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Difficulties Encountered in Projecting Canada's Aboriginal Population

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Introduction:

Population projections are used for all sorts of planning purposes. Demographic forecasts have considerable utility in preparing for future health care needs, housing requirements, social security, educational planning, through to a variety of other public services. Population projections are probably the most frequently requested application of demographic knowledge as requested by government and non-academic organizations. For this reason, it is no great surprise that demographers have been repeatedly contracted by Indian and Northern Affairs Canada among other government departments to generate Aboriginal population projections (Perreault, Paquette and George, 1985; Loh, 1990; Nault et al, 1993; Nault and Jenkins, 1993; Clatworthy, 1994; Loh, 1995; Loh et al, 1998).

Among the most widely publicized sets of projections to date were those contracted by the Royal Commission on Aboriginal Peoples (for a general overview, see Norris, Kerr and Nault, 1995). Summarized in the first volume of the Royal Commission's final report to parliament, these projections received high profile with the initial press release of the commission's work (Dussault and Erasmus, 1996). Basing these projections on 1991 data, considerable energy went into dealing with many of the shortcomings that have characterized demographic data on Aboriginal peoples in the past. The purpose of the current paper is to take a second look at this set of projections and to provide a general overview of some of the insights gained and difficulties encountered in projecting the future growth of Canada's Aboriginal Population.

This paper begins with a brief introduction to some of the definitional issues and data sources currently involved in working with demographic data on the Aboriginal population in Canada. This is followed by a brief overview of the methodology used in the Royal Commission projections, along with a brief presentation of the projection results. Comparisons are made between these projections (based on the 1991 Census) and more up to date demographic data available from Statistics Canada. A general summary of the projection results is followed by a brief discussion of some of the methodological difficulties that will always be encountered in efforts to project a population as defined in terms of ancestry or cultural origins.

Defining the Aboriginal Population

According to the Canadian constitution, there are three major groups of Aboriginal Peoples in Canada, including North American Indians, the MJs (who are of mixed Aboriginal and non-Aboriginal ancestry) and the Inuit (who are indigenous to Canada's Arctic and sub-Arctic regions). In addition, Canada's Indian Act (first established in the 19th century) draws a further distinction between North American

Indians who hold legal Indian status and those who do not (registered and non-registered North American Indians). As outlined by Goldmann (1993), both the Canadian constitution and the Indian Act have had considerable impact on the classification of Aboriginal peoples by government administrators and social scientists. For example, this classification has had a large impact on how the Canadian Census has historically collected and published information on Aboriginal Peoples in Canada, in particular, over the last quarter century.

While legislation in the Constitution Act recognize Aboriginal peoples as Indian, Métis and Inuit, it does not actually define what constitutes their populations. In contrast, Indian Act legislation provides a specific definition of the Aboriginal population by setting the legal criteria for a person to be recognized as a registered Indian. Since the 19th century, the Federal government has defined who is and who is not a registered Indian, with the establishment of eligibility criteria and the maintenance of an Indian Register. With each legislative change and the introduction of new eligibility criteria, the Federal government reviews all individuals on this register, and potentially removes or adds persons. As a recent example of this, in 1985 a major revision of the Indian Act (Bill C-31) led to the reinstatement of over 100,000 Canadians who had previously lost status for one reason or another. The largest percentage of these reinstatements included women and their children who had previously lost status through out-marriage to persons not registered under the Indian Act.

The maintenance of this Indian Register by the Federal Department of Indian and Northern Affairs has been a major source of information on registered Indians in Canada. Births and deaths occurring to this population are documented in maintaining this register as complete as possible. Information on the size, age structure and distribution of status Indians is available, as well as the information useful in the calculation of birth and death rates. On the other hand, since the register exists only for registered Indians, it is necessary to look elsewhere for information on the non-registered Indians, Métis and most Inuit living in Canada. As no other population register exists (with the exception of a small one maintained for the Inuit of northern Quebec), the Census (and related post-censal surveys) have been relied upon as the only other major source of information on Aboriginal peoples.¹

In shifting the emphasis from the registered Indian population (as defined in terms of objective legal criteria) to all Aboriginal peoples (as defined in terms of how individuals report their ancestry), a series of difficulties surface relating primarily to definition and measurement. In recognizing the diverse origins of Canada's population and the long history of intermarriage (which has been particularly true among Aboriginal peoples), the measurement of ancestry or cultural origins is far from being an easy task. Efforts to establish time series data on Aboriginal peoples will always be hindered by the "fluid or situation character" of such concepts as ancestry or cultural origins (Boxhill, 1984). Persons of Aboriginal ancestry may deny their origins, others may have a

¹ Unlike the United States, Canadian Vital Statistics do not compile information on births and deaths by race, nor is information collected on the ancestry or ethnicity of persons involved.

passionate commitment to them, while others still, may be somewhat passive or indifferent.

This situation is complicated by the fact that the propensity to report Aboriginal origins appears to have shifted over time, as reflected in the phenomenal growth in the number of Aboriginal people since the early 1970s (Boxhill, 1984; Pryor, 1984; Goldman and Siggner, 1995; Kerr, Siggner and Bourdeau, 1997; Guimond, 1998). This is due partially, but not entirely, to changes in the formulation of questions used by government authorities in delineating ancestry or cultural origins. For example, prior to 1981, the Census did not collect information on multiple or mixed origins whereas currently the practice is to encourage their reporting. As an example of this growth, the 1991 Census reported about twice as many persons of Aboriginal ancestry than did the 1981 Census. For a variety of reasons, Canadians are more likely to report Aboriginal ancestry today than was the case historically.

