

**SOCIO-ECONOMIC ASSESSMENT OF EDÉHZHÍE CANDIDATE
PROTECTED AREA**

VOLUME 1: SOCIO-ECONOMIC BASELINE

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EXECUTIVE SUMMARY

As part of the process for establishing a protected area in the Northwest Territories (NWT), an assessment of the potential socio-economic effects of designating a protected area is required. The NWT is currently assessing whether it should protect all or parts of the Edézhíé Candidate Protected Area, an area of about 26,000 square kilometres in the Dehcho Region, and has commissioned this study to assess the potential social and economic impacts on the surrounding communities of Fort Simpson, Fort Providence, Wrigley, Jean Marie River, Whatí and Behchokò. This study is presented in two volumes. This volume, Volume 1, provides an overview of current socio-economic conditions in the study area. Volume 2 describes the potential social and economic effects of four development options for Edézhíé, ranging from the status quo (no permanent protection for any of the area) to full protection of the entire area.

The Region, Its People and Economy

In 2006 the six communities in the region had a combined population of about 4,500 people, with Behchokò accounting for 42% of the total, followed by Fort Simpson (25%), Fort Providence (17%), Whatí (11%), Wrigley (4%) and Jean Marie River (1%). Since 1991 the population has been growing at a rate of about 1% per year; in comparison, the population of the NWT has remained largely unchanged since 1996. The population of the region is relatively young, with 44% being under the age of 25; this is much higher than the territorial average of 36%. About 53% of the population is male and this imbalance is slightly higher than for the NWT (51%). The vast majority of the regional population is Aboriginal (87%) and this is much higher than for the NWT (50%). Only about 45% of the adult population (people aged 15 or greater) has completed their high school education and this is much lower than the territorial average (67%).

In terms of the regional economy, 68% of adult residents were active in the labour force in 2006, 21% were unemployed, 25% were employed in goods producing industries and 50% were employed in government, health, social services and education. By comparison, the labour force participation rate in the NWT was 77% and only 10% were unemployed. Within the NWT only 16% were employed in goods producing industries and 42% were employed in government, health, social services and education.

In 2005 households in the four largest communities in the region had an average income of \$62,000 and this was 35% less than the territorial average (\$96,200). At the same time, the cost of food in the regional communities was at least 25% higher than in Yellowknife and, on average, was about 40% higher. In 2004, 29% of regional households were in core need, which means that their incomes were not adequate to own or rent a home without government assistance. Within the NWT only 16% of households were in core need. In general, housing in the region is newer than in the NWT, but the percentage of households in need of major repair was higher in the region (29%) than in the NWT (17%). Crime is another indicator of community well-being and the rates of violent crime in the three larger regional communities were higher than the territorial average, while only one large community had property crime rates that were higher than the NWT average.

Within the region 39% of adults participated in fishing and/or hunting, 13% participated in trapping and 34% rely on country food for 75% or more of their meat or fish consumption. In contrast 37% of adults in the NWT participated in fishing and/or hunting, 6% participated in trapping and only 17% rely on country food for 75% or more of their meat or fish consumption.

The overall picture is that regional communities are primarily Aboriginal, have limited economic development opportunities (especially goods producing industries), face a high cost of living with limited amenities, and are still heavily reliant on traditional activities for food and some income generation. Within the region, each community is unique, however, and Table 1 summarizes how each community compares to the regional average.

Resource Use Values Associated with Edézhíe

Regional residents currently use the Edézhíe area as source of food, fuel and recreation. It is estimated that regional residents annually harvest at least 100,000 kilograms (kg) of meat and 3,000 kg of fish and of this, between 22% and 32% was harvested in the Edézhíe area. The value of this food, based on the local price of purchased food and adjusting for income differentials, is estimated to be in the range of \$632,000 to \$806,000. Many households use wood as their primary or secondary heating source and between 5% and 15% of the 3,200 cords of firewood harvested each year comes from Edézhíe. The value of this firewood, measured in terms of the energy equivalent value of fuel oil, is estimated to be between \$91,000 and \$219,000. The Edézhíe area is also used for recreation and it is estimated that regional residents enjoyed between 10,900 and 27,500 days of recreation and the value of this recreation ranges between \$94,000 and \$285,000 based on what they actually paid to participate in these activities as well as what they would have been prepared to pay.

The Edézhíe also provides some regional residents with a source of income. Regional trappers harvest about \$203,000 of furs annually and, of this, the Edézhíe area accounted for 33% of the harvest. The Dehcho Region currently attracts about 4200 tourists per year and they spend about \$2.2 million during the 25,000 visitor nights in the region. Nahanni National Park reserve is a major attraction and it is expected that Edézhíe currently accounts for at most 1% of tourism visitation and expenditures. Many adult residents manufacture arts and crafts and the Edézhíe area is believed to be the source of between 18% and 23% of the raw materials used. These materials are estimated to have a value of between \$11,000 and \$14,000. While the Edézhíe area also has the potential to support commercial logging, oil and gas development, and possibly zinc and diamond mining, these activities cannot occur until the interim protection measures currently in place are removed.

