2,154.0	2,240.0	2,289.1	0.7%
Participation Rate	72.5%	70.9%	69.2%	67.3%	-0.6%
Source: BC Stats, RKA Estimates					

Population forecasts by age cohort sampled in Table 4 are from BC Stats and the labour force and participation rates are RKA estimates based on Census data for 1991, 1996 and 2001.

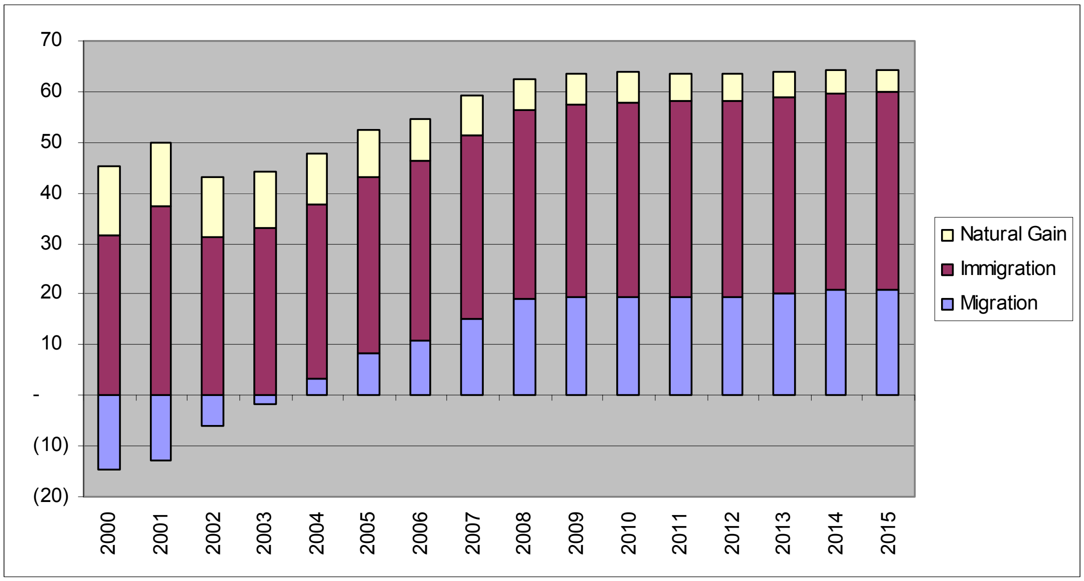
Table 5: Population Gains by Source, 2002-2015					
Primary Source (data in '000s)	2002	2006	2010	2015	CAGR
Total Population	4,132.9	4,330.3	4,579.5	4,899.3	1.3%
Increase during year	37.0	54.6	63.8	64.2	4.3%
Increase from migration	-6.0	10.6	19.4	20.9	nm
Increase from immigration	31.1	35.3	38.5	38.9	1.7%
Increase from natural gain	12.0	8.4	5.9	4.5	-7.3%
Source: BC Stats					
Note: "nm" means not meaningful					

Additional detail of migration and immigration is given in the following sub-section. Table 5 indicates that the most important sources of population growth are expected to be net migration from other provinces and immigration. Movement into BC is even more important if we are correct in our assumption that out-migration will decrease in the tighter labour market generated by the Games and concurrent projects. Mitigating population growth is the falling birth rate due to the overall aging of the population and resulting fall in the number of population aged 0-14 currently being experienced, as shown in Table 4, and the fall in the number of population aged 15-24 expected to begin after 2010.

Migration, Immigration and Natural Increase

BC Stats has available historical statistics on migration, immigration and natural population growth from 1971 to 2000, and forecasts to 2030. For the purposes of this study, we have focused on the 2000 to 2015 period. In total, the net gain in BC population from these three sources is expected to increase from 30,761 in 2000 to 54.6 thousand in 2006; 63.8 thousand in 2010; and 64.2 thousand in 2015, as shown in Table 5.

Figure 4: Net Migration, Immigration and Natural Gain



Between 1997 and 2002, net inter-provincial migration was negative. BC Stats data anticipate that during 2004, net inter-provincial migration will return to positive levels and increase to nearly 20,000 people per year thereafter. Between 1997 and 2002, inter-provincial in-migration was below 50,000 every year, much lower than the over 70,000 per year level at the beginning of the 1990's. BC Stats data also anticipate that from 2004, inter-provincial in-migration will resume an annual level of approximately 65,000 persons.

During the 1990s, net international immigration oscillated in the range of about 30,000 to 50,000 people per year, with a peak of 50,000 in 1997 probably associated with the expiration of the U.K. Government's lease on Hong Kong territory. BC Stats expects net international immigration to rise from about 33,000 in the current year to 39,000 in 2015.

Immigrants coming to the country generally have some expectations of a career path in the local labour market. Therefore in considering immigrants as a valuable source of labour supply, it is important to understand what these expectations are. On the other hand, it is equally important to compare the actual occupational distribution of immigrants with their intended career paths to see where the gaps are.

For the 25 occupations we focus on in this report, Table 6 shows the share of "intended" occupations as opposed to the share actually worked in those occupations in BC. The information shown in this Table highlights the discrepancies, sometimes huge, between expectations and reality. On the positive side, this may also be an indication that new immigrants are relatively quick to respond to the local labour market conditions and make appropriate adjustments accordingly.

Table 6: Share of Intended and Actual Occupations for Immigrants

Occupations	Intended	Actual	Difference (Actual-Intended)
642 Retail Salespersons & Sales Clerks	0.6%	4.5%	4.0%
664 Food Counter Attendants & Helpers	0.1%	3.2%	3.1%
666 Cleaners	0.1%	3.1%	3.0%
661 Cashiers	0.1%	2.2%	2.1%
645 Occ's in Food & Beverage Service	0.3%	2.3%	1.9%
062 Managers in Retail Trade	0.3%	2.1%	1.8%
143 Finance & Insurance Clerks	0.4%	1.7%	1.3%
063 Managers in Food Service & Accommodation	0.3%	1.6%	1.3%
741 Motor Vehicle & Transit Drivers	0.3%	1.5%	1.3%
624 Chefs & Cooks	1.1%	2.2%	1.2%
945 Machine Operators: Fabric / Fur / Leather	0.0%	1.0%	1.0%
414 Secondary / Elementary School Teachers & Counsellors	0.9%	1.5%	0.5%
729 Other Construction Trades	0.0%	0.5%	0.5%
071 Managers in Construction & Transportation	0.1%	0.5%	0.3%
727 Carpenters & Cabinetmakers	0.2%	0.5%	0.3%
667 Travel / Accommodation / Recreation Attendants	0.0%	0.3%	0.3%
761 Trades Helpers & Labourers	0.3%	0.5%	0.2%
643 Occ's in Travel & Accommodation	1.0%	1.1%	0.1%
525 Athletes, Coaches, Referees & Related Occ's	0.2%	0.3%	0.1%
721 Contractors & Supervisors, Trades & Related	0.3%	0.1%	-0.1%
122 Administrative & Regulatory Occ's	2.0%	1.7%	-0.3%
513 Creative & Performing Artists	1.4%	1.0%	-0.4%
647 Childcare & Home Support Workers	4.3%	3.8%	-0.5%
111 Auditors / Accountants / Investment Professionals	5.2%	2.2%	-3.1%
216 Mathematicians / Analysts / Programmers	17.4%	6.9%	-10.5%
Source: Ministry of Skills Development and Labour for information on the number of Landed Immigrants in intended occupations; Statistics Canada, Census 2001 for immigrants by occupation			

As noted in the previous sub-section on population, growth due to natural increase (births minus deaths) has been falling since 1994. Natural increase is expected to continue to fall from the 2002 level of 12,000 to 8,400 in 2006, 5,900 in 2010 and 4,500 in 2015. Thus, immigration becomes a very important source of labour, especially given the flexibility of immigrants and their willingness to move to occupations in demand.

Section 5: Student Outcomes

The terms of reference for this study requested that RKA include data on student outcomes. This is relevant to the Games because incremental demand for workers will be concentrated in 25 occupational groups identified in the demand report, which is a cross-section of skilled and relatively unskilled occupations. Lower skill categories include transit drivers, retail salespersons and clerks, cleaners, cooks, food and beverage service workers and counter attendants, and cashiers. Higher skill workers will include auditors, educators, financial service workers and others. To the extent gaps exist between the occupations that will be in relatively high demand, and the sources of supply among educational institutions of various types, it will be helpful to identify these for policy and planning purposes.

We begin with a forecast of college and university graduates expected to be occupied in specific occupational categories, then turn to other potential sources of supply mentioned in the terms of reference including high schools, private training organizations and apprenticeship programs.

5.1 University and College Outcomes

University Outcomes

University outcomes data were made available from the 2002 Graduate Outcomes Survey from The University President's Council (TUPC). These data track occupational categories that university graduates find work in two years following graduation, or for year 2000 graduates employed in 2002 when the survey was done. A cross-tab of occupational outcomes based on field of study was requested and RKA has obtained some sample data, however, the likelihood that past experience is a useful predictor of future occupational outcomes is likely to be limited. The main reason for this is that while many students choose fields of study based primarily on personal preferences and inherent skills endowments (such as music, languages and athletics, for example), many other students deliberately select education and training based on job, career and pay prospects, which change with the business cycle. Two obvious examples of this selection are the growth in electrical and electronic engineering and software and computer engineering during the 1990's, and more recent increased interest in natural sciences, particularly areas such as biology and chemistry, and related disciplines such as bio-informatics.

A second factor to bear in mind is the evolution of educational programs themselves in response to changing student and job-market demands, as well as changes in policies. Clearly, therefore, ongoing survey work must be undertaken to track changes in college and university programs and occupational outcomes from these programs.

The data from 2002 indicate that occupationally specific outcomes are available for approximately 8,759 university student graduates. Based on the working age population growth estimates from BC Stats, this number is expected to grow to about 10,360 by 2015.

The top 25 occupational categories of interest for this report comprise about 3,970 of the 8,759 university graduates or 45.3% of the total university graduate outcomes data (counts) available from the Field of Study Matrices obtained from the UBGS TUPC data.

College Outcomes

College Outcomes data were made available from the Outcomes Working Group of the Centre for Education Information Standards and Services. Like the university data, these data track occupational categories that college graduates find work in. However they follow a nine-month timeline from graduation and capture the career start, but not career movements thereafter.

The college outcomes data in 2002 reflect occupational detail for some 23,115 graduates, thus providing a larger pool of potential labour for occupational categories of interest for the Games and concurrent projects overall relative to university graduates. However, for the top 25 occupational categories of interest for this report, college outcomes data comprise about 8,775 or 38% of college graduates overall. For the top 25 occupational categories of interest therefore, college graduates appear to be a larger potential pool of relevant labour supply relative to universities (8,775 from colleges versus 3,970 for universities in 2002).

5.2 High School, Private Training and Apprenticeships

Data on high school, private training and apprenticeships program graduates is somewhat patchy. Occupational distribution of graduates from these sources is largely unavailable however we have made some assumptions with respect to the distributions for the purpose of this study.

High School Graduates

Data has been obtained from the Ministry of Education Transition Survey, which measures the number of high school leavers who go into the work force upon leaving high school, but does not track occupational categories once students have left. We have assumed that high school graduates fall within skill level “C” and "D" occupations.[5] The total of such skill level "C" occupation counts from 2002 is 3,755 new workers, and the total of skill level "D" occupation counts is 8,763 new workers. Of this total number of new workers at 12,518, approximately 6,079 or 49% are assumed to fall into the top 25 categories of interest. Primary among these are *Cashiers*, *Cleaners*, *Trades Helpers and Labourers*, and *Retail Sales Clerks*. Clearly, high school graduates who enter the work force upon graduation may start in C or D level occupations and/or subsequently take any number of further routes into higher education, trades training of various types or "churn" from the initial occupational category they find work in to another category. However, given that many jobs required to be filled due to the Games and concurrent projects will be relatively unskilled high school graduates are a key source of supply for such jobs.

It should also be noted that the need for first level management in several occupations may draw experienced workers out of the C and D level occupations into supervisory positions as such positions are most often filled from within the industry. This would generate even more demand for entry level workers, increasing any potential gaps.

Private Training

There are a great many private training facilities in BC, many of which are very small, do not survive for long periods, and/or cater for the needs of student-clients that are not appropriate targets for, or may be ineligible for, jobs related to the Games and concurrent projects. For example, there are many dozens of English language schools in the lower mainland that cater to Asian students who stay temporarily on student visas for English language training. Survey data indicate enrolment reached approximately 1,237 or so in 2001 for various private training facilities.