In 1991, Statistics Canada introduced a large-scale post-censal survey (Aboriginal Peoples Survey) meant to gather additional information on Aboriginal peoples in Canada. A large proportion of persons who reported Aboriginal ancestry in the 1991 census were sampled, and asked whether they actually “identify” with their reported ancestry. This “identity population” has been understood to more accurately capture the essence of what has been denoted as a “core Aboriginal population” (Goldmann and Siggner, 1995). Beyond merely reporting Aboriginal ancestry, the identity item was meant to act as an “indicator of an individual’s feelings, allegiance or association” with Aboriginal culture (Goldmann, 1994:11). In shifting the emphasis to “self-identification”, a relatively minor change in wording had quite a pronounced impact on final tabulations. For example, this narrower definition of the Aboriginal population left for only about 58% of all North American Indians, 64% of the Métis and 74% of the Inuit. It was in this context that the Royal Commission was asked to report on the social and economic conditions of Aboriginal Canadians, and to substantiate recommendations on the basis of carefully documented demographic trends.

Method:

The method selected for the Royal Commission projections is the cohort component approach. This is non-surprising given what has been referred to as a “rare consensus” for the social sciences, that being, the cohort component approach is by far the most preferred technique in generating population projections and forecasts (Preston et al., 2000). Without providing the technical details associated with this method, the basic ideas that underlie it are relatively straightforward. Beginning with a base population (classified by age and sex), mortality, fertility and net migration rates are used to project the base population into the future.

The base population for the Royal Commission projections was selected from the 1991 Aboriginal Peoples Survey. After extensive consultations with representatives from Aboriginal organizations such as the Assembly of First Nations, the Council of Aboriginal Peoples (formerly the Native Council of Canada), the Inuit Tapirisat of Canada, as well

as representatives from numerous research and government organizations, the decision was made to by-pass the 1991 census information on Aboriginal ancestry. Alternatively, the more restrictive definition of Aboriginal population (as based on “Aboriginal identity”) was selected, felt to better portray the population that the Royal Commission was mandated to represent. As aforementioned, this slight shift in definition had a pronounced impact on total population size, reducing overall numbers by several hundred thousand.

Table 1 includes the Royal Commission’s base population subdivided into four distinct groups, that being: (i) status North American Indians, (ii) non-registered North American Indians, (iii) the MJtis, and (iv) the Inuit. Using data from the Aboriginal Peoples Survey, adjustments were introduced in light of two problems. First, a limited number of reserves, primarily for political reasons, refused to participate in either the post-censal survey and/or the 1991 Census (incomplete enumeration). Second, beyond this issue of non-participating reserves, additional persons were missed, both on and off reserve, as part of the more general problem of census undercoverage. Without providing detail in the current paper, the base populations in Table 1 were adjusted for both of these problems and also arrayed by age and sex (with minor adjustments due to sampling error).² The base population was also generated separately by province/territory, on and off reserve, as well as rural and urban areas.

Table 1. Base Population, by Aboriginal Group, Canada 1991

Aboriginal Population	Aboriginal Identity Population			Percent Increase due to		
	1991 APS Estimate (unadjusted)	Adjusted for Incomplete Enumeration	Adjusted for Both Incomplete Enumeration and Undercoverage ²	Adjustment for Incomplete Enumeration	Adjustment for Undercoverage	All Adjustments (Incomplete Enumeration and Undercoverage)
North American Indians						
Status ¹	353,055	406,755	438,030	15.2	8.9	24.1
Non-status	107,625	109,050	112,640	1.3	3.3	4.6
Metis	135,260	136,070	139,395	0.6	2.5	3.1
Inuit	36,215	36,250	37,825	0.1	4.3	4.4
Total Aboriginal without multiples	625,700	681,940	720,650	9.0	6.2	15.2

1 Aboriginal group counts do contain some minor double counting of those giving more than one identity response (e.g. those giving a Metis and North American Identity and status responses are counted as both Metis and as North American indian status).

2 All adjustments include a) incomplete enumeration of reserves; and b) adjustments for undercoverage of the population residing on participating reserves or in non-reserve areas

Source: Unadjusted data: Statistics Canada, 1991 Aboriginal Peoples Survey, special tabulations. Adjusted data: Statistics Canada, Demography Division, Population Projections Section.

² Statistics Canada, in generating national population estimates, routinely produces independent estimates of both of these forms of census coverage error. Since the post-censal survey’s sampling frame was the 1991 Census, adjustments were obviously necessary for both forms of coverage error.

With this base population, a wide range of potential projection scenarios were possible for the 1991-2016 period. As merely one example, after deriving current fertility, mortality and migration rates, projections could be generated by merely setting such rates as constant into the future. Yet while it is reasonable to assume that this might apply for the first few years of a projection, typically most projections rely on more realistic assumptions about future change. A common theme that runs through most attempts at population prediction is that mechanisms that have operated in the past will continue to operate into the future. If recent years have witnessed major gains in terms of reducing mortality, then a continuation or extrapolation of this trend is advisable in projecting the future. In the context of Aboriginal population projections, a large part of the challenge rested in locating a time series of reasonable quality to guide projections on the underlying components of demographic change.

For registered Indians and the Inuit of Northern Quebec, mortality and fertility rates were available directly from population registers. With adjustments for data quality problems and late reporting, population registers have been used in the past to develop time series of reasonable quality (Nault et al, 1993; Robitaille and ChoiniPre,1987). With regard to the other Aboriginal groups, census information and techniques of indirect estimation have periodically been used (Piche and George, 1973; Rominiuc, 1981,1987; Ram, 1991) – with various limitations, as related to the definitional and measurement issues as previously raised. With regard to migration, the census has long been considered the most comprehensive source of information, as the 1-year and 5-year mobility items provide detailed information on both interprovincial and intraprovincial movements. Overall, a review of the varied data sources available have provided some guidance to the Royal Commission in the development of its projections. For example, while fertility and mortality remain relatively high among Aboriginal Canadians, there was considerable evidence to suggest a growing convergence toward rates as observed among Canadians overall – a trend that one might anticipate to continue into the projection period.