Overall, the Edézhíe area is believed to generate between \$1.0 and \$1.5 million in user benefits for regional residents, with country food accounting for more than half of this amount. These uses and associated values are considered to be sustainable in that they can continue without damaging the productive capacity of the area and it is believed that the area could support additional use of the renewable resource base.

Table I: Comparative Assessment of Socio-Economic Conditions in Study Area Communities

Attribute	Fort Providence	Fort Simpson	Jean Marie River	Wrigley	Whatí	Behchokò
Population Growth	Declining	Declining	Growing	Declining	Growing	Growing
Percentage of young people	Lower	Lower	N/A	Lower	Higher	Higher
Male/female imbalance	Imbalance	Balanced	N/A	Imbalance	Imbalance	Balanced
Percentage of Aboriginal people	Higher	Lower	Higher	Higher	Higher	Higher
Educational attainment	Lower	Higher	Average	Lower	Lower	Lower
Labour force participation	Average	Higher	Lower	Lower	Lower	Lower
Employment in primary sector	Average	Lower	Average	Lower	Higher	Higher
Average family income 2005	Lower	Higher	N/A	N/A	Average	Higher
Costs of living	Average	Higher	Higher	Higher	Higher	Lower
Housing in need of major repair	Lower	Lower	Higher	Higher	Lower	Average
Households in core need	Lower	Lower	Higher	Higher	Higher	Higher
Hospitalization for alcohol-related disease	Lower	Lower	Higher	N/A	N/A	N/A
Rate of sexually transmitted infections	Higher	Higher	Average	Average	N/A	N/A
Violent crime rates	Higher	Higher	N/A	N/A	Lower	Higher
Property crime rates	Higher	Lower	N/A	N/A	Lower	Higher
Participation in traditional land uses	Higher	Lower	Higher	Higher	Higher	Lower
Reliance on country food	Higher	Lower	Higher	Higher	Higher	Higher

Cultural Values

The Edézhíe area contains a legacy of old settlements, burial sites, camps and cabins, trails, and special sites that are part of the culture of the Dehcho and Tlicho peoples. Key features are located around Willow, Hornell, Mustard, and Bulmer lakes, the corridor between Mills Lake to Mink Lake, and along the Willowlake River, especially at its junction with the Mackenzie River. About 4% of the land area in Edézhíe is considered to have very high density of traditional land use and occupancy, 7% has high density, 37% has moderate density, and 52% has low density. There is no satisfactory method of placing an economic value on the cultural values of this area.

Non-Use Values

Ecosystems and landscapes provide a range of goods and services beyond direct human use that also contribute to social and physical well-being. A recent study of the value of ecosystem goods and services for the northern boreal ecosystem in the Mackenzie watershed (Anielski and Wilson, 2007) indicates that the most important of these goods and services consists of water regulation and supply and waste treatment by lakes and rivers; climate regulation, water supply, habitat and genetic resources for wetlands; and climate regulation for boreal forests, burnt areas and shrublands. Based on the mix of ecosystems in Edézhíe, the total value of ecological goods and services is calculated to be \$2.7 billion per year, based on the preliminary values contained in that report. However, there is a major risk in applying Mackenzie basin wide estimates to a small, specific sub-basin and when the user benefits quantified in this assessment are compared to those of the Anielski and Wilson report, it is believed that this number significantly overstates the value of ecosystem goods and services provided by Edézhíe. For purposes of this analysis it was concluded that, as a minimum, the non-use values are at least the same as the use values.

Summary

Overall, the Edézhíe area is believed to generate economic values in the range of \$1.8 to \$2.8 million per year. This includes both use and non-use values. This estimate is known to be highly conservative, however. It does not recognize any of the cultural or historical values, which are known to be important but are very difficult to quantify. This range uses the minimum values for ecological goods and services, and these could be 50 to 60 times greater. Thus, the true value of the Edézhíe Candidate Protected Area could be as high as \$80 million per year.

Based on available information it is not possible to be more definitive in quantifying the total value of the Edézhíe Candidate Protected Area. While there is some uncertainty in the values for which there is relatively abundant information (use values), there is very high uncertainty for non-use and cultural values for which there is very little information. However, for purposes of understanding the effects of allowing development in all or parts of the Edézhíe Candidate Protected Area, it is not essential that these values be known with absolute certainty. The values identified in this analysis simply provide a yardstick by which the marginal or incremental changes associated with development can be compared.