For planning purposes, we consider that a guesstimate of some 2,000 enrolled per year may be appropriate. The survey data obtained indicates that some 500 to 600 students enrolled in private training in 2002 were in the occupational categories of interest, primarily *Mathematicians, Analysts and Programmers* (129); *Retail Salespersons and Sales Clerks* (127); *Occupations in Travel and Accommodation* (58); *Finance & Insurance Clerks* (51); *Occupations in Food and Beverage Service* (39); *Chefs and Cooks* (31); *Childcare and Home Support Workers* (25); and *Motor Vehicle and Transit Drivers* (24). The remaining few appear to have trained for occupations falling within the categories of *Cashiers* and *Secondary and Elementary School Teachers and Counsellors*. The latter category must however be considered somewhat cautiously since the vast majority of educators and those involved in professional roles in primary and

[5] Skill level C occupations in the National Occupational Classification systems are those considered intermediate occupations, requiring high school, plus some training courses or on-the-job training. In NOC codes, skill level C occupations are those with a second digit in "4"s or "5"s, e.g., NOC 141 Clerical Occupations, General Office Skills. Skill level D occupations are those considered labouring and elemental occupations, requiring up to two years of secondary school plus some on-the-job training. In NOC codes, skill level D occupations are those with the second digit in "6"s, e.g., NOC 661 Cashiers.

elementary schooling come directly from Education programs in universities and colleges or indirectly from other degreed courses (e.g., sciences, mathematics, physical education, others), some from trades, and some from prior professional careers that have applicability in primary and secondary education.

It should be noted that, according to initial data searches, the Private Training Outcomes Survey is no longer being done, past data is considered too old for use, and therefore the estimates contained herein may be either under- or over-estimates.

It should also be noted that private training might be an appropriate solution to fill specialized niche shortages that may emerge but were not revealed by the more aggregate nature of the current study. For example, police and security workers did not emerge as a separate category in either our demand or supply analysis. On the demand side, employers may not plan for such workers as their functions are often contracted out. Any supply may be hidden in the more aggregated occupational groups, if it exists. Private trainers, putting on specialized programs, could help fill gaps in areas like these.

Apprenticeships

The BC Industry Training and Apprenticeship Commission had formerly managed a database called the Apprenticeship Information Management System (AIMS). We understand that maintenance of this database is no longer the responsibility of the Commission, and may be redeployed with the Industry Training Authority or the Ministry of Advanced Education. The Registered Apprenticeship Information System (RAIS) managed by Statistics Canada has been the primary source of the apprenticeship data we have used. Approximately 2,800 trade certification completions per year are reported to RAIS. An additional average of about 2,500 trades-people also writes the exams each year as challengers in order to obtain formal certification. In some trades, the ratio of new certifications to challengers is very high; in the case of *Chefs and Cooks*, we understand that the ratio is nearly 1:1.

Challengers are, in fact, trades-people with prior experience who have not previously been formally accredited. Challengers who successfully get certification may not be incremental sources of supply, since they are already working in their trade, therefore for planning purposes it may be appropriate to consider the maximum incremental apprenticeship outcomes as a source of new labour at 2,800 new trades-people per year.

5.3 Volunteers and Target Groups

Volunteers

As summarized in Section 2.1 of this report and discussed in great detail in RKA's demand report, there will not only be incremental *paid* employment demand as a consequence of the Games and concurrent projects over the 2003-15 period, there will also be a substantial demand for *volunteers* for the Games itself in the months leading to it. We estimated a minimum count for Vancouver-Whistler of 25,000–30,000 volunteers. We learned that the Vancouver 2010 Bid Corporation has estimated 21,500 volunteers, roughly 17,800 for the Olympic Games and 3,700 for the Paralympics, with overlap difficult to predict.

On the supply side, we learned that the Vancouver 2010 Bid Corporation already has indications of a sufficient number of volunteers coming forward, with 100,000 people already having registered their interest in volunteering. Experience in past events of the same magnitude, such as Vancouver's Expo 86 and Calgary's 1988 Winter Games, indicates that many volunteers came to such events with high level of skills and competence. The issues that require attention are matching of skills with volunteer positions, and recognition of the volunteer jobs as a valuable resource to be allocated amongst the communities in the local area, and the benefits that skills gained through volunteering can bring back to the worksite.

We do not need to duplicate what we have already discussed in the demand report. However, we would emphasize that the pool of volunteers may come from those already employed, as well as from the same sources of supply we have focused on in this report. These include graduates from the education and training institutions, and those unemployed and seeking work. The implication of some of these sources of labour going after volunteer work is that it could create pressure for the need to fill paid job vacancies. In this regard, we note that attracting persons who normally would not be in the labour force, such as those in the 65 years and plus age cohort, into volunteering would be a desirable option.

Target Groups

Finally, supply from three sources of distinct target groups is worth attention, both for potential paid work and volunteer work. The first two are the First Nations people and those living in the Vancouver Downtown East Side. In this regard, we note that they do not represent additional sources of supply of labour as they are already counted in, for example, the pool of unemployed. However, the Vancouver 2010 Bid Corporation has emphasized that the Games to be hosted will be an "inclusive" one, trying to ensure that it will maximize benefits to all British Columbians across all regions in the province.

As has been documented in much detail in RKA's demand report, these two target groups of individuals are much disadvantaged in the labour market. Persons with an Aboriginal identity tend to be underrepresented in highly skilled occupations, and over-represented in low skill occupations. (We will provide more analysis in this respect in Section 7 later in this report.) Many living in the Vancouver Downtown East Side face serious barriers to meaningful employment due to drug addiction and/or health problems, so that there are no simple solutions to overcome these barriers. It is therefore appropriate that potential opportunities from the Games and concurrent projects be made known to these groups of individuals, and pro-active community initiatives and measures taken.

Workers with disabilities are another source of labour supply that is often overlooked. There is no comprehensive data base on the workforce that records disabilities. Also, any specific physical or mental disability may limit a worker to certain jobs, but present no barriers in other occupations.

We recommend making it known that positions are open to any worker who can fill them and dealing with organizations that work with workers with disabilities to ensure that they are included in the labour supply and have access to any needed upgrading or assistance.

Section 6: Labour Force Projections and Gap Analysis

RKA has gathered data comprising potential sources of additional labour: (i) for the period leading up to the Games, and shortly thereafter; and (ii) during the periods in which the concurrent projects (VCEC, RAV and STS) will be undertaken.

As noted previously, the focus of the analysis has been on the top 25 occupational groupings identified in the demand report as being the occupations likely to experience highest growth. Given the complexity of forecasting detailed (i.e., 3-digit) categories so far into the future, our approach has been to allow counts by occupational group obtained from various sources to trend according to either historical growth rates or according to growth rates in the relevant population age cohort, as forecast by BC Stats.

Some qualifications should be kept in mind when examining the results below.

- First, within the three digit occupations that we have looked at may be components that do not follow the pattern of the larger group. For example, certain accountants may be in excess supply while there is a shortage of accountants with other skills or experience. Similarly, there may be subsets of occupations that we did not examine that will present potential gaps. We recommend on-going qualitative analysis with employing groups to cover this issue.
- Second, given the data available, our measurements of demand are in person years. This could be one person working full time for an entire year or two people working full time for six months or five people working one day a week, etc., etc. However, the actual human beings cannot work two full time jobs at the same time or hold two part time jobs if they are not in the same place. The results below do not measure this factor. Therefore, an occupation that may appear to be in balance could have potential gaps at one time and surpluses at another and any imbalances indicated could be exacerbated by this factor.
- Third, the numbers below have not taken into account inter-occupational mobility which could be significant if workers are aware of future opportunities and have access to openings and upgrading. This would increase the labour supply.
- Fourth, much of our data was not available at a sub-provincial level. Therefore, our results assume that workers are perfectly mobile within the province. To the extent that this is not true, supply is less than indicated.

Given the above-mentioned factors, our results should be treated as general indicators which describe the most likely areas of large labour market problems and point to the detailed areas for further analysis.

The potential sources of supply included in this analysis for the period 2003 to 2015 have been as follows:

1. University Graduates – graduates by occupational category two years following graduation. Data obtained is for 2002, therefore reflecting occupations of graduates from the 2000 graduation year.

2. College Graduates – graduates by occupational category nine months following graduation. Data obtained is for 2001, therefore reflecting occupations of graduates from the 2000 graduation year.

3. High School Graduates – graduates entering the work force are available from the Transition Survey as indicated above, however occupational detail is not. We have allocated high school graduates entering the work force into skill levels “C” and “D” jobs.

4. Persons in Private Training – we have included information on private training outcomes however this data lacks specificity in terms of occupational categories in which graduates of private training institutes and schools find themselves subsequent to graduation. It should be noted that the numbers are, overall, very small.

5. Apprenticeship Certifications Awarded – as noted above there is likely to be a high degree of double counting in these data because many tradespersons who are already in labour force occupational groups are so-called “challengers” of the tests used to assess adequacy of skills and award Certifications. As in the case of person in private training, the numbers are very small, however, Apprenticeship Certifications will be an important area to monitor in future because of the high number of construction tradespersons that will be required for the Games and concurrent projects.

6. Immigrants – data for 2001 has been obtained from Statistics Canada and is quite detailed in terms of occupational categories. In comparison with BC Stats’ immigration forecast, these Statistics Canada data identify occupational categories for some 47% of net immigration counts in BC Stats’ immigration forecast.

7. Migrants – Inter-provincial migration data, also from Statistics Canada, is quite detailed in terms of occupational category counts. In comparison with BC Stats’ in-migration forecast, these data identify occupational categories for some 39% of in-migration counts in BC Stats’ migration forecast. The remainder is likely to be comprised of groups such as workers for whom occupational detail was not collected, children and elderly dependents, independent retirees, migrants who moved to BC after immigrating to other

provinces from other countries, students, and others not in the labour force. As pointed out earlier in the report, we have only used occupationally detailed data pertaining to inter-provincial in-migrants.

8. Persons leaving Income Assistance – these data were obtained from the Ministry of Human Resources. In general, approximately 5,000 persons per month come off of income assistance. Of these 5,000, approximately 70% remain off of income assistance for six months and of this approximately two-thirds find employment.

9. Unemployed – these data were obtained from Statistics Canada by occupational grouping for 2001. However, as pointed out earlier in the report, we have assumed zero supply of labour from this pool of workers.

In total, we have included eight potential sources of labour supply by occupational category and compare these potential sources with the corresponding additional demand analyzed in the demand report. The results reveal likely worker shortfalls and surpluses and comprise the gap analysis in this report.

Table 7: Labour Demand Summary Results, 2003-2015

Total Openings in Base Model and All Games and Concurrent Projects by Top 25 Occupations, 2003 to 2015

Demand by Occupation and Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
062 Managers in Retail Trade	2,340	2,788	2,511	2,179	2,105	1,620	1,641	2,205	1,615	1,316	1,322	1,317	1,309	24,269
063 Managers in Food Service & Accommodation	747	1,983	1,160	1,724	2,716	705	3,428	2,717	1,909	1,648	1,674	1,664	1,637	23,713
071 Managers in Construction & Transportation	628	752	1,036	1,179	1,141	1,070	962	1,012	870	671	679	685	689	11,375
111 Auditors / Accountants / Investment Professionals	2,029	2,547	2,753	2,216	2,612	2,372	2,424	3,113	1,631	1,730	1,749	1,762	1,768	28,706
122 Administrative & Regulatory Occ's	1,605	1,711	2,066	2,261	1,036	2,386	1,210	1,978	1,312	1,329	1,344	1,355	1,362	20,953
143 Finance & Insurance Clerks	1,180	1,743	2,527	2,568	1,193	1,511	1,767	566	733	1,551	1,566	1,576	1,580	20,058
216 Mathematicians / Analysts / Programmers	3,226	2,342	2,244	2,678	2,493	1,535	2,937	1,797	1,671	2,261	2,312	2,360	2,405	30,260
414 Secondary / Elementary School Teachers & Counsellors	2,820	2,872	1,592	2,623	1,321	1,832	1,736	2,118	1,943	1,618	1,617	1,615	1,613	25,321
513 Creative & Performing Artists	386	697	474	604	490	559	618	1,073	570	589	596	593	585	7,834
525 Athletes, Coaches, Referees & Related Occ's	272	536	555	507	531	506	722	1,335	524	695	705	702	693	8,283
624 Chefs & Cooks	720	2,274	857	1,575	1,807	960	2,875	4,303	2,075	2,002	2,033	2,021	1,989	25,491
642 Retail Salespersons & Sales Clerks	3,869	3,927	3,653	3,256	2,241	1,887	2,016	2,351	1,884	2,075	2,085	2,077	2,064	33,384
643 Occ's in Travel & Accommodation	403	275	541	386	431	497	497	817	558	572	580	581	577	6,715
645 Occ's in Food & Beverage Service	875	1,559	1,455	1,044	850	803	1,806	4,811	2,171	2,384	2,422	2,405	2,363	24,947
647 Childcare & Home Support Workers	2,489	1,397	1,751	1,322	1,486	1,366	1,467	1,318	1,564	1,898	1,922	1,945	1,965	21,891
661 Cashiers	2,481	1,132	2,152	1,691	640	1,142	1,279	1,929	1,913	1,472	1,485	1,477	1,461	20,254
664 Food Counter Attendants & Helpers	1,927	262	1,513	4,012	-1,738	2,390	1,537	2,400	2,027	2,054	2,086	2,078	2,051	22,598
666 Cleaners	2,265	1,536	4,520	2,433	2,849	1,707	2,622	1,951	2,213	2,087	2,110	2,114	2,109	30,517
667 Travel / Accommodation / Recreation Attendants	547	-177	404	227	60	298	402	311	289	319	324	322	317	3,644
721 Contractors & Supervisors, Trades & Related	1,185	1,843	1,240	1,849	1,615	1,304	1,155	1,052	996	856	864	869	872	15,700
727 Carpenters & Cabinetmakers	608	720	981	1,115	1,073	994	902	920	775	637	643	648	652	10,669
729 Other Construction Trades	352	634	696	728	665	642	524	307	350	405	409	413	416	6,541
741 Motor Vehicle & Transit Drivers	1,416	3,956	2,186	3,611	2,574	2,998	2,501	4,120	2,898	2,831	2,871	2,891	2,897	37,749
761 Trades Helpers & Labourers	29	226	546	488	789	380	524	142	401	427	431	435	438	5,255
945 Machine Operators: Fabric / Fur / Leather	156	49	257	446	225	287	383	541	206	187	190	192	192	3,312
Top 25 Occupational Groups	34,555	37,582	39,671	42,722	31,205	31,751	37,934	45,187	33,098	33,614	34,021	34,094	34,004	469,439
All Occupational Groups	70,525	87,147	89,549	96,152	72,233	76,062	79,234	98,388	74,495	74,086	74,959	75,339	75,457	1,043,625
Top 25 as Percent of Total	49.0%	43.1%	44.3%	44.4%	43.2%	41.7%	47.9%	45.9%	44.4%	45.4%	45.4%	45.3%	45.1%	45.0%