In working with this data, Table 2 portrays fertility (total fertility rates) and mortality (life expectancy at birth) as estimated for the aforementioned base populations in 1991. For comparative purposes, these summary indicators were also obtained for Canada as a whole, as derived from Vital Statistics. Table 2 also includes the fertility and mortality of these different Aboriginal groups - projected for the year 2016 - with four separate projection scenarios. After a thorough review of relevant time series, four separate projection scenarios were chosen to provide a range of growth, including two medium growth scenarios (with and without migration), one high growth scenario and one low growth. The second scenario (medium growth with migration) was considered the most plausible projection – as it represented largely a continuation of recent trends. With regard to the underlying components of demographic change, both fertility and mortality were projected to decline at a moderate pace over the 1991-2016 period. In so doing, the most pronounced change was projected to occur toward the beginning of the 1991-2016 period - in extrapolating past rates in a curvilinear fashion. Although not portrayed in Table 2, age/sex specific rates are projected for the full period, as necessary input into the cohort component method. Across all Aboriginal groups, the by-product

of lower mortality and fertility was longer life expectancy and a lower total fertility rate (TFR).

Briefly, the 1991 estimates of fertility and mortality indicated important differences across Aboriginal groups. For example, both Inuit fertility and mortality was consistently higher than that of registered Indians, which in turn exceeded that of the

Table 2: Estimates for 1991 and Projections for 2016, Demographic Components by Aboriginal Identity Group

Aboriginal Group	1991	- 2016 -			
		Projection 1 Current trends without migration	Projection 2 Current trends with migration	Projection 3 High growth	Projection 4 Low growth
Registered Indians					
Total Fertility Rate (births per woman):	2.9	2.2	2.2	2.9	2.2
Life Expectancy at Birth (in years):					
Male	66.9	72.9	72.9	72.9	66.9
Female	74.0	80.1	80.1	80.1	74.0
Internal Migration ¹		zero	current trend	current trend	current trend
Non-Registered Indians					
Total Fertility Rate (births per woman):	2.1	1.6	1.6	2.1	1.6
Life Expectancy at Birth (in years):					
Male	71.4	76.2	76.2	76.2	71.4
Female	77.9	82.3	82.3	82.3	77.9
Internal Migration		zero	current trend	current trend	current trend
Metis					
Total Fertility Rate (births per woman):	2.5	1.8	1.8	2.5	1.8
Life Expectancy at Birth (in years):					
Male	70.4	75.5	75.5	75.5	70.4
Female	76.9	81.3	81.3	81.3	76.9
Internal Migration		zero	current trend	current trend	current trend
Inuit					
Total Fertility Rate (births per woman):	3.4	2.5	2.5	3.4	2.5
Life Expectancy at Birth (in years):					
Male	57.6	63.6	63.6	63.6	57.6
Female	68.8	76.3	76.3	76.3	68.8
Internal Migration		zero	current trend	current trend	current trend
Canada					
Total Fertility Rate (births per woman):	1.7				
Life Expectancy at Birth (in years):					
Male	74.6				
Female	81.0				
Internal Migration					

1 Current trends on internal migration by place of residence and region are based on patterns observed over the 1986-1991 intercensal period. It is assumed that rates observed over this period can be held constant over the full projection period. Migration is projected both in terms of interprovincial migration and intraprovincial migration (on-reserve / off-reserve, rural/urban).

Metis and non-status Indians. Total fertility rates (TFRs), as obtained on the basis of indirect estimation techniques, yielded the following ranking in 1991: Inuit, 3.4 children; registered Indians, 2.9, Metis, 2.5; and non-status Indians 2.1. With regard to mortality, the relative ranking of Aboriginal groups was much the same, although the disadvantages that characterize Inuit Canadians appeared particularly striking (for example, the life expectancy at birth of Inuit males is estimated at only 57.6 years). On the basis of recent trends, both mortality and fertility were projected to decline into the future – while the relative rankings of these Aboriginal groups was largely maintained. With regard to the impact of migration, for three of the four scenarios, the patterns as observed over the most recent intercensal period (1986-1991) were expected to continue over the full projection period. In terms of international migration, the negligible net flow of Aboriginal peoples into and out of Canada indicated that it was reasonable to drop such migration from the projection model.

Legislative Reform as a Non-Conventional Growth Factor

With most population forecasts, projections fail to the extent that future trends in fertility, mortality and migration are off the mark. Uncertainty about future trends on these fundamental demographic components is what makes the generation of long-term projections such a hazardous enterprise. Yet with the Royal Commission projections, additional complications surface due to factors not normally encountered in standard population projections. For example, the Federal government has repeatedly introduced revisions and reforms to the Indian Act, which in a direct manner, can have a rather pronounced impact on the size and rate of growth of the registered Indian population.

The last legislative change of any importance in this regard was the introduction of Bill C-31 in 1985. This amendment to the Indian Act provided for the restoration of Indian status to individuals (and their children) who had lost status under selected provisions of previous legislation. With its introduction, the impact of Bill C-31 was felt almost immediately, as for example, over the 1985-1994 period approximately 96,000 persons were formally reinstated as registered Indians. As a particularly important yet non-conventional growth factor for status Indians, the impact of Bill C-31 was not overlooked in finalizing the Royal Commission projections. An additional 47,000 reinstatements were forecasted over the full projection period – an assumption introduced across all four projection scenarios.