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1.0 INTRODUCTION

In 1999 studies were initiated to advance the Horn Plateau, Mills Lake and Horn River as candidate protected areas that would benefit Deh Cho First Nations. Local communities wanted to have these areas protected for its ecological and cultural values. Subsequent discussions with the communities and the Canadian Wildlife Service (CWS) led to an agreement to have CWS sponsor the Edézhzhíe area as a protected area under the *Canadian Wildlife Act*. The Edézhzhíe area is 25,224 square kilometres in area and is located mostly in the Dehcho region of the Northwest Territories (NWT). It is located north of the Mackenzie River and is surrounded by the communities of Fort Providence, Jean Marie River, Fort Simpson, Wrigley, Whatí and Behchokò. Residents of Fort Simpson recognize the importance of the Horn plateau as the source of most watersheds in the region and as a source of food during times of scarcity in the Mackenzie valley. Residents of Fort Providence consider the Mills Lake and lower Horn River areas to be important food sources. The Horn Plateau is also a traditional use area for the communities of Whatí and Behchokò, which are part of the Tlicho First Nation. In response to local concerns, the Cabinet of Canada issued an Order in Council in 2002 that prevented any land dispositions being issued for a five-year period in what is termed the Edézhzhíe Candidate Protected Area. This has since been extended to October 31, 2008.

Decisions regarding the protection of land in the NWT are made in the context of its Protected Areas Strategy (PAS). The PAS is a community-drive partnership consisting of communities, Aboriginal governments and/or land claim bodies, federal and territorial governments, and industry stakeholders. Its purpose is to “collaborate to identify and protect the ecological quality and integrity of special areas of land and water” (NWT PAS, 2007). The PAS uses an eight step process to identify, designate and manage protected areas:

1. Identify areas in need of protection, and get community support for protecting the area.
2. Gather information about the area. Use this information to prepare a proposal to protect the area. Get support for this proposal at the regional level.
3. Submit a proposal to a potential sponsoring agency for their review and approval.
4. The sponsoring agency applies for interim (short-term) protection for the area, if needed.
5. Document the candidate area’s ecological, cultural and economic values. This information is used to make recommendations on the area’s designation, boundaries and management.
6. Formally ask the sponsoring agency to protect the area using their legislation.
7. Approve and establish the protected area.
8. Manage, monitor and review

As part of the PAS process for Edézhzhíe, a Working Group has been established. This group consists of representatives from CWS, Fort Simpson, Wrigley, Jean Marie River, Fort Providence, Rae/Edzo (now Behchokò), Whatí, GNWT, World Wildlife Fund, Ducks Unlimited Canada, Canadian Petroleum Producers, and the NWT Chamber of Mines. As part of Step 5 of the PAS process, the Working Group issued the terms of reference for a socio-economic assessment of the Edézhzhíe Candidate Protected Area in 2007. The terms of reference area provide in Appendix A. This report was prepared in response to these terms of reference.

1.1 Objectives

The terms of reference for the socio-economic assessment

1. Develop socio-economic profiles using indicator statistics for each of the six surrounding communities
 - Develop consistent data baselines
 - Describe information specific to Edézhíe
 - Identify socio-economic data gaps and develop a strategy to address these gaps
2. Calculate Total Economic Value of Edézhíe based on available information
3. Assess socio-economic effects for the surrounding communities, the southern NWT, the entire NWT and for Canada of three scenarios:
 - National Wildlife Areas with current boundaries
 - National Wildlife Area with modified boundaries
 - No formal protection
4. Produce a plain language report and present information to stakeholders, communities and First Nations

Items 1 and 2 were to be provided in Volume 1 of the final report. Item 3 was to be addressed in Volume 2.