Table 8: Labour Supply Summary Results, 2003-2015

Total Sources of Supply by Top 25 Occupations, 2003 to 2015

Supply by Occupation and Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
062 Managers in Retail Trade	1,444	1,485	1,528	1,547	1,570	1,592	1,611	1,626	1,634	1,641	1,650	1,661	1,667	20,656
063 Managers in Food Service & Accommodation	1,056	1,086	1,115	1,129	1,147	1,163	1,178	1,190	1,197	1,202	1,209	1,217	1,222	15,112
071 Managers in Construction & Transportation	325	334	343	347	352	357	362	366	368	369	372	374	376	4,645
111 Auditors / Accountants / Investment Professionals	1,783	1,826	1,867	1,891	1,920	1,948	1,975	1,996	2,012	2,026	2,041	2,058	2,071	25,415
122 Administrative & Regulatory Occ's	1,409	1,445	1,483	1,502	1,524	1,546	1,565	1,581	1,592	1,601	1,612	1,624	1,632	20,114
143 Finance & Insurance Clerks	2,460	2,508	2,557	2,591	2,629	2,666	2,700	2,731	2,756	2,775	2,794	2,813	2,827	34,807
216 Mathematicians / Analysts / Programmers	3,338	3,432	3,510	3,557	3,618	3,675	3,730	3,770	3,792	3,811	3,833	3,859	3,880	47,804
414 Secondary / Elementary School Teachers & Counsellors	3,088	3,145	3,203	3,245	3,289	3,333	3,375	3,415	3,450	3,484	3,520	3,558	3,592	43,698
513 Creative & Performing Artists	850	872	894	906	920	933	945	954	961	966	973	980	985	12,137
525 Athletes, Coaches, Referees & Related Occ's	620	634	649	658	667	677	685	692	698	703	709	714	718	8,826
624 Chefs & Cooks	2,496	2,548	2,600	2,634	2,672	2,709	2,744	2,774	2,796	2,813	2,831	2,850	2,864	35,329
642 Retail Salespersons & Sales Clerks	5,247	5,360	5,475	5,549	5,632	5,712	5,786	5,850	5,900	5,937	5,975	6,013	6,040	74,476
643 Occ's in Travel & Accommodation	1,139	1,166	1,193	1,209	1,227	1,244	1,259	1,272	1,281	1,289	1,297	1,305	1,311	16,191
645 Occ's in Food & Beverage Service	3,579	3,652	3,730	3,781	3,836	3,891	3,940	3,985	4,022	4,049	4,077	4,105	4,125	50,771
647 Childcare & Home Support Workers	3,651	3,729	3,800	3,854	3,915	3,975	4,031	4,080	4,117	4,144	4,170	4,197	4,219	51,884
661 Cashiers	3,538	3,592	3,645	3,686	3,731	3,774	3,812	3,845	3,873	3,888	3,900	3,906	3,904	49,096
664 Food Counter Attendants & Helpers	3,850	3,916	3,979	4,025	4,078	4,129	4,174	4,213	4,243	4,261	4,276	4,287	4,289	53,720
666 Cleaners	4,906	4,984	5,063	5,122	5,186	5,248	5,303	5,351	5,392	5,415	5,434	5,447	5,449	68,299
667 Travel / Accommodation / Recreation Attendants	541	550	560	567	573	580	585	590	594	596	598	599	599	7,532
721 Contractors & Supervisors, Trades & Related	340	347	356	361	366	371	376	380	384	386	389	393	395	4,843
727 Carpenters & Cabinetmakers	1,492	1,514	1,537	1,553	1,569	1,585	1,600	1,613	1,625	1,633	1,642	1,651	1,658	20,671
729 Other Construction Trades	1,130	1,148	1,168	1,182	1,196	1,210	1,223	1,235	1,245	1,253	1,260	1,268	1,274	15,794
741 Motor Vehicle & Transit Drivers	2,270	2,316	2,366	2,396	2,429	2,461	2,489	2,515	2,535	2,549	2,563	2,576	2,584	32,049
761 Trades Helpers & Labourers	1,533	1,557	1,583	1,603	1,624	1,644	1,662	1,679	1,695	1,704	1,713	1,720	1,723	21,441
945 Machine Operators: Fabric / Fur / Leather	247	255	260	263	269	274	279	281	282	282	282	283	284	3,540
Top 25 Occupational Groups	52,331	53,399	54,464	55,159	55,939	56,697	57,389	57,984	58,442	58,777	59,121	59,457	59,689	738,850
All Occupational Groups	115,637	118,062	120,507	122,088	123,850	125,568	127,148	128,517	129,584	130,404	131,258	132,113	132,743	1,637,478
Top 25 as Percent of Total	45.3%	45.2%	45.2%	45.2%	45.2%	45.2%	45.1%	45.1%	45.1%	45.1%	45.0%	45.0%	45.0%	45.1%

Table 9: Summary Gap Analysis (Supply from all sources minus Demand from Games, Projects and Base)

Gap Analysis, Demand from Games, RAV, VCEC and STS Hwy vs. Supply from all Sources, Top 25 Occupations, 2003 to 2015

Worker Surplus (Shortage), Top 25 Occupations	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
062 Managers in Retail Trade	(896)	(1,303)	(983)	(631)	(535)	(28)	(30)	(579)	18	325	328	344	359	(3,613)
063 Managers in Food Service & Accommodation	309	(898)	(45)	(594)	(1,569)	458	(2,250)	(1,527)	(712)	(446)	(465)	(446)	(415)	(8,601)
071 Managers in Construction & Transportation	(303)	(418)	(693)	(832)	(789)	(712)	(600)	(646)	(503)	(302)	(307)	(311)	(314)	(6,731)
111 Auditors / Accountants / Investment Professionals	(246)	(721)	(887)	(324)	(691)	(423)	(449)	(1,117)	381	296	292	296	304	(3,291)
122 Administrative & Regulatory Occ's	(196)	(266)	(583)	(759)	489	(840)	355	(397)	280	272	268	269	270	(839)
143 Finance & Insurance Clerks	1,281	765	30	23	1,436	1,155	933	2,165	2,023	1,225	1,228	1,237	1,247	14,749
216 Mathematicians / Analysts / Programmers	112	1,090	1,266	879	1,125	2,141	793	1,973	2,121	1,550	1,521	1,499	1,475	17,544
414 Secondary / Elementary School Teachers & Counsellors	268	273	1,611	622	1,968	1,501	1,639	1,297	1,507	1,866	1,903	1,943	1,979	18,377
513 Creative & Performing Artists	464	175	421	302	430	373	327	(119)	390	377	376	387	399	4,302
525 Athletes, Coaches, Referees & Related Occ's	348	97	94	151	137	170	(37)	(643)	175	8	4	13	25	543
624 Chefs & Cooks	1,775	274	1,743	1,059	864	1,749	(131)	(1,530)	721	811	797	829	875	9,838
642 Retail Salespersons & Sales Clerks	1,378	1,433	1,822	2,293	3,391	3,825	3,770	3,500	4,016	3,862	3,890	3,936	3,976	41,092
643 Occ's in Travel & Accommodation	736	891	652	823	795	747	763	455	723	717	716	725	734	9,476
645 Occ's in Food & Beverage Service	2,703	2,093	2,275	2,737	2,986	3,088	2,134	(826)	1,851	1,665	1,654	1,700	1,762	25,824
647 Childcare & Home Support Workers	1,163	2,332	2,049	2,531	2,429	2,609	2,564	2,762	2,553	2,246	2,248	2,252	2,254	29,994
661 Cashiers	1,058	2,460	1,493	1,995	3,091	2,632	2,533	1,917	1,961	2,416	2,415	2,429	2,443	28,842
664 Food Counter Attendants & Helpers	1,923	3,654	2,466	13	5,817	1,739	2,637	1,813	2,216	2,207	2,190	2,209	2,239	31,122
666 Cleaners	2,641	3,448	543	2,689	2,337	3,541	2,681	3,400	3,179	3,328	3,325	3,333	3,339	37,782
667 Travel / Accommodation / Recreation Attendants	(7)	727	156	340	513	282	183	279	305	277	274	277	282	3,889
721 Contractors & Supervisors, Trades & Related	(845)	(1,496)	(885)	(1,488)	(1,249)	(934)	(779)	(672)	(612)	(470)	(475)	(476)	(477)	(10,857)
727 Carpenters & Cabinetmakers	883	794	556	437	496	591	698	693	850	996	999	1,003	1,006	10,001
729 Other Construction Trades	777	515	473	454	531	568	700	928	895	848	851	856	859	9,254
741 Motor Vehicle & Transit Drivers	855	(1,640)	180	(1,215)	(146)	(537)	(12)	(1,606)	(364)	(282)	(308)	(314)	(312)	(5,700)
761 Trades Helpers & Labourers	1,504	1,332	1,038	1,115	835	1,264	1,138	1,537	1,294	1,278	1,282	1,285	1,285	16,186
945 Machine Operators: Fabric / Fur / Leather	91	206	2	(183)	43	(14)	(104)	(259)	76	95	92	91	92	229
Aggregate Surplus (Shortage), Top 25 Occupational Groups	17,776	15,817	14,794	12,437	24,734	24,945	19,455	12,797	25,344	25,164	25,099	25,362	25,685	269,411
Aggregate Surplus (Shortage), All Occupational Groups	45,112	30,915	30,958	25,937	51,617	49,506	47,914	30,129	55,089	56,318	56,299	56,774	57,286	593,853

6.1 Gap Analysis Results

Using the demand analysis results as the basis for demand, and the eight potential sources of incremental labour supply and subject to the qualifications explained above, we have compared the data and projections in order to identify which occupations are likely to be in surplus and which are likely to be in deficit, that is, have a shortfall of supply in comparison with estimated demand.

Apart from the considerable identification and training issues that will need to be addressed in order to convert potential labour supply from the sources considered into viable, trained and employable workers, the analysis indicates that the potential sources of supply identified are likely to provide enough "counts" of workers to satisfy demand in most occupations. In 13 of the 25 top occupational categories considered, potential supply exceeds demand in all years from 2003 to 2015. In the remaining 12 categories, shortfalls are revealed although some occupational categories may experience potential gap of workers in a few years, while other categories may experience more critical potential gaps. In particular:

1. *NOC 062: Managers in Retail Trade*: this category exhibits a shortfall of workers in comparison with demand in 2003 through 2010, however there is a small surplus (less than 400 potential workers per year) thereafter. The largest shortfalls of workers are expected to occur from 2003 through 2007, and during the Games year in 2010. Overall shortfall during the period of analysis is approximately 3,600 workers, representing 15 per cent of the expected demand. Given adequate information and enough lead-time, any shortfall in this occupation could likely be filled by upgrading existing line workers. However, this would increase demand a possible shortage for entry-level retail workers.

2. *NOC 063: Managers in Food Service and Accommodation*: this category may experience potential gap of workers in all but two years (2003 and 2008) during our period of analysis. As such overall potential gap of workers in this category amounts to over 8,600 persons, representing over a third of expected demand. The shortfall is expected to be most severe during the Games year and the year leading to it. Moreover, *NOC 645 Occupations in Food and Beverage Service* is not expected to experience shortfalls except in 2010, which makes the shortfall even more alarming because *NOC 645* is a source of labour supply to *NOC 063* and as such should be monitored. Given adequate information and enough lead-time, any shortfall in this occupation could likely be filled by upgrading existing line workers. However, this would increase demand a possible shortage for entry-level retail workers.