In the projection of reinstatements through to 2016, the annual number of reinstatements was forecasted to decline in a gradual yet steady manner. This projection was consistent with the idea that the potential pool of C-31 applicants would gradually become depleted. In addition, it was forecasted that a disproportionate number of reinstatements would be Indian women and/or their offspring. Prior to 1985, women who out-married (i.e. to persons not registered under the Indian Act) lost registered status, whereas men who out-married, not only retained their status, but also transferred eligibility to their wives. With regard to births, patrilineal descent (or inheritance) was in place, such that only the offspring of registered men (who married non-status women)

would retain Indian status for their children. A motivating factor behind Bill C-31 was the need to eliminate such rules, whereas reinstatements were meant to correct for past legislation. A whole new series of status inheritance rules were subsequently introduced, such that descent was no longer simply defined on a patrilineal basis.

While all projection scenarios included reinstatements, a review of the new status inheritance rules of Bill C-31 raised further issues relevant to the Royal Commission projections. Further amendments to the Indian Act (specifically Section 6) contained descent rules that specified two separate ways in which one could acquire status under the revised Indian Act: under either Section 6(1) or Section 6(2). In definition, children born to parents, both of who were currently status Indians acquired entitlement under Section 6(1). Children born to parent combinations involving a parent registered under section 6(1) and a non-registered parent acquired entitlement under Section 6(2). Offspring from parental combinations involving a non-registered parent and a parent registered under Section 6(2) were accordingly not entitled to Indian status. In thinking through the longer term implications of this legislation, it was realized that projections of the status population that failed to consider the impact of descent rules were likely to overstate population growth for registered Indians.

In preparation of the Royal Commission projections, relatively little information was available on the propensity of status Indians to marry non-status Indians. After consultation with Indian and Northern Affairs, indirect evidence was introduced to suggest that in 1991, the percentage of births to status Indians that retained status according to the new rules was probably about 90% (Clatworthy,1994). On the basis of simulations, this percentage was projected to decline in a rather dramatic manner toward the end of the projection period, such that only about 75% of all births to status Indians retained status by 2016. On this basis, it was projected that about 10% of births to status Indian women in 1991 be allocated to the non-status population, a proportion projected to increase to about 25% by 2016. In the absence of carefully documented out-marriage rates and a formal modeling of the impact of out-marriage on the status inheritance of births, this was considered an improvement over merely allocating all births to the status population.

Projection Results:

While population projections can provide us with a sense of the future size, growth and age/sex structure of Aboriginal groups, their eventual success obviously rests on the degree to which underlying assumptions on future fertility, mortality and migration prove to be correct. In addition, in the context of the Royal Commission projections, additional non-conventional growth factors can also have their impact, and add an additional element of uncertainty to projections of future population growth. In reaction to such uncertainty, most attempts to project future population growth either implicitly or explicitly underline the difficulties involved through the development of alternate scenarios. While appreciating the logic behind such an approach, for the sake of simplicity, our primary emphasis in summarizing the Royal Commission projection results will be on the second scenario - medium growth with migration.

The medium growth scenario was described as involving “the continuation of current trends” and combines fertility decline with declining mortality and internal migration (Table 3: projection 2). This scenario was highlighted in the Royal Commission’s final report to parliament and generally judged to be the most plausible in the eyes of Commission staff. As in all four scenarios, the impact of Bill C-31 was included, both in terms of reinstatements and the allocation of births in light of revised descent rules. Table 3 also summarizes the projection results of the three other scenarios, for the total Aboriginal population of Canada, as well as for registered North American Indians, non-status Indians, the Metis and Inuit.

In summarizing the results from the medium growth scenario, overall population with Aboriginal identity was projected to increase from an estimated 720,600 in 1991 to over a million (1,093,400) by 2016. This implied an increase of fully 52% over a period of approximately 25 years. To put this into some sort of context, the Canadian population overall has been projected to increase by about 30% over this same period (medium growth scenario; Statistics Canada, 1994). Non-surprisingly, in light of what is known of the demographics of Aboriginal peoples in Canada, the growth rate of its population was expected to outpace that of the Canadian population in general. This conclusion was true across projection scenarios, and reflects a simple demographic fact, that being, the fertility of Aboriginal peoples has for many decades been relatively high in comparison to the fertility of other Canadians. As a result, a relatively young population was expected to experience a high level of natural increase for several decades into the future.

Between 1991 and 2016, the medium growth scenario projected considerable growth across Aboriginal groups – without exception. Among North American Indians, the total registered population was projected to increase from 438,000 to 665,600 (up by 52%), whereas among non-status Indians, the population was projected to increase from 112,600 to 178,400 (an increase of fully 58.4%). Among the Metis, the population was projected to increase from 139,400 to 199,400 (up by 43%) whereas among the Inuit, the population was projected to increase from 37,800 to 60,300 (up by 59.5%). With respect to the projected growth of this latter group, as a direct by-product of their high level of fertility, the Inuit were projected to experience higher growth than any other Aboriginal group. Moving even further, if the Inuit experience little change in fertility over the full projection period (as in the high growth scenario) an extremely rapid increase for this population was projected - of just over 80% in only 25 years.