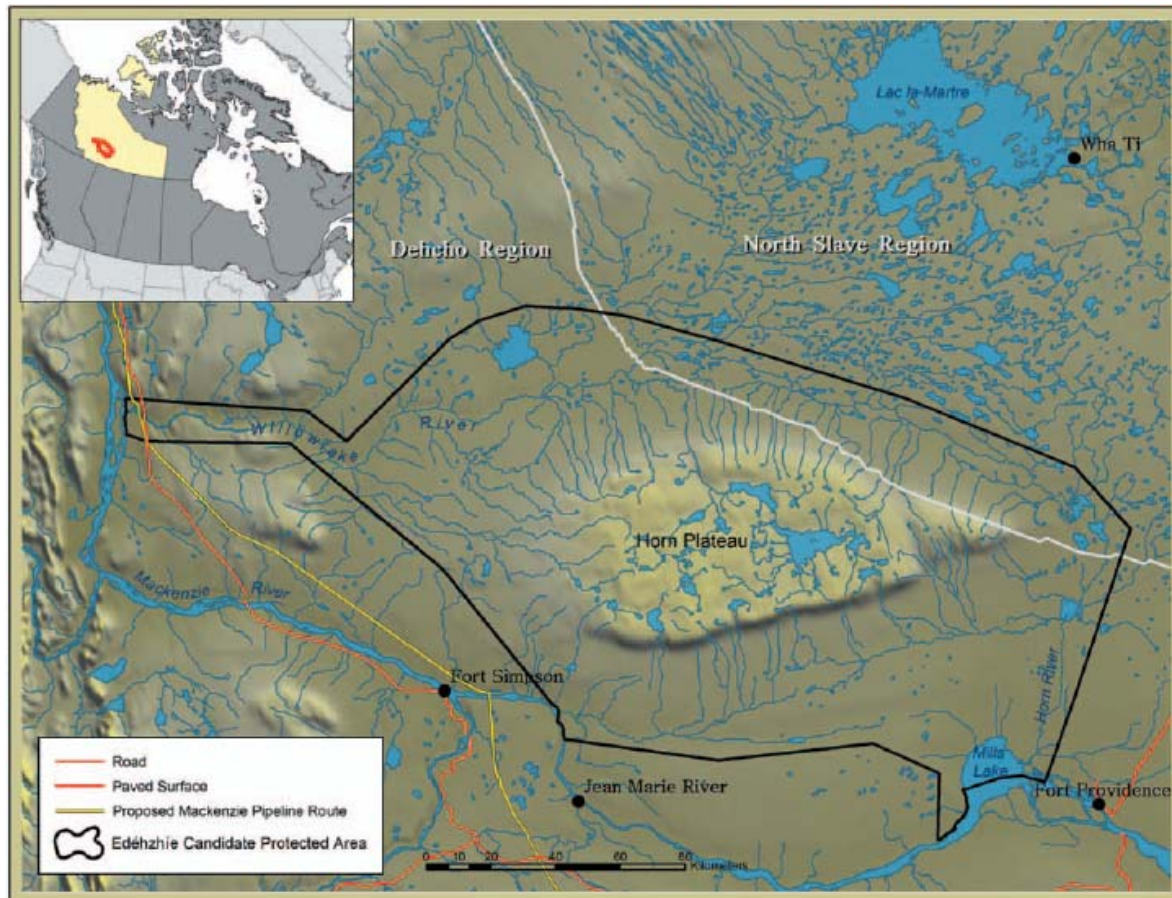
1.2 Study Area

A map of the Edézhíe Candidate Protected Area is provided in Figure1-1. The Horn Plateau is of ecological significance for a number of reasons (EBA Engineering Consultants, 2006):

1. It supports several species at risk, including threatened species (boreal woodland caribou, wood bison, peregrine falcon) and species of special concern (wolverine and short-eared owl)
2. It contains three International Biological Program (IBP) sites.
3. Mills Lake is considered a “key migratory bird terrestrial habitat site” by the CWS.
4. It provides the source waters for three drainages that are of importance to the subsistence economies and culture of surrounding communities.
5. It contains almost the entire Horn Plateau ecoregion.

The area also has oil, gas, mineral and forestry development potential that could contribute to the regional economy.

Figure 1-1: Proposed Edézhíe Candidate Protected Area



Source: NWT PAS (no date).

1.3 Methodology

1.3.1 Approach

The general approach used for this assessment is similar to that of a socio-economic assessment prepared as part of an environmental assessment of a proposed development project. Impact assessments consist of three tasks:

1. Assess current social and economic conditions in the communities that may be affected by the development using a series of selected indicators (baseline)
2. Use the project description to estimate potential demands on the communities in terms of employment, incomes, population, housing, infrastructure and services, and general well-being.
3. Compare these potential demands with baseline conditions to determine the significance of proposed changes and identify strategies for enhancing benefits and minimizing costs

This study uses this same approach, with Volume 1 summarizing the baseline socio-economic conditions while Volume 2 describes the potential for development and the resulting socio-economic effects.

1.3.2 Information Sources

The baseline socio-economic information comes from published public information. The key sources are the 2006 Census (Statistics Canada 2007) and various publications from the Government of the Northwest Territories (GNWT). Some additional information related to health conditions in the Dehcho portion of the study area was taken from the environmental impact statement for the proposed Mackenzie Gas Project, although this information is now a little dated. As per the terms of reference, the socio-economic study area consisted of six communities: Fort Providence, Fort Simpson, Jean Marie River, Wrigley, Whatí and Behchokò. Due to their small population size and concerns about data confidentiality, published socio-economic information was not always available for the two small communities (Jean Marie River and Wrigley). In addition, listed data for some communities was not always consistent or complete but has been reported as it appears in available publications.

The INAC Final Terms of Reference for the project provided a list of socio-economic indicators that could be included in this report. AMEC researchers used this as a guide and, where possible and the data were obtainable through published sources, the indicators were used. Where the data did not exist in a secondary source, proxy data sets were used where available. However, based on previous experience with socio-economic assessments of mining, parks and oil and gas projects, not all indicators are useful in characterizing potential effects, so not all of the indicators in the terms of reference were actually employed.

2.0 BASELINE SOCIO-ECONOMIC CONDITIONS

2.1 *Regional History*

Prior to the arrival of European explorers, this region was home to the Dene people. The Deh Cho Dene inhabited the area along the Mackenzie River while the Tlicho Dene hunted the barren-ground caribou in the areas north of Great Slave Lake. The arrival of the fur trade resulted in communities developing adjacent to the trading posts. Trading posts were initially established in the region by the Northwest Company prior to 1800 but these were abandoned soon after (INAC, 2007). The Hudson Bay Company (HBC) began to develop its trading posts in the early 1800s. The trading post at Fort Simpson was established in 1822 and remains the oldest continuously occupied trading post on the Mackenzie River. HBC trading posts were also developed at Old Fort Rae on Great Slave Lake in 1852, Fort Alexander at the mouth of the Willowlake River, and on the Mackenzie River at Fort Providence in the 1860s and Fort Wrigley in 1870.