3. *NOC 071: Managers in Construction and Transportation*: this category is expected to experience severe shortfalls during our period of analysis. These shortfalls likely relate primarily to the projects rather than the Games themselves. Overall potential gap of workers in this category represents close to 60 per cent of expected demand.

4. *NOC 111: Auditors, Accountants and Investment Professionals*: this category is expected to experience deficits in potential labour from now (2003) through 2010. The largest deficit, 1,100 workers in 2010, is about 36 per cent of expected additional demand in that year. This occupational category has been growing rapidly (18,400 in 1991, 27,185 in 1996 and 39,825 in 2001), still, there appears to be a need to continue producing more workers in this category.

5. *NOC 122: Administrative and Regulatory Occupations*: this occupational category may experience a shortfall of workers in most of the years leading to the Games as well as in 2010. However, overall deficit of 800 workers during the period of analysis makes this group the least vulnerable amongst the seven occupational categories that may experience overall shortfall.

6. *NOC 721: Contractors and Supervisors, Trades and Related*: Like *NOC 071, Managers in Construction and Transportation*, this category is expected to experience worker deficits throughout the period to 2015. Over the entire period of analysis, worker deficit represents close to 70 per cent of expected demand. It should be noted also that this category of workers has been falling since 1991. The number of workers in this category was 28,555 in 1991, 20,275 in 1996 and 12,805 in 2001 according to the Census data for these years. Again, the potential gaps could be alleviated by upgrading and promoting trades workers. However, not all workers are willing or able to move to supervisory positions and any upward movement could exacerbate potential gaps in the trades themselves.

7. *NOC 741: Motor Vehicle and Transit Drivers*: this category of workers is also expected to experience deficit throughout almost every year during our period of analysis. The overall deficit, 5,700 workers, represents 15 per cent of the expected demand. The potential gap is expected to be most severe during the Games year in 2010, when the shortfall represents almost 40 per cent of expected demand.

In addition to these seven occupational groups identified as facing overall potential gaps, we also put the following four groups into our watch list. *NOC 513 – Creative and Performing Artists* may face a potential gap of workers in 2010. *NOC 624 – Chefs and Cooks may experience shortfall of workers in 2009 and 2010*. We mentioned *NOC 645 – Occupations in Food and Beverage Services*, which may face a potential gap in the year 2010. Lastly, *NOC 945 Machine Operators: Fabric, Fur, or Leather* is on the list as there may be a potential gap from 2008 through 2010.

Other occupations, which are not discernible at a three digit level or because they are in demand for a very short time period, may require attention. Security positions during the weeks of the Games themselves would be an example of a possible bottleneck occupation to watch.

6.2 Peaks and Seasonality

In addition to looking at gaps overall, we are interested in those occupations where there are pronounced peak potential gaps in 2010 itself, indicating crucial Games-related needs.

Examination of Table 9 shows dramatic peaks in 2010 with significant decline or moves to surplus in the following areas: *Managers in Food Service and Accommodation*; *Auditors, Accountants and Investment Professionals; Chefs and Cooks*, *Occupations in Food and Beverage Service*; and *Motor Vehicle and Transit Drivers*. These occupations are likely to present the most pressing needs during the Games themselves.

Furthermore, the person year shortages expressed in Table 9 are most likely to underestimate the actual number of workers that will be required in these occupations during the Games themselves and for the time periods immediately surrounding the Games as most work is likely to be concentrated in a few months of the year. In addition, the PY estimates may be imperfectly incorporating part-time work, therefore in sectors with higher incidence of part-time work (such as tourism), the estimates will likely be underestimate the actual pressure.

The high peak occupations present a challenge not only as we try to prevent potential gaps at the peak, but also when those potential gaps turn into surpluses in post-peak years. Tourism related industries could well show higher growth than our current models predict in the post-Game period as a result of the Games. Such a pattern was observed after Expo 86. This would help to absorb workers in related occupations.

Attempts to fill lesser skilled openings such as those for *Motor Vehicle and Transit Drivers* should consider using temporary workers such as senior students taking a semester off for the games or retired people no longer seeking a permanent attachment to the labour market.

Estimates of person year potential gaps are likely to be lower than the number of workers required at peak times in any occupations where there is seasonality. These would include tourism related occupations and construction. Fortunately, tourism is becoming much less seasonal with two peak seasons and ever expanding shoulder seasons and construction is much less seasonal in Southwest BC than in other parts of Canada.

6.3 Person Years and Full-Time Work Lasting More Than A Year

In Section 6.2, we discussed demand expressed in person years may underestimate the actual number of workers needed for occupations with seasonality and during the Games year. Contrary to the points made in Section 6.2, demand expressed in person years may overestimate the actual number of workers needed for occupations where employment tends to be stable and generally lasts more than a year. In this section, we will adjust for this.

In Table 10, we first reproduce the incremental labour demand, in person years, due to the Games and concurrent projects, for those occupations where employment tends to be more stable and last over a year. These numbers can be found in Appendix D (Table D-5A and Table D-5B) of our demand report. We argue that, since employment in these occupations tends to be permanent full-time jobs, numbers expressed in person years would overestimate the actual number of individuals required. As such we have adjusted this by, for example, subtracting the number of *Accountants/Auditors/Investment Professionals* (in person years) needed in 2003 from the estimated demand in 2004 to arrive at an estimate of the actual number of individuals needed to work in that occupational group in 2004.

The “number of individuals” shown in Table 10 implies that all openings for these occupational groups would be full-time, permanent positions lasting until the end of 2015. They would therefore represent the most conservative estimate of the incremental labour demand due to the Games and concurrent projects. In reality, though, considering the points we made here and in Section 6.2, the overestimation and underestimation may offset each other and therefore estimates shown in Table 7 to Table 9 should be reasonably valid.

Table 10: Potential Incremental Labour Demand Due to Games and Concurrent Projects for Occupations In Which Employment Tends to Last Over One Year

Selected Occupations from the Top 25 Occupations		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
062 Managers in Retail Trade	Person Years	4	25	82	126	126	212	232	619	154	129	129	119	106
	Number of Individuals	4	21	57	44	(0)	85	21	386	(464)	(26)	1	(10)	(14)
111 Auditors / Accountants / Investment Professionals	Person Years	11	50	184	304	282	358	441	676	157	144	149	148	139
	Number of Individuals	11	39	134	120	(22)	75	83	236	(519)	(13)	5	(1)	(9)
122 Administrative & Regulatory Occ's	Person Years	6	36	126	196	177	218	228	396	92	81	84	81	74
	Number of Individuals	6	29	91	69	(19)	41	9	169	(304)	(11)	2	(3)	(6)
143 Finance & Insurance Clerks	Person Years	8	43	150	238	222	278	307	526	124	110	113	109	101
	Number of Individuals	8	35	107	87	(15)	55	29	219	(402)	(14)	3	(4)	(8)
216 Mathematicians / Analysts / Programmers	Person Years	8	40	140	236	226	264	332	471	102	94	97	97	91
	Number of Individuals	8	32	100	96	(10)	38	67	139	(369)	(8)	4	(1)	(6)
414 Secondary / Elementary School Teachers & Counsellors	Person Years	0	3	8	14	19	21	18	37	7	5	5	4	3
	Number of Individuals	0	2	6	6	4	2	(3)	19	(30)	(2)	(0)	(1)	(1)
721 Contractors & Supervisors, Trades & Related	Person Years	17	122	406	540	466	359	212	276	52	44	45	42	37
	Number of Individuals	17	105	284	134	(74)	(107)	(147)	64	(224)	(8)	1	(3)	(4)
945 Machine Operators: Fabric / Fur / Leather	Person Years	9	22	93	178	148	183	297	335	28	27	29	30	29
	Number of Individuals	9	14	71	86	(31)	36	114	39	(308)	(0)	2	1	(1)

6.4 Expected Surpluses

Several occupational categories are expected to exhibit large potential labour force surpluses during the period under examination. Since results for some occupations tend to oscillate, we focus primarily on those occupations that exhibit persistent surpluses over the planning horizon, *including during the Games year 2010*. We measure these surpluses as a percentage of openings, to give a picture of over-supply in relation to additional demand. These include:

1. *NOC 642: Retail Salespersons and Sales Clerks*: This occupational category exhibits surpluses roughly on the order of 120% between now and 2015.

2. *NOC 643 Occupations in Travel and Accommodation*: This category exhibits surpluses roughly on the order of 140% between now and 2015.

3. *NOC 647: Childcare and Home Support Workers*: This category shows a substantial over-supply of approximately 140% of expected demand.

4. *NOC 761 Trades Helpers and Labourers*: This category shows a substantial over supply of over three times the estimated demand, making it the one exhibiting over-supply of all the occupational groups examined.

5. The remaining occupational categories also show substantial and persistent surpluses over the planning horizon. These remaining occupational categories for which surpluses, as a percentage of additional demand, are very high, are (i) NOC 661 Cashiers; (ii) NOC 666 Cleaners; and (iii) NOC 729 Other Construction Trades.

Section 7: First Nations in the Experienced Labour Force

RKA's 2010 Winter Games Labour Demand Analysis report contained extensive analysis of the representation of First Nations' people in the bid for the 2010 Winter Games. The topics covered in that analysis include the Shared Legacies Agreement, 2010 Olympic Bid and First Nations Training and Employment Initiatives, First Nations' Representation in the Experienced Labour Force, (level of) Education (Attainment), and Career Choice. In this section, we will expand this analysis by discussing the labour force representation of First Nations people by occupation.

Table 11 following shows the distribution of broad occupational skill types for persons with and without an Aboriginal identity in 2001. Compared with persons who do not have an Aboriginal identity, those with an Aboriginal identity are under-represented in Management Occupations; Business, Finance, and Administrative Occupations; Natural and Applied Science Occupations; Health Occupations; and Occupations in Art, Culture, Recreation and Sports. However, those with an Aboriginal identity have a higher representation in Occupations in Social Science, Education, Government Service; Sales and Service Occupations; Trades, Transport and Equipment Operators and Related Occupations; Occupations Unique to Primary Industry; and Occupations Unique to Processing, Manufacturing and Utilities.

Table 11: Representation by Aboriginal and Non-Aboriginal Identity, 2001

No.	Cat.	Occupation Group	Aboriginal Identity	Non-Aboriginal Identity
1	0	Management Occupations	6.1%	10.6%
2	1	Business, Finance and Administrative Occupations	13.2%	17.8%
3	2	Natural and Applied Sciences and Related Occupations	3.2%	6.1%
4	3	Health Occupations	2.7%	5.2%
5	4	Occupations in Social Science, Education, Government Service and Religion	7.7%	7.0%
6	5	Occupations in Art, Culture, Recreation and Sport	2.7%	3.4%
7	6	Sales and Service Occupations	30.6%	27.1%
8	7	Trades, Transport and Equipment Operators and Related Occupations	15.9%	13.6%
9	8	Occupations Unique to Primary Industry	10.9%	4.1%
10	9	Occupations Unique to Processing, Manufacturing and Utilities	7.1%	5.1%
Total Working Age Population who worked 2000 and/or January to May 2001			79,820	2,129,980
Source: Statistics Canada, 2001 Census.				

Table 12 following shows labour force distributions for persons with and without an Aboriginal identity in the 25 occupations we focus on in this report. Table 12 reconfirms our general finding of distributional differences in labour force representation for persons with and without an Aboriginal identity.

For example, persons with an Aboriginal identity have a lower representation in Management Occupations (*NOC 062*, *063*, and *071*), in Auditing, Accounting and investment professions (*NOC 111*) and as Finance and Insurance Clerks (*NOC 143*) compared with their counterparts without an Aboriginal identity. There are a few occupations, however, in which the reverse is the case. However some of these are in general lower-skill positions; examples include *Retail Sales Clerks*, *Occupations in Travel and Accommodation*, *Trades Contractors and Supervisors*, *Fabric/Fur/Leather Machine Operators*, *Childcare and Home Support Workers*, *Cleaners*, and *Chefs and Cooks*.

It should be noted that overall, representation of persons with an Aboriginal identity in the top 25 occupations as a percent of all (occupied) persons with an Aboriginal identity is nearly equal to that of persons without an Aboriginal identity. Put another way, approximately the same proportion of Aboriginals is occupied in the top 25 occupations as non-Aboriginals. This means that, among the top 25 occupations at least, aggregate representation within each identity group is nearly the same, but there are distributional differences between the two broad groups. Distributional imbalances among occupations between Aboriginal and non-Aboriginal groups, if addressed, would provide opportunities for gains by Aboriginals particularly in auditing, accounting, investment, finance and insurance professions. Fortunately, these areas coincide to some degree with the focus of the agreements and First Nations HR plans described in the 2010 Winter Games Demand Analysis.