In terms of the total Aboriginal population, the high growth scenario projected a population of 1,207,100 persons by 2016, fully 114,000 higher than the medium growth scenario. Since the only difference between the high and medium growth scenarios relates to the assumption on projected fertility, a comparison of the two provides us with some evidence as to the impact of the fertility assumptions in projecting Canada’s Aboriginal population. More specifically, the high growth scenario maintained fertility rates at 1991 levels whereas the medium growth scenario projected a steady decline in fertility – toward replacement level across Aboriginal groups. With regard to mortality, a

Table 3
Annual Growth Rate, by Aboriginal Total and Group, by Projection, Canada, 1991 to 2016

	Projection 1	Projection 2	Projection 3	Projection 4	Projection 1	Projection 2	Projection 3	Projection 4
	Current trends without migration	Current trends with migration	High growth	Low growth	Current trends without migration	Current trends with migration	High growth	Low growth
Total Aboriginal								
1991	720.6	720.6	720.6	720.6	-	-	-	-
1996	811.4	811.4	818.4	810.9	2.4	2.4	2.6	2.4
2001	890.6	890.5	914.4	887.9	1.9	1.9	2.2	1.8
2006	959.6	959.1	1006.7	952.4	1.5	1.5	1.9	1.4
2011	1028.7	1027.5	1104.6	1014.5	1.4	1.4	1.9	1.3
2016	1095.9	1093.4	1207.1	1071.3	1.3	1.3	1.8	1.1
Registered Indians								
1991	438	438	438	438	-	-	-	-
1996	505.7	505.7	509.9	505.3	2.9	2.9	3.1	2.9
2001	561.5	561.3	575.8	559.5	2.1	2.1	2.5	2.1
2006	601.7	601.1	629	596.5	1.4	1.4	1.8	1.3
2011	636.8	635.5	679	626.7	1.1	1.1	1.5	1.0
2016	667.7	665.6	727	650.6	1.0	0.9	1.4	0.8
Non-status Indians								
1991	112.6	112.6	112.6	112.6	-	-	-	-
1996	118.3	118.3	119.4	118.3	1.0	1.0	1.2	1.0
2001	126	126.1	130	125.8	1.3	1.3	1.7	1.2
2006	139.6	139.7	148.4	139	2.1	2.1	2.7	2
2011	157.7	157.7	173.5	156.4	2.5	2.5	3.2	2.4
2016	178.6	178.4	204.1	176	2.5	2.5	3.3	2.4
Metis								
1991	139.4	139.4	139.4	139.4	-	-	-	-
1996	152.8	152.8	154.1	152.8	1.9	1.9	2.0	1.9
2001	165	165	169.2	164.6	1.5	1.5	1.9	1.5
2006	176.7	176.7	185.1	175.8	1.4	1.4	1.8	1.3
2011	188.6	188.6	202.1	186.7	1.3	1.3	1.8	1.2
2016	199.5	199.4	219.1	196.2	1.1	1.1	1.6	1.0
Inuit								
1991	37.8	37.8	37.8	37.8	-	-	-	-
1996	42.5	42.5	43	42.5	2.4	2.4	2.6	2.4
2001	46.6	46.6	48.1	46.4	1.9	1.9	2.3	1.8
2006	50.7	50.7	53.7	50.2	1.7	1.7	2.2	1.6
2011	55.3	55.3	60.4	54.3	1.8	1.8	2.4	1.6
2016	60.3	60.3	68.1	58.6	1.7	1.7	2.4	1.5

comparison of the low growth (projection 3) and medium growth scenarios provides some indication as to the impact of the mortality assumptions - as the only difference between the two relates to projected mortality. Whereas the low growth scenario maintained mortality rates at 1991 levels, the medium growth scenario projected a steady decline – towards levels as observed overall in Canada. By 2016, the low growth scenario projected the total Aboriginal population at only 1,071,300 persons, or minus 22,000 in relation to medium growth. The relatively small difference in projected population demonstrated that the impact of projected mortality change had only a modest effect in comparison to the two assumptions on fertility. With regard to migration, a comparison of projections 1 and 2 demonstrated a negligible difference at the national level, which was completely in line with expectations as there was no modeling of international migration in these projections. On the other hand, a detailed regional breakdown (not presented here) demonstrated modest differences in terms of the distribution of population by province and territory, as well as distribution of population internal to provinces, across urban and rural areas as well as on and off reserves.

While the total Aboriginal population in Canada was projected to grow at a relatively rapid pace, across scenarios, the pace of projected growth was expected to decline noticeably throughout the projection period. For example, with the medium growth scenario, the growth rate was projected to decline from 2.4% annually between 1991-1996 to 1.3% between 2011-2016. Corresponding rates under the low growth scenario were 2.4% to 1.1%, while even under the high-growth scenario, the rate of population growth was expected to slow - from 2.6% to 1.8%. In comparing projected growth rates across Aboriginal groups, this same generalization was true of only three of the four Aboriginal groups – with the exception of non-status Indians. With regard to this latter group, growth rates were projected to increase rather than decline, from an average of 1.0% for 1991-1996 to 2.5% by 2011-2016. In explanation, it is necessary to return to the underlying components of demographic change, and how these differ by Aboriginal group.

The projected growth of both the Metis and Inuit populations was based solely on natural increase, with the declining rates of population growth a result of reduced fertility. In the case of the registered Indians, while a declining rate of natural increase was fundamental in defining overall growth, Bill C-31 reinstatements also represent an important component of projected growth. With the non-status population, Bill C-31 was also relevant, expected to have both a positive and negative impact. The number of Bill C-31 reinstatements was projected to act as a negative, as the non-status group served as the primary source population for reinstatements. The impact of Bill C-31 descent rules (i.e. births to status Indians transferred to the non-status Indian category) was projected to act as a positive - particularly toward the latter part of the projection period. On the assumption that as many as 25% of all births to the status population would not qualify for registered status toward the latter part of the projection period, the growth rate for the non-status was projected to increase – irrespective of reduced natural increase. Overall, the impact of Bill C-31 through out-marriage and descent rules was projected to accelerate throughout the projection period, yielding a growing population not entitled to registered status.

