Appendix 1: Additional Human Well-being Measures of Interest

National gross domestic product per capita (GDP)

National gross domestic product per capita (GDP) is frequently used as an indicator or proxy for level of well-being. However, GDP is a simplistic measure and conveys little information beyond the size of the economy. In fact, increases in GDP potentially disguise declines in human and environmental conditions. From an environmental sustainability approach, Costanza and Daly (1992) explain that reductions in natural capital stocks, drawn down and transformed to increase economic output, are not accounted for in measuring GDP. Furthermore, Daly (2002) indicates that economic activity resulting from mitigation of the environmental and social harms of economic growth is reflected in further increasing GDP though these gains are the result of decreased well-being. Though economic conditions have an undisputable impact on quality of life, additional measures of are needed to more accurately represent HWB.

Index of Sustainable Economic Welfare

Improving on GDP, the Index of Sustainable Economic Welfare (ISEW) includes the costs of defense expenditures, environmental degradation, and the depreciation of natural capital in addition to other more traditional economic growth measures (e.g., personal consumption). In its initial construction, the ISEW did not contain measures of social well-being or human health unless they influenced other economic factors. Like GDP, the ISEW and its successor the Genuine Progress Indicator were developed to be a national indicator of progress and not explicitly human well-being or quality of life.

Human Development Index

The Human Development Index (HDI), published annually since 1990 by the United Nations Development Programme, relies on national-level indicators of life expectancy at birth, literacy, and real GDP per capita to measure individuals' ability to lead a healthy life, be educated, and have access to resources for a decent standard of living (UNDP 1990). Indicators are equally weighted and countries are ranked by respective total scores. Criticisms of the HDI include inability to compare ratings across time periods, limited conceptualization of well-being, and data error (Klugman et al. 2011). The HDI's conceptualization of well-being is limited to only three dimensions, which is considered overly simplistic by some (Dasgupta and Weale 1992; Srinivasan 1994). It has also been argued that the HDI is a redundant tool, adding little to what is already known about measuring development because the indicators are closely correlated with each other and the composite HDI score (McGillivray 1991).

EPA Human Well-being Index

The U.S. Environmental Protection Agency developed and is applying the Human Well-being Index (HWBI) in tribal communities in the U.S. The index is geared towards public policy uses with the aim of providing communities and governing bodies with information and tools to increase community sustainability. The model, most recently described in Smith and Summers (2011), proposes environmental, societal, and economic elements of well-being, which can be evaluated through measurement within eight domains: social cohesion; education; connection to nature; health; living standards; leisure time; safety and security; and spiritual and cultural fulfillment. The HWBI incorporates subjectivity through including subjective indicators (e.g., *level of biophelia* and *life satisfaction/happiness)* and by weighting each indicator's contribution

to overall well-being score based on its unique Relative Importance Value, which is a combination of public perception and professional opinion on the indicator's relative contribution to well-being (Summers and Smith 2010, Smith and Summers 2011). Little documentation exists on calculation of values for domains of wellbeing in the HWBI.

Federation of Canadian Municipalities' Quality of Life Reporting System

The Federation of Canadian Municipalities measures quality of life at a local level to address issues impacting residents in Canadian cities and municipalities. The Quality of Life Reporting System uses 11 dimensions: demographic and background information; affordable and appropriate housing; civic engagement; community and social infrastructure; education; employment; local economy; natural environment; personal and community health; personal financial security; and personal safety (Burrett 2009). These dimensions are measured using 72 indicators collected at the municipal level. The abundance of indicators presumably creates problems for data collection. Additionally, indicators overlap within and among well-being dimensions (e.g., *local economy* and *employment*) and some indicators may not contribute substantially to the conceptualization of well-being (e.g., *rental housing starts* and *newspaper circulation*).