The rich soils in the area adjacent to Fort Providence and Fort Simpson allowed the development of agriculture, including the growing of vegetables and raising livestock for local residents until the Mackenzie Highway system provided an opportunity for the importation of less expensive food. The construction of the highway and the ferry crossing at Fort Providence marked a transition from a wildlife-based hunting economy to one based on transportation services. Many local residents are employed in trapping in the winter and fire-fighting in the summer.

Fort Simpson was developed at the junction of the Liard and Mackenzie rivers. The RCMP established a detachment in Fort Simpson in 1913 and a hospital was constructed in 1916. In the 1960s Fort Simpson became a regional government centre and served as a base for oil exploration. It has since become a centre for regional renewable and non-renewable resource development and has a wide array of businesses that provide goods and services for economic development and tourism.

Permanent housing was established in the community of Rae in the 1940s and a connecting road to Yellowknife was completed in 1960. The nearby community of Edzo was developed to attract residents of Rae to a community with schools and sanitation facilities, but many residents chose to continue to live at Rae. The two communities amalgamated and became the hamlet of Rae-Edzo in 1971. The community renamed itself Behchokò in 2005.

The community of Wha'tí was originally a traditional hunting site and although a trading post was operated at the site for a short time, the Dene preferred to trade with the adjacent forts at Rae and Wrigley. A federal school was built at Lac la Martre in 1955 and the community remains almost exclusively based on trapping, hunting and fishing, with limited tourism opportunities. It became a hamlet in 1986 and changed its name to Whatí in 1996 Lac la Martre.

The location of Wrigley has changed over time. The original settlement was Fort Alexander, a trading post operated by the Northwest Trading Company from 1817 to 1821, near the junction of the Willowlake and Mackenzie Rivers. Following closure of the post the community relocated to Old Fort Island. Following a famine and an outbreak of tuberculosis, the community moved to Fort Wrigley. The community was eventually relocated to its current setting in 1965; this location is located adjacent to a wartime airstrip that provides better access to the community. Hunting, trapping and fishing remain the primary economic activities, although there are some retail stores and visitor services. The community has no legal status.

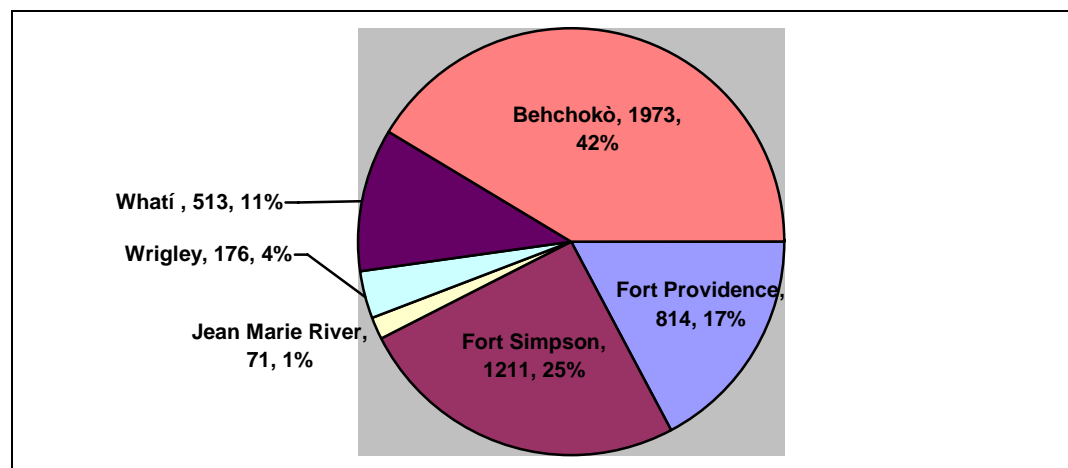
Jean Marie River is the newest of the communities, having evolved around an informal trading post established in 1915. The HBC store opened in 1964; a saw mill began operating in 1965. The economic mainstays of the community continue to be the saw mill and traditional hunting, trapping and fishing, but there is strong market for locally-produced Aboriginal crafts. Like Wrigley, this settlement also has no legal status.

2.2 Regional Population

2.2.1 Current Population

There is some disagreement as to the number of people currently living in the six study area communities. The 2006 Census shows that there were a total of 4,300 residents, but information from the GNWT Bureau of Statistics suggests that 4,758 people actually lived in the communities. Part of the difference can be attributed to the number of people who may live in the communities for the winter months but disperse throughout the region during the spring and summer months for camping, hunting, fishing activities, the period during which the census was completed. The distribution of the regional population among the six communities is shown in Figure 2-1

Figure 2-1: Population Distribution by Community (2006)



Source: GNWT Bureau of Statistics, 2007a

Figure 2-1 shows that Behchokò, with 1,973 people, accounted for 42% of the regional population. Fort Simpson and Fort Providence are the next largest communities. In contrast, Jean Marie River accounted for only 1% of the regional population.