Without providing detail in the current context, it is worth briefly acknowledging that the Royal Commission projections also generated detailed projections by age and sex. Non-surprisingly, in light of projected fertility decline, population aging was expected to characterize all Aboriginal groups – without exception. As change in age structure is particularly sensitive to projected change in fertility (and to a lesser extent, mortality), the extent of population aging varied in an important manner across Aboriginal groups. As an added complication, the descent rules in Bill C-31 were also found to have quite a pronounced impact on age structure, in particular, toward the latter part of the projection period.

To the extent that births to registered Indians were reallocated into the non-status group, a younger non-status population was anticipated. In a similar manner, as the registered Indian population lost births due to Bill C-31, this same process contributed to population aging. As a by-product, the status population was projected to be older than anticipated, given their relatively high fertility, whereas the non-status population was projected to be somewhat younger – irrespective of fertility rates projected to be lower than for any other Aboriginal group. The only other group projected to have a younger age structure than the non-status group in 2016 was the Inuit - long known for their relatively high fertility and young age profile. Furthermore, while population aging was projected across all Aboriginal groups, in comparison with the Canadian population in general, the Aboriginal population was projected to continue to be relatively young.

The 1996 Census Based Aboriginal Identity Population

As an update on the size of the Aboriginal population of Canada, the 1996 Canadian Census is potentially quite useful. While the 1991 Aboriginal Peoples Survey was used in establishing the base population for the current set of projections, the 1996 census included a new question that was very similar to the Aboriginal identity question as used in 1991. While in the past, census data on Aboriginal persons involved a question on ancestry or ethnic origins, the 1996 Census included a new question that asked persons directly of their Aboriginal identity; as to whether they considered themselves to be North American Indian, Metis or Inuit. As the wording was virtually identical to the identity question in the Aboriginal peoples Survey, theoretically one would expect that the characteristics of the 1996 Aboriginal identity population be very similar to the base population as defined in 1991, with a difference of five years of demographic growth.

With a consistent definition of the Aboriginal population, it is expected that figures coming out of the 1996 Census fall reasonably close to the current set of projections. To the extent that the base population was established with accuracy and the assumptions on projected growth for the intercensal period turn out to be reasonable, after a short period of only 5 years, the projection results should be very close to the 1996 census counts. Yet beyond the need for consistency in definition, additional factors have also been raised as potentially affecting the comparability of census or survey data over

time. Issues relating to census coverage (e.g. incomplete enumeration), questionnaire format (e.g. instructions, examples), data quality (e.g. content error), among other problems have all been raised as affecting the comparability of census and survey data over time (Pryor, 1984; Goldman and Siggner, 1995; Guimond, 1999; Norris, 2000).

To the degree that census coverage error shifts over time, demographic growth as implied in population figures is potentially biased as an artifact of methodology or difficulties in enumeration. In the current context, some minor adjustments are necessary with the 1996 census figures in order to make them as comparable as possible with the 1991 base population. With the 1991 base population, it is recalled that two separate types of adjustments were introduced, including the introduction of an independent estimate of population size for non-enumerated Indian reserves as well as a correction for the more general problem of census undercount. Similarly in 1996, a limited number of reserves refused to participate – indicating the need for an independent estimate – while the 1996 census coverage studies allow for undercount adjustments in a manner consistent with 1991. As a result, an estimated 44,000 persons are added to the 1996 registered Indian count (i.e. the estimated population size of refusal reserves and settlements) while the total Aboriginal identity population is raised by about 61,000 (given the more general problem of census undercount).

In addition, minor differences characterize the 1991 postcensal survey and the 1996 Census – relating to questionnaire design and the manner in which the Aboriginal population was surveyed. While the Aboriginal identity population in the 1991 postcensal survey was selected from only those persons who had reported Aboriginal ancestry or who were registered Indians in the 1991 census, the identity question in the 1996 Census was asked in an independent manner, without regard to ancestry or registered status. As a result of this minor difference, a small number of Canadians reported an Aboriginal identity in the 1996 Census, but not Aboriginal ancestry or registered Indian status (i.e. 40,730 persons). In comparing the two data sources, the 1996 Aboriginal population might be expected to be slightly larger as a by-product – although in interpretation, it is far from clear as to why persons without ancestry or registered status might identify with an Aboriginal group.

Such responses may be related to content or reporting error – which exists to an unknown degree in both the 1991 and 1996 data. As Statistics Canada has yet to publish a systematic study on the possibility of content error in its Aboriginal data, it is reasonable to assume a roughly comparable level over time, with perhaps a slightly higher level in 1996 due to the above mentioned questionnaire design. While it is generally assumed by methodologists working with the census that content error is very low, if not negligible (Statistics Canada, 1999), it is noted that if only a very small proportion of Canadians misinterpret questions relating to Aboriginal identity, the resultant error might have a disproportionate impact on specific Aboriginal population counts. This observation relates to the fact that Aboriginal Canadians make up a relatively small proportion of Canada's overall population (with the identity population at about 2.9% of Canada's overall population in 1996) whereas millions of Canadians are required to respond to the Aboriginal item in the census. In the absence of a systematic

Table 4. RCAP Population Projections for 1996 and Adjusted 1996 Census Aboriginal Populations

Aboriginal groups	1991 APS Base population	1996 RCAP Projections			1996 Census of Canada
		Low growth scenario	Medium growth scenario with migration	High growth scenario	
	(1)	(2)	(3)	(4)	(5)
Total Aboriginal	720.6	810.9	811.4	818.4	859.8
Status Indians	438.0	505.3	505.7	509.9	544.7
Non-status Indians	112.6	118.2	118.3	119.4	92.8
Métis	139.4	152.7	152.8	154.1	213.3
Inuit	37.8	42.4	42.5	43.0	42.1

study of content error, this may or may not have an impact on the precision possible in the documentation of demographic trends through both the census and postcensal survey data.