Table 12: Representation by Aboriginal and Non-Aboriginal Identity in Top 25 Occupations, 2001				
No.	NOC Code	Occupational Category	Aboriginal Identity	Non-Aboriginal Identity
1	741	Motor Vehicle and Transit Drivers	2.9%	2.7%
2	642	Retail Salespersons and Sales Clerks	2.9%	4.3%
3	666	Cleaners	5.3%	2.9%
4	216	Mathematicians, Analysts, Programmers	0.7%	2.3%
5	111	Auditors, Accountants, Investment Professionals	0.6%	2.0%
6	624	Chefs and Cooks	2.4%	1.7%
7	414	School Teachers and Counsellors	1.7%	2.6%
8	645	Occupations in Food and Beverage Service	2.3%	2.2%
9	062	Managers in Retail Trade	1.4%	2.4%
10	063	Managers in Food Service and Accommodation	0.7%	1.3%
11	664	Food Counter Attendants and Helpers	2.9%	2.3%
12	647	Childcare and Home Support Workers	5.3%	3.0%
13	122	Administrative and Regulatory Occupations	1.5%	2.2%
14	661	Cashiers	2.1%	1.9%
15	143	Finance and Insurance Clerks	1.3%	2.0%
16	945	Machine Operators, Fabric, Fur, Leather	0.1%	0.3%
17	667	Travel, Accommodation and Recreation Attendants	0.4%	0.3%
18	761	Trades Helpers and Labourers	2.2%	0.8%
19	525	Athletes, Coaches, Referees and Related Occupations	0.6%	0.7%
20	729	Other Construction Trades	1.1%	0.7%
21	513	Creative and Performing Artists	0.4%	0.8%
22	643	Occupations in Travel and Accommodation	0.4%	0.8%
23	727	Carpenters and Cabinetmakers	1.7%	1.1%
24	071	Managers in Construction and Transportation	0.5%	0.8%
25	721	Contractors and Supervisors, Trades and Related	0.4%	0.6%
Total Working Age Population who worked in 2000 and/or January-May 2001			79,820	2,129,980
Percent Representation in Top 25 Occupations			41.5%	42.6%
Percent Representation in Total Working Age Population who worked 2000 and/or January-May 2001			3.6%	96.4%
Percent Representation in Working Age Population			3.7%	96.3%
Source: Statistics Canada, 2001 Census.				

Clearly, to address these issues, not only is it important to increase the general educational attainment of the Aboriginal population, but also to promote programs aimed at attaining specific job skills. Pro-active government-industry programs and initiatives would have a positive impact.

Section 8: Factors Influencing Trends

This study has rapidly gathered various data and estimated incremental potential labour supply and compared this supply with incremental labour demand assessed in the demand report previously submitted by RKA. Since the planning horizon for this study spans the period 2003 through 2015, with emphasis on the period leading up to the Games in 2010, many changes could occur to change the trends upon which much of this analysis is based. Major factors that influence these trends, which should be watched for over the coming years, include:

- Trends in population growth, participation rates, international and inter-provincial migration: while these are important, preliminary sensitivity analysis suggests unrealistically large reductions from trend would have to occur to materially effect the gap analysis results. The most volatile components of the above mentioned trends are international and inter-provincial migration and we have already assumed that increased demand generated by the Games and concurrent activities would dampen the outflow components of migration.
- Business cycles and occupational attractiveness: the propensity for individuals to choose specific occupations, as suggested by historical data, is likely to change. People may choose to enter different occupations as they become aware of growing demand or they may avoid given occupations for fear that the demand will be only short term. The spike in attractiveness of electronics and computer engineering in the 1990's and recent increased interest in biotechnology-related fields, are two examples from the university and college sources of supply we have discussed; others exist among the other supply sources.
- Measurement issues: since people are occupationally mobile, not equally qualified or experienced, and overlaps exist between the different sources of labour supply, it is possible to undercount or overcount the numbers of workers available in aggregate and in specific occupations. Analysts, cooks or trades workers may not have up-to-date skills leading to an over-estimate of the talent pool. Unskilled workers may acquire skills through informal training.
- Exogenous labour demand changes: the BC labour market could be influenced by changes in labour demand in other provinces and countries. Major construction projects occurring elsewhere during the time period under consideration could attract our potential workforce. A widespread economic slowdown could ease worker availability, while buoyant economic conditions elsewhere relative to BC could tighten the BC labour market.
- Market factors: although the labour market is not perfect, given time, accurate information and the absence of explicit barriers, the market does work to alleviate excesses of demand and supply. Market factors, by themselves, are most likely to eliminate potential gaps in areas where lower levels of

qualifications are required, there are few if any barriers to entry and compensation is perfectly elastic.

- Analytical classification: due to data availability, we have looked at occupations at the three-digit level of aggregation. In some three-digit groups that contain numerous sub-categories of workers only subsets of the group will be in demand. Those planning for training programs or other strategies such as recruitment drives, in-house career laddering programs, should be aware of this.
- Policy changes: there are many policies in force that could change in the years leading up to the Games in 2010. Examples include policies with respect to educational programs, funding and seat availability, credential recognition in trades and professions, income assistance and employment insurance, future occupational data reclassifications that could render future comparisons with current Games-and-concurrent demand and economic impact assessments problematic or at least challenging.

Although we have paid attention to the occupations that we think are most important, other occupations lower down the list of demand could possibly generate problems or bottlenecks. A watching brief should be kept on them. We have recommended five occupational categories that we believe should be on the list.

Section 9: Conclusions and Recommendations

This report has been undertaken to assess potential gaps between additional labour demand attributable to the base model, the Games and concurrent projects, and potential incremental supply from a number of sources. The focus of our analysis has been on the top 25 three-digit occupational classifications for which additional demand is expected to be the highest, as detailed in the demand report.

In general, we expect there to be a substantial aggregate surplus of labour for the Games and concurrent projects. However, in a number of specific occupational groups, a shortfall is expected. Key findings with respect to anticipated potential gaps are as follows:

Table 13: Occupational Potential Gaps Identified

Category	Severity
NOC 721: Contractors & Supervisors, Trades and Related	Severe: overall potential gap 70% of estimated demand
NOC 063: Managers in Food Service & Accommodation	Severe: overall potential gap 36% of estimated demand
NOC 071: Managers in Construction and Transportation	Severe: overall potential gap 59% of estimated demand
NOC 062: Managers in Retail Trade	Medium: overall potential gap 15% of estimated demand
NOC 111: Auditors, Accountants, Investment Professionals	Medium: overall potential gap 11% of estimated demand
NOC 741: Motor Vehicle & Transit Drivers	Medium: overall potential gap 15% of estimated demand
NOC 122: Administrative and Regulatory Occ's	Medium: overall potential gap 4% of estimated demand

Key occupations for which potential gaps in Games year and/or years leading to the Games are anticipated are included in a recommended watch list, as follows:

Table 14: Recommended Watch List

Category	Indicators

NOC 513: Creative and Performing Artists	Deficit in 2010
NOC 525: Athletes, Coaches, Referees and related	Deficit in 2009 and 2010
NOC 624: Chefs and Cooks	Deficit in 2009 and 2010
NOC 645: Occ's in Food and Beverage Service	Deficit in 2010
NOC 945: Machine Operators: Fabric, Fur, Leather	Deficit in 2006, 2008, 2009 and 2010
See Table 9 for estimates of surpluses and potential gaps	

Top Seven Potential Gaps:

1. The most severe potential gap appears to be in *NOC 721: Contractors and Supervisors, Trades and Related Occupations*. Many, though not all, trades contractors are currently certified through apprenticeship training programs, and many experienced tradespersons become certified by “challenging” the examinations required to gain certification. It may be advisable to assess what training programs could be used (or established) to draw additional workers into relevant trades. Candidates for trades training and certification are numerous but obvious candidates include high school graduates who enter the work force rather than pursue higher education, uncertified but otherwise capable and experienced tradespersons already in the economy, migrants from other provinces as well as immigrants who may be capable but are not formally certified.

   The potential gaps are expected to be felt throughout the period of analysis, 2003-2015, and they are driven mostly by the Games concurrent projects. In addition to increasing training opportunities, the potential gaps could also be alleviated by upgrading and promoting trades workers.

2. Another problem area appears to be in *NOC 063 Managers in Food Service and Accommodation*. The potential gap is expected to exist throughout the whole period of analysis, 2003-2015, and is likely to be mainly driven by the Games and other Games concurrent projects. Those in this occupational group are likely to be drawn from the existing pool of food service workers as well as relatively uneducated people entering the work force in the coming years and working their way up the occupational ladder in this sector. There may be an opportunity to leverage existing entry channels for this work, in particular the larger restaurant and hotel chains, to build up the pool of candidates as the Games date draws near. Incentives may have to be established (or expanded, where already in place) to encourage these businesses to in-take, train and promote individuals who will become candidate-managers in these areas in future.

   It should be noted that the potential gaps could be over-estimated given the lack of data on inter-occupational movement of workers, which could increase the level of labour supply to this occupational group.

3. *NOC 071 Managers in Construction and Transportation* appear to be in deficit during the entire period of analysis, from 2003 through 2015. This is also an occupational group where potential openings are more likely filled by internal candidates than by pure school graduates. Relevant construction and transport companies could perhaps be provided incentives to train existing workers for managerial roles, and/or in-take more lesser experienced people and provide training to supplement the potential labour supply pool.

   The potential gaps are expected to be driven by the Games concurrent projects, in addition to demand in the base model.

4. *NOC 062 Managers in Retail Trade* appear to be in deficit in the current year and through 2010, and have only small surpluses beyond 2010. While denoted as a "medium severity" category, the persistence of potential gaps and small surpluses, where estimated, means this is a category requiring regular monitoring.

   The potential gaps in this occupational group are expected to be driven by the demand from the base model. However, the Games and other Games concurrent projects are expected to generate increased level of tourism and other consumer activities, which could in turn put pressure to the already tight demand for these workers during the Games year and the years leading to it.

   On the other hand, it should also be noted that the potential gaps could be over-estimated given the lack of data on inter-occupational movement of workers, which could increase the level of labour supply to this occupational group.

5. *NOC 111 Auditors, Accountants and Investment Professionals* as a group have been growing quite rapidly between the 1991, 1996 and 2001 Census years. Given the events of the past three years concerning corporate governance and related issues, we expect increased interest in these occupations is being felt by post-secondary educational institutions and professional associations (CA, CGA, CMA, CFA, others). One approach to augment supply may be to encourage professional firms, banks, credit unions and investment managers, small and large, to in-take additional trainees as the Games date draws closer. To the extent requirements differ, it may also be useful to assess the differences between BC's and other provinces' relevant certifications and licensing processes, with a view to allowing otherwise ineligible workers from other provinces to participate in these occupations in BC.

   Although the potential gaps are driven mainly by demand in the base model, we note that occupational pressure will rise as a result of the incremental demand due to the Games and other Games concurrent projects. For example, accountants will be tied to supply chain management functions, additional payroll responsibility, and investment management for new development projects.

6. *NOC 741 Motor Vehicle and Transit Drivers* appear to be in deficit in almost all the years throughout our period of analysis, the exceptions being in 2003 and 2005. Although the magnitude of potential gaps is not as severe as that for those

occupational groups mentioned earlier, such potential gaps are severe enough to warrant on-going monitoring. Given the relatively low skill level required to enter this occupational group, it will be useful to make such labour market information as widely available as possible, especially to the pool of the unemployed and those who have left income assistance, to benefit those most in need.

The potential gaps are expected to be mainly driven by demand in the base model. However, the Games are also expected to contribute to increasing the additional demand, given that without them, those attending the Games cannot be mobile. As such, it is important to ensure that a large enough pool of labour supply be made ready, especially in the Games year.

7. *NOC 122 Administrative and Regulatory Occupations* also appear to be in deficit in the Games year and the years leading to it. Given that those in this occupational group such as *Administrative Officer*, *Personnel and Recruitment Officers*, *Purchasing Agents and Officers*, *Conference and Event Planners* are critical in all the years preparing for the Games, it may be necessary to increase training seats in the training institutions, and to make the labour market information as widely available as possible.

<u>Watch List for 2010:</u>

8. *NOC 513 Creative and Performing Artists:* This category exhibits a medium potential gap during 2010. Recommendations include creating a registration process and database of Creative and Performing Artists, and inviting expressions of interest, to monitor likely number of attendees for the Games. Clearly, interest will be stirred and final approximate numbers of participants/attendees should be clearer as the Games date draws nearer. Liaising with university and college performing arts departments, professional providers of such entertainment, and guilds/societies should enable a free flow of information and stimulate interest as the Games date draws closer. In general, Creative and Performing Artists will be in demand for relatively short periods during the Games and will likely come to BC for the Games. Consequently BC's local supply of this occupational category will be augmented during the Games events.

9. *NOC 624 Chefs and Cooks* also appear to face some deficit in 2009, but quite a large one in the Games year. (About 36 per cent short of estimated demand.) Given the importance of this occupational group in the overall tourism related industry, it may be necessary to take measures to encourage those who are not currently certified to take proper certification, or alternatively, to attract qualified persons from out of the province to meet the needs in the Games year.