2.2.2 Population Change 1991 to 2006

Table 2.1 shows that the population of the region increased by about 15% between 1991 and 2006, or an average of about 1% per year. The most pronounced population increases have occurred in Jean Marie River (65%) and Behchokò (25%), but the population of Wrigley has decreased by 30%.

Table 2-1: Population Change in Study Area Communities: 1991 to 2006

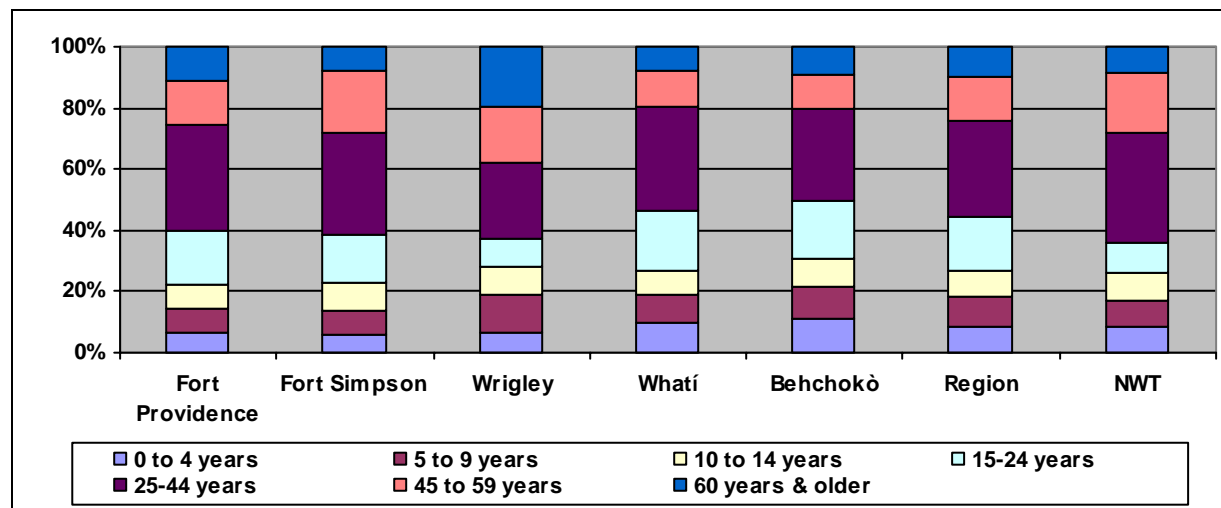
Census Year	Fort Providence	Fort Simpson	Jean Marie River	Wrigley	Whatí	Behchokò	TOTAL
1991	645	1,142	49	174	392	1,521	3,923
1996	748	1,257	53	167	418	1,662	4,305
2001	753	1,163	50	165	453	1,552	4,136
2006	727	1,216	81	122	460	1,894	4,500
Rate of Population Change							
1991-1996	16.0%	10.1%	8.2%	-4.0%	6.6%	9.3%	9.7%
2001-1996	0.7%	-7.5%	-5.7%	-1.2%	8.4%	-6.6%	-3.9%
2001-2006	-3.5%	4.6%	62.0%	-26.1%	1.5%	22.0%	8.8%
1996-2006	12.7%	6.5%	65.3%	-29.9%	17.3%	24.5%	14.7%

Source: Statistics Canada 1991, 1997, 2002, 2007

2.2.3 Population by Age Group

Figure 2-2 shows the age structure of the regional population. Statistics are not available for Jean Marie River. The results show that Behchokò and Whatí are very young communities; nearly half the population in these communities (49% and 46%, respectively) is under the age of 25. In contrast, the population of Wrigley is much older, with 38% of the population being 45 years old or greater. This percentage is nearly double that of Behchokò and Whatí, and 10 percentage points more than either Fort Providence or Fort Simpson.

Figure 2-2: Composition of the Population by Age (2006)