Briefly, Table 4 includes both Royal Commission projections for 1996 as well as 1996 Census based figures, by Aboriginal group. With the 1996 Census, adjustments have been introduced for coverage error in a manner consistent with the 1991 base population. In providing a range in projections, the medium growth scenario (with migration) is supplemented by both the low and high growth scenarios. With the expectation that Census based figures fall somewhere within the resultant range of projections - Table 4 suggest a rather poor performance over only a short period of 5 years. At the very least, this suggests the need for caution in working with Aboriginal data, given an apparent imprecision in documenting and projecting population size.

In terms of the total Aboriginal population, the current set of projections (with a range of 810,900 to 818,400 persons) are below the 1996 Census based figure (859,800 persons). While the aforementioned difference in terms of questionnaire format is likely partially responsible for this, the 1996 Census figure is higher than anticipated, particularly since the corresponding projections were based on relatively high growth rates (at between 2.4% and 2.6% annually for the 1991-1996 period). In terms of the registered Indian population, even in working with a population defined with clear objective criteria (i.e. the Indian Act), the 1996 Census figure is high (at 544,700 relative to a projected range of 505,300 to 509,900 persons). As the current set of projections included the impact of Bill C-31 reinstatements, it is not clear as to why the projections would have understated population growth. With the non-status population, the opposite occurs, as the 1996 Census figure is significantly lower than projected (at only 92,800 relative to a range of 118,200 to 119,400 persons). The fact that the 1996 figure is even lower than the corresponding 1991 base population is reason for concern, as natural increase was projected to outweigh any population loss due to Bill C-31 reinstatements. Among the Metis, the 1996 Census population is much higher than projected (with 215,300 persons relative to a projected range of 152,700 to 154,100). Even with a doubling or tripling of projected fertility, the Metis projections would have fallen short. It is only among the Inuit that the projections appear reasonable, although even here, the 1996 figures fall slightly outside the projected range (at 42,100 relative to a range of 42,200 to 43,000 persons). Factors beyond the components of growth as considered in the Royal Commission projections are relevant in understanding why the current projections missed the mark, in drawing systematic comparisons after only a short interval of 5 years.

Discussion

Beyond the population projections as reviewed in the current paper, several attempts have been made to document and project the size of the Aboriginal population in Canada, starting from the early 1970s and continuing right through to the recent past (Piche and George, 1973; Perreault, Paquette and George, 1985; Loh, 1990; Nault et al, 1993; Nault and Jenkins, 1993; Clatworthy, 1994; Loh, 1995; Loh et al, 1998). In a

similar manner, recent attempts have been made to project the size of the visible minority population in Canada, among other target populations (Kalbach et al, 1993; Dai and George, 1995). In fact, these projections have much in common with a broader international literature that has developed race and ethnic population projections (Bouvier, 1992, Edmonston and Passel, 1992, 1994; Smith and Edmonston, 1997). In establishing some legitimacy to this exercise, the U.S. Census Bureau has added North American Indian population projections to its standard set of products, in racial and Hispanic-origin population projections through to the middle of the twenty first century (Day,1996).

On the surface, the generation of useful projections by race and ethnicity appears relatively straightforward. Through the Canadian Census, ethnicity has long been documented as a fundamental characteristic of Canada's population. In a similar manner, over recent decades the census has incorporated specific items meant to document the size of the Aboriginal population, the number of registered Indians, and in 1996, introduced the concept of "visible minority". As ethnicity or race is typically understood as a fundamental "ascriptive" characteristic of all persons, it is generally assumed that a person's ethnic ancestry or identity is fixed at birth, remains the same over one's lifetime, and is subsequently transferred to one's offspring. On this basis, population projections require data on past fertility, mortality and migration – with realistic scenarios as to future growth. In projecting the future, a convergence toward rates as observed nationally might be considered more than reasonable, in anticipating a diffusion of cultural practices and living standards across ethnic or cultural boundaries.

Unfortunately, as some of the comparisons in the current paper suggest, the development of Aboriginal projections is much more complicated than one might initially believe. In fact, some of the complicating factors were alluded to, yet not elaborated upon, in the Royal Commission projections themselves. More specifically, the impact of descent rules as defined by Bill C-31 raised a whole series of issues, which were not only relevant to registered Indians, but in fact, to all Aboriginal groups. In examining the impact of descent rules, the importance of future marriage patterns was acknowledged, as having an impact on the number of births that would lose entitlement to registered status. Yet just as intermarriage is relevant to the future size of the registered Indian group, it is also relevant to the Inuit or Metis, or for that matter, any population defined in terms of ancestry or ethnic self-identification. A series of fundamental questions surface in this context, primarily relating to the practice of out-marriage (or exogamy); as to what extent exogamy has characterized marriage patterns in the past; to what extent will it characterize marriage patterns into the future; and what has and will be the cultural or ethnic attribution of the children of mixed marriages. As exogamy has long characterized marriage patterns among Aboriginal Canadians, these questions are in fact fundamental in defining the size and characteristics of the Aboriginal identity population, both currently and into the future.

In the projections prepared for the Royal Commission, a reliance upon the cohort component method involved what is generally referred to as the "assumption of one sex reproduction", i.e. future births are a function of assumed fertility rates, multiplied by the

number of women in their reproductive years. The resultant births are then allocated by sex, in light of what is known of the sex ratio at birth (which remains relatively stable at about 105 male births to every 100 female births across populations and over time). While this method ignores men of reproductive age, for most populations (defined in terms of geography or citizenship), this is not an issue, with no bias introduced as a result. Yet in the case of populations as defined in terms of ethnicity or cultural identity, the situation is complicated greatly by the possibility (or likelihood) of exogamous marriage.