10. *NOC 645 Occupations in Food and Beverage Service* is on the watch list because, while the worker potential gap of about 800 workers in 2010 appears relatively low to other watch-list occupations, this potential gap amounts to about 17% of estimated demand. More importantly, *NOC 063 Managers in Food*

Service and Accommodation, a closely related occupation, is expected to be in severe potential gap, and personnel in *NOC 645* jobs are obvious candidates for training and promotion to *NOC 063* managerial positions. Without adequate supply of workers in *NOC 645* (and related) occupations, there will be an inadequate pool of potential managers from which to draw.

11. *NOC 945 Machine Operators, Fabric, Fur and Leather* includes certain personnel needed to manufacture goods for coverings, clothing, equipment and other goods needed for the Games and concurrent projects. The expected potential gaps are in year 2006 and from 2008 to 2010 and as such this is an occupational category that also requires monitoring.

Recommendations on Further Research/Analysis

1. Unemployed workers may not be considered to be immediately job-ready for the kinds of openings that the Games and projects would be generating. We have not included them in this study, mainly to avoid potential double counting in the source of labour supply. Given the potential contribution from and the need for viable employment among this group there would appear to be an opportunity to involve the relevant government departments in labour supply issues. For example, data mining of EI recipients and matching against labour requirements may yield a potentially useful pool of labour for certain occupational categories. To the extent companies experience difficulties in hiring workers, they could be encouraged to utilize EI offices as advertising “distribution channels” for work opportunities for EI recipients. Targeted skills programs and upgrading should be provided where necessary.

2. Because of the lack of data on inter-occupational mobility, we have not been able to consider such movements in our analysis of potential labour supply. As such it is possible that some of the potential gaps we have identified would be somewhat over-estimates. We recommend better collection of data and establishing a model to analyze inter-occupational mobility be conducted in the future.

3. In both the demand study completed previously and in this study, the lack of suitably detailed information about intra-provincial/inter-regional occupational counts, movements and “churn” has been evident. While in some regions and in some categories, sampling issues will prevent short- and medium-term improvements in detailed estimation and information availability, further work is required to shed light on intra-provincial/inter-regional occupational detail.

4. It is strongly recommended that further analysis of labour supply and demand be conducted at appropriate periodic intervals over the period during which the projects commence and in the years preceding the Games. Further study should certainly be undertaken when the detailed labour force 2001 Census results are available and when the Census 2006 results are published. More sub-provincial analysis and additional occupations should be included in future work.

5. Because the pressures identified cannot be assumed to be felt equally among all the occupations within the 3-digit group, some disaggregation to the four digit level (or finer) and examined using quantitative analysis if possible or qualitatively by interviewing those knowledgeable in the industries, etc. should be conducted. Specific potential gaps thus identified can be dealt with via dedicated training programs provided publicly and/or through private trainers, or through other strategies such as recruitment and retention initiatives.

6. Continued refinements of the supply/demand model, including more analysis of seasonality and the conversion of person years into actual worker requirements over periods longer than a year needs to be undertaken.

7. Work with industry sectors in the future to collect qualitative information where quantitative data is limited and develop strategies to equip workers with the needed skills in order to alleviate potential shortages.

8. Additional sources of useful data on labour supply need to be identified and developed. These would include qualitative and well as quantitative sources. Longitudinal information should be used to develop sensitivity indicators of labour supply reactions to changing conditions of demand.

9. Research on possibility for crowding out to anticipate potential for “drain” of workers from the “heartlands”, and develop strategies to mitigate.

10. Readers are referred to Section 2.3 Demand Study Recommendations below, and the demand study itself, for further specific recommendations. Those recommendations relate to trades training, dissemination of employment training and opportunities, liaising with First Nations about training initiatives and tailoring those initiatives to match known or anticipated skilled labour shortages, building upon the Ference Weicker recommendation to prepare an employment strategy for residents of the inner-city neighbourhoods, the first step for which should be conducting a more detailed look at the employability characteristics of the neighbourhoods’ populations, and other areas.

It is important to keep in mind that in dealing with a potential shortage of workers in an occupational group, formal institutional training is not the only solution. Other strategies, including informal on-the-job training offered by employers, should also be considered along with migration, technological changes and other solutions.

Appendix A

Detailed Sources by Occupation, 2003–2015

Table A-1 Managers in Retail Trade, Food Service & Accommodation and Construction & Transportation

Supply & Demand by Occupation (3-digit NOC)		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
062	**Managers in Retail Trade**	**1,444**	**1,485**	**1,528**	**1,547**	**1,570**	**1,592**	**1,611**	**1,626**	**1,634**	**1,641**	**1,650**	**1,661**	**1,667**	**20,656**
	University graduates	68	69	70	71	71	72	73	74	75	76	77	78	79	954
	College graduates	191	194	197	200	203	207	210	213	216	218	220	222	224	2,714
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	329	343	347	352	362	371	380	385	385	385	385	386	388	4,798
	In-Migration	589	608	639	645	649	653	655	656	656	657	661	665	664	8,394
	Ex-Income Assistance recipients	267	271	276	280	284	289	293	298	302	305	308	310	313	3,796
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	2,340	2,788	2,511	2,179	2,105	1,620	1,641	2,205	1,615	1,316	1,322	1,317	1,309	24,269
	SURPLUS (DEFICIT)	(896)	(1,303)	(983)	(631)	(535)	(28)	(30)	(579)	18	325	328	344	359	(3,613)
	SURPLUS (DEFICIT) as % of DEMAND	-38%	-47%	-39%	-29%	-25%	-2%	-2%	-26%	1%	25%	25%	26%	27%	-15%
063	**Managers in Food Service & Accommodation**	**1,056**	**1,086**	**1,115**	**1,129**	**1,147**	**1,163**	**1,178**	**1,190**	**1,197**	**1,202**	**1,209**	**1,217**	**1,222**	**15,112**
	University graduates	34	34	35	35	36	36	36	37	37	38	38	39	39	475
	College graduates	140	142	145	147	149	152	154	156	159	160	162	163	164	1,994
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	249	260	263	267	274	281	288	292	292	292	292	293	294	3,637
	In-Migration	371	384	403	407	409	412	413	414	414	414	417	419	419	5,295
	Ex-Income Assistance recipients	261	265	269	274	278	283	287	291	295	298	301	304	306	3,712
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	747	1,983	1,160	1,724	2,716	705	3,428	2,717	1,909	1,648	1,674	1,664	1,637	23,713
	SURPLUS (DEFICIT)	309	(898)	(45)	(594)	(1,569)	458	(2,250)	(1,527)	(712)	(446)	(465)	(446)	(415)	(8,601)
	SURPLUS (DEFICIT) as % of DEMAND	41%	-45%	-4%	-34%	-58%	65%	-66%	-56%	-37%	-27%	-28%	-27%	-25%	-36%
071	**Managers in Construction & Transportation**	**325**	**334**	**343**	**347**	**352**	**357**	**362**	**366**	**368**	**369**	**372**	**374**	**376**	**4,645**
	University graduates	17	17	17	17	17	18	18	18	18	19	19	19	19	233
	College graduates	54	55	56	57	58	59	60	60	61	62	62	63	64	771
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	72	75	76	77	79	81	83	84	84	84	84	84	84	1,045
	In-Migration	117	121	127	128	129	130	130	130	130	131	131	132	132	1,669
	Ex-Income Assistance recipients	65	66	67	68	70	71	72	73	74	75	75	76	76	928
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	628	752	1,036	1,179	1,141	1,070	962	1,012	870	671	679	685	689	11,375
	SURPLUS (DEFICIT)	(303)	(418)	(693)	(832)	(789)	(712)	(600)	(646)	(503)	(302)	(307)	(311)	(314)	(6,731)
	SURPLUS (DEFICIT) as % of DEMAND	-48%	-56%	-67%	-71%	-69%	-67%	-62%	-64%	-58%	-45%	-45%	-45%	-46%	-59%

Table A-2 Auditors / Accountants / Investment Professionals, Administrative & Regulatory, Finance & Insurance Clerks

	Supply & Demand by Occupation (3-digit NOC)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
111	**Auditors / Accountants / Investment Professionals**	**1,783**	**1,826**	**1,867**	**1,891**	**1,920**	**1,948**	**1,975**	**1,996**	**2,012**	**2,026**	**2,041**	**2,058**	**2,071**	**25,415**
	University graduates	466	472	479	485	491	497	504	511	517	524	531	538	545	6,559
	College graduates	483	490	498	506	514	522	530	538	545	551	556	561	565	6,857
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	13	14	14	14	14	14	15	15	15	15	15	15	16	189
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	339	353	357	362	373	382	391	396	396	396	396	397	399	4,940
	In-Migration	411	424	446	450	453	455	457	458	458	458	461	464	463	5,857
	Ex-Income Assistance recipients	71	72	73	75	76	77	78	79	81	81	82	83	83	1,012
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	2,029	2,547	2,753	2,216	2,612	2,372	2,424	3,113	1,631	1,730	1,749	1,762	1,768	28,706
	SURPLUS (DEFICIT)	(246)	(721)	(887)	(324)	(691)	(423)	(449)	(1,117)	381	296	292	296	304	(3,291)
	SURPLUS (DEFICIT) as % of DEMAND	-12%	-28%	-32%	-15%	-26%	-18%	-19%	-36%	23%	17%	17%	17%	17%	-11%
122	**Administrative & Regulatory Occ's**	**1,409**	**1,445**	**1,483**	**1,502**	**1,524**	**1,546**	**1,565**	**1,581**	**1,592**	**1,601**	**1,612**	**1,624**	**1,632**	**20,114**
	University graduates	165	167	169	171	174	176	178	180	183	185	188	190	192	2,319
	College graduates	411	417	424	431	437	444	451	458	464	469	473	477	481	5,839
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	258	269	272	276	284	291	298	302	302	302	302	303	305	3,766
	In-Migration	450	465	489	493	496	499	501	501	501	502	505	508	507	6,419
	Ex-Income Assistance recipients	125	127	129	131	133	135	137	139	141	142	144	145	146	1,771
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	1,605	1,711	2,066	2,261	1,036	2,386	1,210	1,978	1,312	1,329	1,344	1,355	1,362	20,953
	SURPLUS (DEFICIT)	(196)	(266)	(583)	(759)	489	(840)	355	(397)	280	272	268	269	270	(839)
	SURPLUS (DEFICIT) as % of DEMAND	-12%	-16%	-28%	-34%	47%	-35%	29%	-20%	21%	20%	20%	20%	20%	-4%
143	**Finance & Insurance Clerks**	**2,460**	**2,508**	**2,557**	**2,591**	**2,629**	**2,666**	**2,700**	**2,731**	**2,756**	**2,775**	**2,794**	**2,813**	**2,827**	**34,807**
	University graduates	267	270	274	278	281	285	288	292	296	300	304	308	312	3,755
	College graduates	880	893	908	922	937	952	966	981	994	1,004	1,013	1,022	1,031	12,504
	High School graduates	279	281	283	285	287	288	290	291	292	292	292	290	287	3,736
	Private Training institute students	51	52	53	54	55	55	56	57	58	58	59	60	60	728
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	263	274	277	281	289	296	303	307	307	307	307	308	310	3,831
	In-Migration	358	370	389	392	395	397	398	399	399	400	402	404	404	5,108
	Ex-Income Assistance recipients	362	368	374	379	386	392	398	404	409	413	417	421	424	5,146
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	1,180	1,743	2,527	2,568	1,193	1,511	1,767	566	733	1,551	1,566	1,576	1,580	20,058
	SURPLUS (DEFICIT)	1,281	765	30	23	1,436	1,155	933	2,165	2,023	1,225	1,228	1,237	1,247	14,749
	SURPLUS (DEFICIT) as % of DEMAND	109%	44%	1%	1%	120%	76%	53%	383%	276%	79%	78%	79%	79%	74%

Table A-3 Mathematicians / Analysts / Programmers, Secondary / Elementary School Teachers & Counselors, Creative & Performing Artists