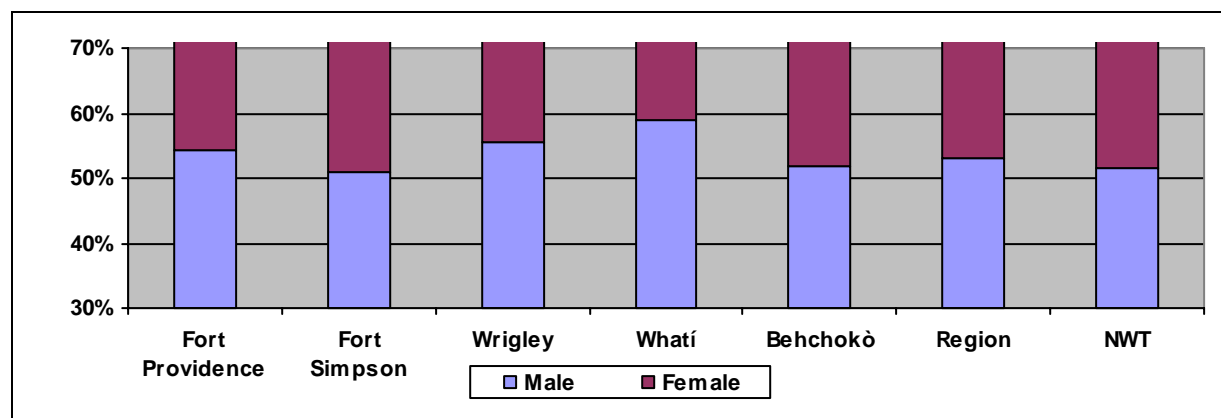


Source: GNWT Bureau of Statistics, 2007a

2.2.4 Population by Gender

The regional population has a significant gender imbalance, with males outnumbering females in all six communities (Figure 2-3). The largest imbalance is in Whatí where 59% of the population was male. There is also a large imbalance in Wrigley and Fort Providence. The ratio of males to females was more equally balanced in Fort Simpson and Behchokò.

Figure 2-3: Composition of the Population: Gender (2006)



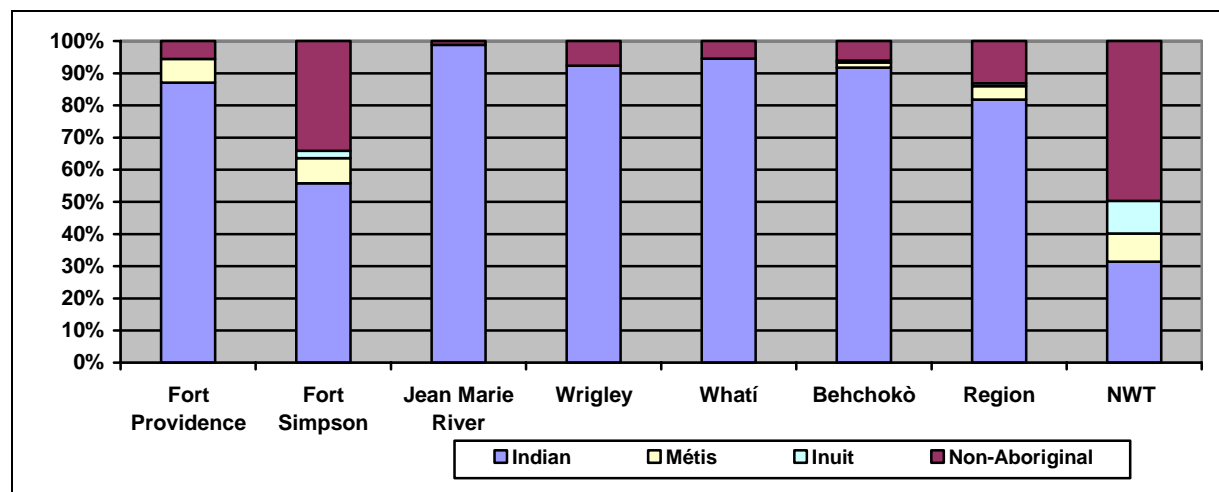
Source: GNWT Bureau of Statistics, 2007a

2.2.5 Ethnicity and Culture

The vast majority of the regional population (86%) is Aboriginal (Figure 2-4). The Aboriginal population is defined by Statistics Canada to include Indians, who comprised 94% of the regional Aboriginal population, Métis (5%) and Inuit (1%). The Aboriginal portion of the regional population ranged from 68% in Fort Simpson to 99% in Jean Marie River and Wrigley, and was

much higher than the average for the NWT (51%). According to the GNWT (2007), there were more than 4,130 Aboriginal people in the six communities.

Figure 2-4: Aboriginal Composition of the Population



Source: Statistics Canada, 2007

There are six First Nations in the region, with each First Nation corresponding to one of the six communities (Table 2-2). According to Indian and Northern Affairs Canada (INAC), the registered population of the six First Nations totaled 5,942 people, of whom 4,370 lived in the communities. The other 1,570 Aboriginal people lived elsewhere, primarily off-reserve. The percentage of Aboriginal people living outside the six communities ranged from 6% of the What Ti First Nation to 37% of the Liidlii Kue First Nation (Fort Simpson). INAC does not provide information for the Fort Simpson or Fort Providence Métis Locals. According to the 2006 census there are about 150 Métis people in these two communities.