To provide an example as to how bias can be introduced into a set of projections, consider the case of total exogamy. This in turn can have an impact on fertility, as illustrated with the simple case of 100 male and 100 female members of a given group, all of whom out-marry. If we assume that all members out-marry, then the maximum possible number of marriages is 200; on the other hand, if we assume no out-marriage, then the maximum number of marriages is 100. To the extent that endogamous and exogamous marriages have the same level of fertility, then the number of births generated to a group could be doubled. Between these extremes of total endogamy (100 in-marriages) and exogamy (200 out-marriages), offspring will vary in terms of their propensity to identify with their parent's ancestry. Among Aboriginal Canadians, depending on the extent that children identify with their ancestry, the cohort component approach (as based on "one sex reproduction") can potentially overstate, or more likely understate, projected population growth.

In this context, some exploratory work has recently attempted to model out-marriage and the intergenerational transmission of identity in population projections. For example, while limiting efforts to the registered Indian population, the Research and Analysis Directorate of Indian and Northern Affairs Canada has begun to address some of these methodological challenges, in explicitly incorporating the interplay among out-marriage, fertility and inheritance within projection models (Clathworthy, forthcoming). Similarly, in light of many of these same issues in the United States, the National Research Council Panel on the Demographic and Economic Impacts of Immigration produced population projections by race and ethnicity, that incorporate current levels of intermarriage and variations in ethnic attribution across generations (Smith and Edmonston, 1997). A conclusion that comes out of this work is that the impact and uncertainty on intermarriage and ethnic attribution can rival, if not surpass, other fundamental components in generating population projections by racial group. This is shown to be particularly true over the longer term.

While a failure to consider such factors throw into question the utility of many long term forecasts, over the shorter term (as for example, projections for the 1991-1996 period), one would not expect that they have a major impact. While a more careful modeling of intermarriage and the intergenerational transmission of births would likely lead to better data on the components of future growth, a substantial proportion of the discrepancies as documented in the current paper would remain. For example, as previously indicated, even with a doubling or tripling in the number of births attributed to the Metis over the 1991-1996 period, the range of projections would continue to fall short of the population figure obtained through the 1996 Census. Beyond the need for good

data on the components of future growth, there are obviously additional problems that must be overcome in developing useful population projections.

In a recent critique of race and ethnic population projections, Hirschman (forthcoming) highlights what he considers as perhaps the most fundamental shortcoming of most published projections, that being, the assumption - rarely stated explicitly - of ascriptively defined populations. As argued, the measurement and reporting of ethnic identity involves increasingly porous boundaries, particularly in multicultural societies such as the United States and Canada. Rather than being a purely ascriptive characteristic assigned at birth, for a growing number of persons, a significant level of choice is exercised in defining their ethnicity. Consequently, it becomes extremely difficult to make assumptions about fixed identities and stable boundaries that are the basis of statistical measurement. Building on a growing body of research, it is argued that many respondents to census or survey research select a racial or ethnic identity for largely idiosyncratic reasons (Alba, 1990; Waters, 1990; Farley, 1991; Perlman, 1997).

Diverse origins for Aboriginal Canadians are reflected in the 1996 Census: of the 1,101,960 people who reported Aboriginal ancestry, fully 624,330 reported it as part of a multiple response. Recent analyses of census data which has explicitly controlled for various factors affecting comparability across censuses over time has demonstrated how demographic forces alone - national increase and migration - cannot account for the significant variations in growth as observed among Aboriginal groups (Guimond, 1998). Far from being an ascribed characteristic of our population, transfers have occurred from non-Aboriginal origins to Aboriginal origins, from one Aboriginal origin to another. Over the 1991-1996 period, Canadians appear to be more likely to report Metis identity, yet less likely to report North American Indian identity if not registered under the Indian Act. In terms of statistical measurement, this lack of stability in the reporting of Aboriginal origins introduces a series of obstacles to obtaining precision with even the most fundamental demographic statistics. For Hirschman, these difficulties complemented by the uncertainty associated with future intermarriage leads to his prediction that population projections that rely on the conventional criteria of race and ethnic measurement will become increasingly anachronistic into the future.

Conclusion

Irrespective of its shortcomings, one relatively safe conclusion to come out of the Royal Commission population projections is that the Aboriginal population of Canada will grow at a relatively rapid pace for the next several decades. Even though mortality remains relatively high (at levels more characteristic of Latin America than Canada), fertility also remains well above replacement level such that a high rate of natural increase is expected to continue to characterize this population for some time to come. As demonstrated in the current set of projections, even with a relatively rapid decline in both fertility and mortality, considerable growth is anticipated across Aboriginal groups. This growth is expected to easily outpace the national growth rate, although our ability to

quantify this with a reasonable level of precision appears to be seriously hindered by several of the factors as raised in the current paper.

Beyond the difficulties involved in projecting future natural increase (which are non-trivial), additional complications relate to future marriage patterns, the extent of marital exogamy, the manner in which descendants of mixed marriages report their ancestry, not to mention the impact of current legislation or future changes in the Indian Act. Yet after considering all such factors, perhaps the most serious difficulty relates to the increasingly indeterminate boundaries as associated with ethnic or Aboriginal self-identification. This in turn relates to a long history of exogamous marriage, which has not only characterized Aboriginal peoples, but to a greater or lesser extent, most racial or ethnic populations in Canada. In terms of statistical measurement, this lack of stability in the reporting of Aboriginal origins introduces a series of obstacles to obtaining precision with even the most fundamental demographic statistics

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