Supply & Demand by Occupation (3-digit NOC)		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
216	**Mathematicians / Analysts / Programmers**	**3,338**	**3,432**	**3,510**	**3,557**	**3,618**	**3,675**	**3,730**	**3,770**	**3,792**	**3,811**	**3,833**	**3,859**	**3,880**	**47,804**
	University graduates	480	486	493	499	506	512	519	526	532	539	546	553	561	6,752
	College graduates	679	689	700	711	723	734	745	756	767	775	782	789	795	9,644
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	130	132	134	136	139	141	143	145	147	149	150	151	152	1,850
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	1,075	1,121	1,134	1,151	1,183	1,213	1,242	1,258	1,258	1,258	1,258	1,262	1,268	15,684
	In-Migration	831	859	902	910	916	922	924	926	926	927	933	938	937	11,850
	Ex-Income Assistance recipients	143	145	147	149	152	154	156	159	161	163	164	166	167	2,025
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	3,226	2,342	2,244	2,678	2,493	1,535	2,937	1,797	1,671	2,261	2,312	2,360	2,405	30,260
	SURPLUS (DEFICIT)	112	1,090	1,266	879	1,125	2,141	793	1,973	2,121	1,550	1,521	1,499	1,475	17,544
	SURPLUS (DEFICIT) as % of DEMAND	3%	47%	56%	33%	45%	139%	27%	110%	127%	69%	66%	63%	61%	58%
414	**Secondary / Elementary School Teachers & Counsellor**	**3,088**	**3,145**	**3,203**	**3,245**	**3,289**	**3,333**	**3,375**	**3,415**	**3,450**	**3,484**	**3,520**	**3,558**	**3,592**	**43,698**
	University graduates	1,946	1,971	1,997	2,023	2,049	2,075	2,102	2,130	2,157	2,186	2,214	2,243	2,272	27,364
	College graduates	378	384	390	396	403	409	415	422	427	432	436	440	443	5,375
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	11	11	12	12	12	12	12	13	13	13	13	13	13	160
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	226	236	239	242	249	255	262	265	265	265	265	266	267	3,302
	In-Migration	437	452	474	479	482	485	486	487	487	488	490	493	493	6,232
	Ex-Income Assistance recipients	89	90	92	93	95	96	98	99	101	102	103	103	104	1,265
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	2,820	2,872	1,592	2,623	1,321	1,832	1,736	2,118	1,943	1,618	1,617	1,615	1,613	25,321
	SURPLUS (DEFICIT)	268	273	1,611	622	1,968	1,501	1,639	1,297	1,507	1,866	1,903	1,943	1,979	18,377
	SURPLUS (DEFICIT) as % of DEMAND	9%	10%	101%	24%	149%	82%	94%	61%	78%	115%	118%	120%	123%	73%
513	**Creative & Performing Artists**	**850**	**872**	**894**	**906**	**920**	**933**	**945**	**954**	**961**	**966**	**973**	**980**	**985**	**12,137**
	University graduates	95	96	97	98	100	101	102	104	105	106	108	109	111	1,332
	College graduates	163	165	168	170	173	176	178	181	184	186	187	189	190	2,310
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	164	171	173	175	180	185	189	191	191	191	191	192	193	2,386
	In-Migration	269	278	292	294	296	298	299	299	299	300	302	303	303	3,831
	Ex-Income Assistance recipients	160	163	165	168	171	173	176	179	181	183	185	186	188	2,278
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	386	697	474	604	490	559	618	1,073	570	589	596	593	585	7,834
	SURPLUS (DEFICIT)	464	175	421	302	430	373	327	(119)	390	377	376	387	399	4,302
	SURPLUS (DEFICIT) as % of DEMAND	120%	25%	89%	50%	88%	67%	53%	-11%	68%	64%	63%	65%	68%	55%

Table A-4 Athletes, Coaches, Referees & Related, Chefs & Cooks, Retail Salespersons & Sales Clerks

Supply & Demand by Occupation (3-digit NOC)		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
525	**Athletes, Coaches, Referees & Related Occ's**	**620**	**634**	**649**	**658**	**667**	**677**	**685**	**692**	**698**	**703**	**709**	**714**	**718**	**8,826**
	University graduates	55	56	57	57	58	59	60	61	61	62	63	64	65	778
	College graduates	288	292	297	302	306	311	316	321	325	328	331	334	337	4,089
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	51	53	54	55	56	58	59	60	60	60	60	60	60	748
	In-Migration	172	178	187	188	190	191	191	192	192	192	193	194	194	2,452
	Ex-Income Assistance recipients	53	54	55	56	57	58	59	60	60	61	62	62	63	759
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	272	536	555	507	531	506	722	1,335	524	695	705	702	693	8,283
	SURPLUS (DEFICIT)	348	97	94	151	137	170	(37)	(643)	175	8	4	13	25	543
	SURPLUS (DEFICIT) as % of DEMAND	128%	18%	17%	30%	26%	34%	-5%	-48%	33%	1%	1%	2%	4%	7%
624	**Chefs & Cooks**	**2,496**	**2,548**	**2,600**	**2,634**	**2,672**	**2,709**	**2,744**	**2,774**	**2,796**	**2,813**	**2,831**	**2,850**	**2,864**	**35,329**
	University graduates	11	11	12	12	12	12	12	12	12	13	13	13	13	158
	College graduates	460	467	474	482	489	497	505	512	519	525	529	534	538	6,531
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	32	32	33	33	34	34	35	35	36	36	37	37	37	452
	Apprentices	268	269	270	271	272	272	273	273	273	273	273	273	273	3,533
	Immigration	346	361	365	370	380	390	399	405	405	405	405	406	408	5,043
	In-Migration	453	468	491	496	499	502	503	504	504	505	508	511	510	6,453
	Ex-Income Assistance recipients	926	940	955	970	986	1,002	1,017	1,032	1,047	1,057	1,066	1,076	1,085	13,160
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	720	2,274	857	1,575	1,807	960	2,875	4,303	2,075	2,002	2,033	2,021	1,989	25,491
	SURPLUS (DEFICIT)	1,775	274	1,743	1,059	864	1,749	(131)	(1,530)	721	811	797	829	875	9,838
	SURPLUS (DEFICIT) as % of DEMAND	247%	12%	203%	67%	48%	182%	-5%	-36%	35%	41%	39%	41%	44%	39%
642	**Retail Salespersons & Sales Clerks**	**5,247**	**5,360**	**5,475**	**5,549**	**5,632**	**5,712**	**5,786**	**5,850**	**5,900**	**5,937**	**5,975**	**6,013**	**6,040**	**74,476**
	University graduates	130	132	133	135	137	139	140	142	144	146	148	150	152	1,828
	College graduates	1,297	1,316	1,337	1,359	1,380	1,402	1,423	1,445	1,465	1,480	1,493	1,506	1,518	18,422
	High School graduates	465	468	472	475	478	481	483	485	488	488	487	484	479	6,234
	Private Training institute students	128	130	132	134	136	139	141	143	145	146	148	149	150	1,821
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	707	737	745	756	778	797	816	827	827	827	827	829	833	10,305
	In-Migration	1,024	1,059	1,112	1,122	1,129	1,136	1,139	1,141	1,141	1,143	1,150	1,157	1,155	14,608
	Ex-Income Assistance recipients	1,496	1,519	1,543	1,568	1,593	1,618	1,643	1,667	1,691	1,707	1,723	1,738	1,752	21,258
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	3,869	3,927	3,653	3,256	2,241	1,887	2,016	2,351	1,884	2,075	2,085	2,077	2,064	33,384
	SURPLUS (DEFICIT)	1,378	1,433	1,822	2,293	3,391	3,825	3,770	3,500	4,016	3,862	3,890	3,936	3,976	41,092
	SURPLUS (DEFICIT) as % of DEMAND	36%	36%	50%	70%	151%	203%	187%	149%	213%	186%	187%	189%	193%	123%

Table A-5 Travel & Accommodation, Food & Beverage Service, Childcare & Home Support Workers

Supply & Demand by Occupation (3-digit NOC)		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
643	**Occ's in Travel & Accommodation**	**1,139**	**1,166**	**1,193**	**1,209**	**1,227**	**1,244**	**1,259**	**1,272**	**1,281**	**1,289**	**1,297**	**1,305**	**1,311**	**16,191**
	University graduates	56	57	57	58	59	60	60	61	62	63	63	64	65	785
	College graduates	267	271	275	279	284	288	293	297	301	304	307	310	312	3,786
	High School graduates	76	77	78	78	79	79	79	80	80	80	80	80	79	1,025
	Private Training institute students	58	59	60	61	62	63	64	65	66	67	67	68	68	830
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	179	186	188	191	197	201	206	209	209	209	209	210	211	2,605
	In-Migration	307	317	333	336	338	340	341	342	342	342	344	346	346	4,376
	Ex-Income Assistance recipients	196	199	202	205	209	212	215	218	221	224	226	228	229	2,784
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	403	275	541	386	431	497	497	817	558	572	580	581	577	6,715
	SURPLUS (DEFICIT)	736	891	652	823	795	747	763	455	723	717	716	725	734	9,476
	SURPLUS (DEFICIT) as % of DEMAND	183%	324%	120%	213%	184%	150%	154%	56%	129%	125%	123%	125%	127%	141%
645	**Occ's in Food & Beverage Service**	**3,579**	**3,652**	**3,730**	**3,781**	**3,836**	**3,891**	**3,940**	**3,985**	**4,022**	**4,049**	**4,077**	**4,105**	**4,125**	**50,771**
	University graduates	106	107	109	110	112	113	114	116	117	119	120	122	124	1,489
	College graduates	833	846	859	873	887	901	915	928	941	951	959	968	976	11,839
	High School graduates	276	277	280	282	284	285	286	288	289	289	288	287	284	3,694
	Private Training institute students	40	41	41	42	43	43	44	45	45	46	46	46	47	568
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	351	366	370	376	386	396	406	411	411	411	411	412	414	5,120
	In-Migration	678	701	736	743	747	752	754	755	755	757	761	766	765	9,671
	Ex-Income Assistance recipients	1,294	1,314	1,335	1,356	1,378	1,400	1,421	1,442	1,462	1,477	1,490	1,504	1,516	18,390
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	875	1,559	1,455	1,044	850	803	1,806	4,811	2,171	2,384	2,422	2,405	2,363	24,947
	SURPLUS (DEFICIT)	2,703	2,093	2,275	2,737	2,986	3,088	2,134	(826)	1,851	1,665	1,654	1,700	1,762	25,824
	SURPLUS (DEFICIT) as % of DEMAND	309%	134%	156%	262%	351%	385%	118%	-17%	85%	70%	68%	71%	75%	104%
647	**Childcare & Home Support Workers**	**3,651**	**3,729**	**3,800**	**3,854**	**3,915**	**3,975**	**4,031**	**4,080**	**4,117**	**4,144**	**4,170**	**4,197**	**4,219**	**51,884**
	University graduates	55	56	57	57	58	59	60	61	61	62	63	64	65	777
	College graduates	865	878	892	906	921	935	949	964	977	987	996	1,005	1,013	12,286
	High School graduates	290	292	294	296	298	300	301	302	304	304	303	301	299	3,884
	Private Training institute students	26	26	26	27	27	28	28	29	29	29	30	30	30	364
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	599	624	632	641	659	675	692	701	701	701	701	702	706	8,732
	In-Migration	475	491	516	521	524	527	529	529	529	530	533	537	536	6,776
	Ex-Income Assistance recipients	1,342	1,362	1,384	1,406	1,428	1,451	1,473	1,495	1,516	1,531	1,545	1,559	1,571	19,064
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	2,489	1,397	1,751	1,322	1,486	1,366	1,467	1,318	1,564	1,898	1,922	1,945	1,965	21,891
	SURPLUS (DEFICIT)	1,163	2,332	2,049	2,531	2,429	2,609	2,564	2,762	2,553	2,246	2,248	2,252	2,254	29,994
	SURPLUS (DEFICIT) as % of DEMAND	47%	167%	117%	191%	163%	191%	175%	210%	163%	118%	117%	116%	115%	137%

Table A-6 Cashiers, Food Counter Attendants & Helpers, Cleaners

Supply & Demand by Occupation (3-digit NOC)		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
661	**Cashiers**	**3,538**	**3,592**	**3,645**	**3,686**	**3,731**	**3,774**	**3,812**	**3,845**	**3,873**	**3,888**	**3,900**	**3,906**	**3,904**	**49,096**
	University graduates	13	13	13	13	14	14	14	14	14	15	15	15	15	182
	College graduates	306	310	315	320	325	331	336	341	345	349	352	355	358	4,343
	High School graduates	1,629	1,639	1,652	1,663	1,675	1,685	1,692	1,699	1,707	1,707	1,704	1,694	1,678	21,824
	Private Training institute students	11	11	12	12	12	12	12	13	13	13	13	13	13	160
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	348	362	367	372	382	392	401	407	407	407	407	408	410	5,069
	In-Migration	300	310	325	328	330	332	333	334	334	334	336	338	338	4,274
	Ex-Income Assistance recipients	932	946	961	977	992	1,008	1,023	1,039	1,053	1,064	1,073	1,083	1,092	13,244
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	2,481	1,132	2,152	1,691	640	1,142	1,279	1,929	1,913	1,472	1,485	1,477	1,461	20,254
	SURPLUS (DEFICIT)	1,058	2,460	1,493	1,995	3,091	2,632	2,533	1,917	1,961	2,416	2,415	2,429	2,443	28,842
	SURPLUS (DEFICIT) as % of DEMAND	43%	217%	69%	118%	483%	230%	198%	99%	103%	164%	163%	164%	167%	142%
664	**Food Counter Attendants & Helpers**	**3,850**	**3,916**	**3,979**	**4,025**	**4,078**	**4,129**	**4,174**	**4,213**	**4,243**	**4,261**	**4,276**	**4,287**	**4,289**	**53,720**
	University graduates	14	14	14	14	14	15	15	15	15	15	16	16	16	192
	College graduates	309	314	319	324	329	335	340	345	350	353	356	360	362	4,397
	High School graduates	1,456	1,465	1,476	1,487	1,497	1,506	1,512	1,518	1,526	1,526	1,523	1,514	1,500	19,505
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	493	514	520	527	542	556	569	576	576	576	576	578	581	7,184
	In-Migration	414	428	450	454	457	459	461	462	462	462	465	468	467	5,908
	Ex-Income Assistance recipients	1,164	1,181	1,200	1,219	1,239	1,259	1,278	1,297	1,315	1,328	1,340	1,352	1,363	16,534
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	1,927	262	1,513	4,012	(1,738)	2,390	1,537	2,400	2,027	2,054	2,086	2,078	2,051	22,598
	SURPLUS (DEFICIT)	1,923	3,654	2,466	13	5,817	1,739	2,637	1,813	2,216	2,207	2,190	2,209	2,239	31,122
	SURPLUS (DEFICIT) as % of DEMAND	100%	1397%	163%	0%	-335%	73%	172%	76%	109%	107%	105%	106%	109%	138%
666	**Cleaners**	**4,906**	**4,984**	**5,063**	**5,122**	**5,186**	**5,248**	**5,303**	**5,351**	**5,392**	**5,415**	**5,434**	**5,447**	**5,449**	**68,299**
	University graduates	7	7	7	7	7	7	7	7	7	7	8	8	8	93
	College graduates	294	299	303	308	313	318	323	328	332	336	339	342	344	4,178
	High School graduates	1,975	1,987	2,003	2,017	2,031	2,044	2,052	2,060	2,070	2,070	2,066	2,054	2,035	26,465
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	478	499	505	512	526	540	553	560	560	560	560	561	564	6,978
	In-Migration	500	517	543	548	551	555	556	557	557	558	561	565	564	7,134
	Ex-Income Assistance recipients	1,651	1,675	1,702	1,729	1,757	1,785	1,812	1,839	1,865	1,884	1,901	1,918	1,933	23,451
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	2,265	1,536	4,520	2,433	2,849	1,707	2,622	1,951	2,213	2,087	2,110	2,114	2,109	30,517
	SURPLUS (DEFICIT)	2,641	3,448	543	2,689	2,337	3,541	2,681	3,400	3,179	3,328	3,325	3,333	3,339	37,782
	SURPLUS (DEFICIT) as % of DEMAND	117%	224%	12%	111%	82%	207%	102%	174%	144%	159%	158%	158%	158%	124%

Table A-7 Travel / Accommodation / Recreation Attendants, Contractors & Supervisors in Trades & Related, Carpenters & Cabinetmakers

Supply & Demand by Occupation (3-digit NOC)		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
667	**Travel / Accommodation / Recreation Attendants**	**541**	**550**	**560**	**567**	**573**	**580**	**585**	**590**	**594**	**596**	**598**	**599**	**599**	**7,532**
	University graduates	11	11	11	11	11	11	12	12	12	12	12	12	12	150
	College graduates	119	121	123	125	127	129	131	133	135	136	137	139	140	1,695
	High School graduates	216	217	219	221	222	223	224	225	226	226	226	225	223	2,894
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	53	55	56	57	58	60	61	62	62	62	62	62	63	774
	In-Migration	94	97	102	103	104	105	105	105	105	105	106	106	106	1,345
	Ex-Income Assistance recipients	48	48	49	50	51	51	52	53	54	54	55	55	56	675
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	547	(177)	404	227	60	298	402	311	289	319	324	322	317	3,644
	SURPLUS (DEFICIT)	(7)	727	156	340	513	282	183	279	305	277	274	277	282	3,889
	SURPLUS (DEFICIT) as % of DEMAND	-1%	-411%	39%	150%	855%	95%	46%	90%	105%	87%	84%	86%	89%	107%
721	**Contractors & Supervisors, Trades & Related**	**340**	**347**	**356**	**361**	**366**	**371**	**376**	**380**	**384**	**386**	**389**	**393**	**395**	**4,843**
	University graduates	15	15	15	15	16	16	16	16	16	17	17	17	17	209
	College graduates	79	80	81	83	84	85	87	88	89	90	91	92	92	1,121
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	20	21	21	22	22	23	23	24	24	24	24	24	24	297
	In-Migration	84	86	91	92	92	93	93	93	93	93	94	94	94	1,192
	Ex-Income Assistance recipients	143	145	147	149	152	154	156	159	161	163	164	166	167	2,025
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	1,185	1,843	1,240	1,849	1,615	1,304	1,155	1,052	996	856	864	869	872	15,700
	SURPLUS (DEFICIT)	(845)	(1,496)	(885)	(1,488)	(1,249)	(934)	(779)	(672)	(612)	(470)	(475)	(476)	(477)	(10,857)
	SURPLUS (DEFICIT) as % of DEMAND	-71%	-81%	-71%	-80%	-77%	-72%	-67%	-64%	-61%	-55%	-55%	-55%	-55%	-69%
727	**Carpenters & Cabinetmakers**	**1,492**	**1,514**	**1,537**	**1,553**	**1,569**	**1,585**	**1,600**	**1,613**	**1,625**	**1,633**	**1,642**	**1,651**	**1,658**	**20,671**
	University graduates	5	5	5	5	5	5	5	5	5	5	5	6	6	68
	College graduates	188	191	194	197	200	203	206	210	212	215	217	218	220	2,672
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	557	559	561	562	564	565	566	567	568	569	569	570	571	7,348
	Immigration	83	87	88	89	91	94	96	97	97	97	97	98	98	1,212
	In-Migration	184	190	200	201	203	204	205	205	205	205	206	208	207	2,622
	Ex-Income Assistance recipients	475	482	490	498	506	514	521	529	537	542	547	552	556	6,748
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	608	720	981	1,115	1,073	994	902	920	775	637	643	648	652	10,669
	SURPLUS (DEFICIT)	883	794	556	437	496	591	698	693	850	996	999	1,003	1,006	10,001
	SURPLUS (DEFICIT) as % of DEMAND	145%	110%	57%	39%	46%	59%	77%	75%	110%	156%	155%	155%	154%	94%

Table A-8 Other Construction Trades, Motor Vehicle & Transit Drivers, Trades Helpers & Labourers

Supply & Demand by Occupation (3-digit NOC)		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
729	**Other Construction Trades**	**1,130**	**1,148**	**1,168**	**1,182**	**1,196**	**1,210**	**1,223**	**1,235**	**1,245**	**1,253**	**1,260**	**1,268**	**1,274**	**15,794**
	University graduates	2	2	2	2	2	2	2	2	2	2	2	2	2	23
	College graduates	32	33	33	34	34	35	35	36	36	37	37	37	38	458
	High School graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Private Training institute students	8	8	8	9	9	9	9	9	9	9	9	10	10	117
	Apprentices	248	248	248	249	249	249	249	249	249	248	248	248	248	3,229
	Immigration	71	74	75	76	78	80	82	83	83	83	83	83	83	1,032
	In-Migration	158	163	171	173	174	175	175	176	176	176	177	178	178	2,247
	Ex-Income Assistance recipients	612	621	631	641	651	661	671	681	691	698	704	710	716	8,689
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	352	634	696	728	665	642	524	307	350	405	409	413	416	6,541
	SURPLUS (DEFICIT)	777	515	473	454	531	568	700	928	895	848	851	856	859	9,254
	SURPLUS (DEFICIT) as % of DEMAND	221%	81%	68%	62%	80%	89%	134%	302%	256%	209%	208%	207%	207%	141%
741	**Motor Vehicle & Transit Drivers**	**2,270**	**2,316**	**2,366**	**2,396**	**2,429**	**2,461**	**2,489**	**2,515**	**2,535**	**2,549**	**2,563**	**2,576**	**2,584**	**32,049**
	University graduates	3	3	3	3	3	3	3	4	4	4	4	4	4	45
	College graduates	159	161	164	166	169	172	174	177	179	181	183	184	186	2,254
	High School graduates	397	400	403	406	409	411	413	414	417	417	416	413	409	5,325
	Private Training institute students	25	25	25	26	26	27	27	27	28	28	28	29	29	350
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	239	249	252	255	263	269	276	279	279	279	279	280	282	3,482
	In-Migration	474	490	515	519	522	526	527	528	528	529	532	535	534	6,759
	Ex-Income Assistance recipients	974	988	1,004	1,020	1,037	1,053	1,069	1,085	1,100	1,111	1,121	1,131	1,140	13,834
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	1,416	3,956	2,186	3,611	2,574	2,998	2,501	4,120	2,898	2,831	2,871	2,891	2,897	37,749
	SURPLUS (DEFICIT)	855	(1,640)	180	(1,215)	(146)	(537)	(12)	(1,606)	(364)	(282)	(308)	(314)	(312)	(5,700)
	SURPLUS (DEFICIT) as % of DEMAND	60%	-41%	8%	-34%	-6%	-18%	0%	-39%	-13%	-10%	-11%	-11%	-11%	-15%
761	**Trades Helpers & Labourers**	**1,533**	**1,557**	**1,583**	**1,603**	**1,624**	**1,644**	**1,662**	**1,679**	**1,695**	**1,704**	**1,713**	**1,720**	**1,723**	**21,441**
	University graduates	3	3	3	3	3	3	3	3	3	3	3	3	4	42
	College graduates	120	121	123	125	127	129	131	133	135	136	138	139	140	1,699
	High School graduates	471	474	478	481	484	487	489	491	494	494	493	490	485	6,309
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	77	80	81	82	85	87	89	90	90	90	90	90	91	1,122
	In-Migration	150	155	163	165	166	167	167	168	168	168	169	170	170	2,145
	Ex-Income Assistance recipients	713	723	735	747	758	771	782	794	805	813	820	828	834	10,123
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	29	226	546	488	789	380	524	142	401	427	431	435	438	5,255
	SURPLUS (DEFICIT)	1,504	1,332	1,038	1,115	835	1,264	1,138	1,537	1,294	1,278	1,282	1,285	1,285	16,186
	SURPLUS (DEFICIT) as % of DEMAND	5194%	590%	190%	229%	106%	333%	217%	1079%	323%	299%	297%	295%	293%	308%

Table A-9 Machine Operators in Fabric, Fur & Leather, and Totals

Supply & Demand by Occupation (3-digit NOC)		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
945	**Machine Operators: Fabric / Fur / Leather**	**247**	**255**	**260**	**263**	**269**	**274**	**279**	**281**	**282**	**282**	**282**	**283**	**284**	**3,540**
	University graduates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	College graduates	2	2	2	2	2	2	2	2	2	2	2	2	2	25
	High School graduates	34	34	35	35	35	35	36	36	36	36	36	36	35	458
	Private Training institute students	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Apprentices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Immigration	162	169	171	173	178	183	187	189	189	189	189	190	191	2,360
	In-Migration	37	38	40	41	41	41	41	41	41	41	42	42	42	528
	Ex-Income Assistance recipients	12	12	12	12	13	13	13	13	13	14	14	14	14	169
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	156	49	257	446	225	287	383	541	206	187	190	192	192	3,312
	SURPLUS (DEFICIT)	91	206	2	(183)	43	(14)	(104)	(259)	76	95	92	91	92	229
	SURPLUS (DEFICIT) as % of DEMAND	59%	419%	1%	-41%	19%	-5%	-27%	-48%	37%	50%	49%	47%	48%	7%
TOP 25 OCCS, ALL SOURCES		**52,331**	**53,399**	**54,464**	**55,159**	**55,939**	**56,697**	**57,389**	**57,984**	**58,442**	**58,777**	**59,121**	**59,457**	**59,689**	**738,850**
	University graduates	4,022	4,074	4,127	4,181	4,235	4,290	4,346	4,402	4,460	4,518	4,576	4,636	4,696	56,561
	College graduates	8,996	9,131	9,277	9,425	9,576	9,729	9,875	10,023	10,164	10,265	10,358	10,451	10,534	127,803
	High School graduates	7,565	7,611	7,672	7,725	7,779	7,826	7,857	7,889	7,928	7,928	7,912	7,865	7,794	101,353
	Private Training institute students	534	542	551	560	569	578	586	595	603	609	615	621	625	7,588
	Apprentices	1,072	1,076	1,080	1,082	1,084	1,086	1,088	1,089	1,090	1,090	1,091	1,091	1,091	14,110
	Immigration	7,231	7,539	7,627	7,736	7,956	8,154	8,352	8,462	8,462	8,462	8,462	8,484	8,528	105,453
	In-Migration	9,337	9,650	10,135	10,229	10,291	10,354	10,385	10,401	10,401	10,416	10,479	10,541	10,526	133,143
	Ex-Income Assistance recipients	13,573	13,777	13,997	14,221	14,449	14,680	14,900	15,124	15,335	15,489	15,628	15,769	15,895	192,838
	Unemployed	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DEMAND	34,555	37,582	39,671	42,722	31,205	31,751	37,934	45,187	33,098	33,614	34,021	34,094	34,004	469,439
	SURPLUS (DEFICIT)	17,776	15,817	14,794	12,437	24,734	24,945	19,455	12,797	25,344	25,164	25,099	25,362	25,685	269,411
	SURPLUS (DEFICIT) as % of DEMAND	51%	42%	37%	29%	79%	79%	51%	28%	77%	75%	74%	74%	76%	57%