Table 2-2: Registered Populations of First Nations in the Region

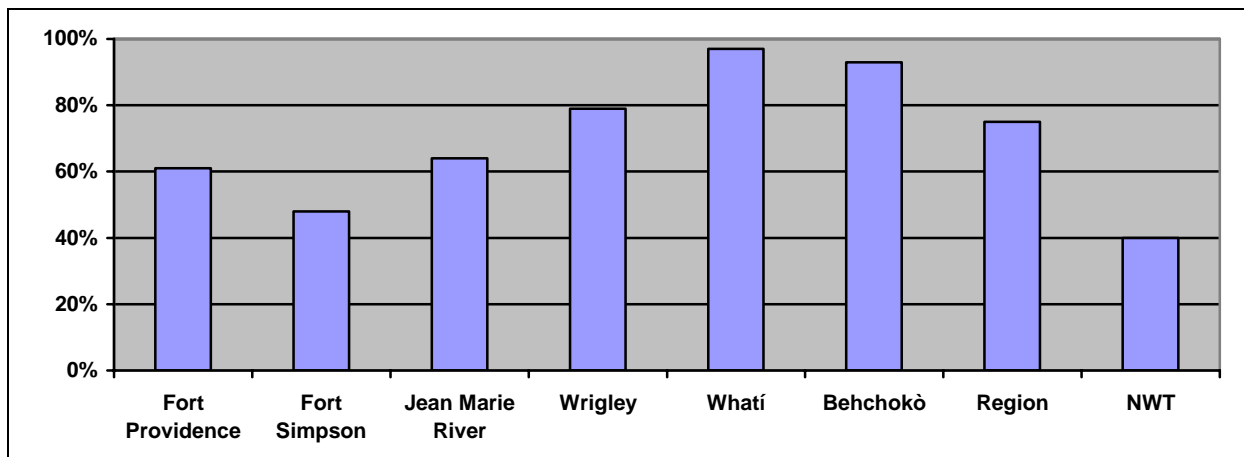
	On Crown Land	Other Crown Land	Off Reserve	Other	Total
Deh Gah Gotie Dene Council (Fort Providence)	763	0	262	6	1,034 (1031)
Liidlii Kue First Nation (Fort Simpson)	755	1	449	2	1,207
Jean Marie River First Nation	100	0	28	0	128
Pehdzeh Ki First Nation (Wrigley)	253	0	70	1	324
What Ti First Nation	550	6	32	0	588
Dog Rib Rae (Behchokò)	1,949	116	586	10	2,661
TOTAL	4,370	123	1,427	19	5,942

Source: INAC, 2007

Retention of culture is tied to speaking the language of that culture. The number of those living in the study area communities speaking an Aboriginal language is shown in Figure 2.5. The

data show that Whatí and Behchokò have the largest percentage of the adult population who speak and Aboriginal language at 97% and 93% respectively. Fort Simpson had the least percentage at 48% and reflects the fact that Fort Simpson has the largest number of non-Aboriginal population of all the study area communities. On average, 75% of regional residents could speak and Aboriginal language and this is much higher than for the NWT (44%).

Figure 2-5: Percentage of Study Area Communities Aged 15+ Years Who Speak an Aboriginal Language

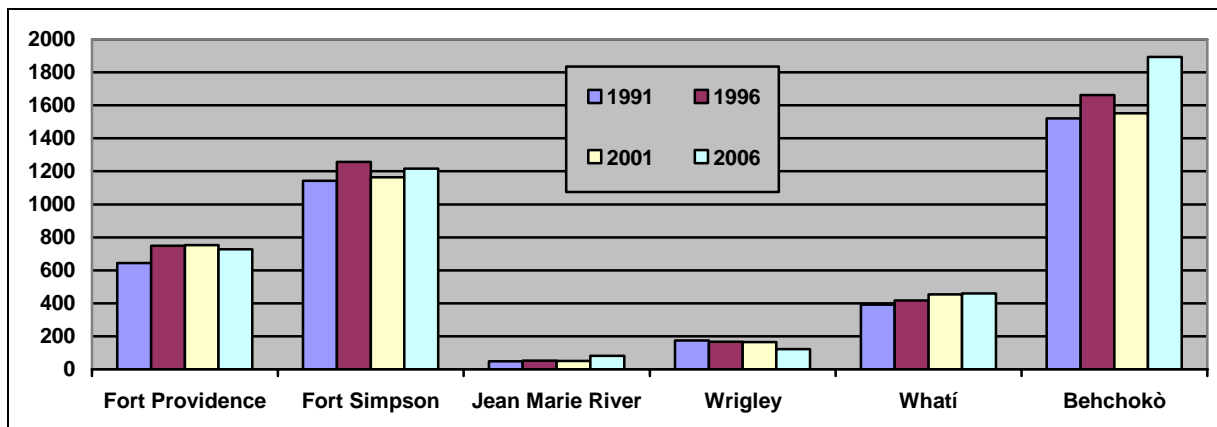


Source: GNWT Bureau of Statistics, 2007a

2.2.6 Recent Population Growth

The population of the six communities has remained relatively constant over the last 15 years. Figure 2.6 shows the population of each community for each Census year from 1991 to 2006. Behchokò is clearly the largest and most rapidly growing community in the region, while Jean Marie River is the smallest. It also shows that, since 1991, most of the population growth occurred in Behchokò while the population of the other communities has remained fairly constant over the 15-year period.

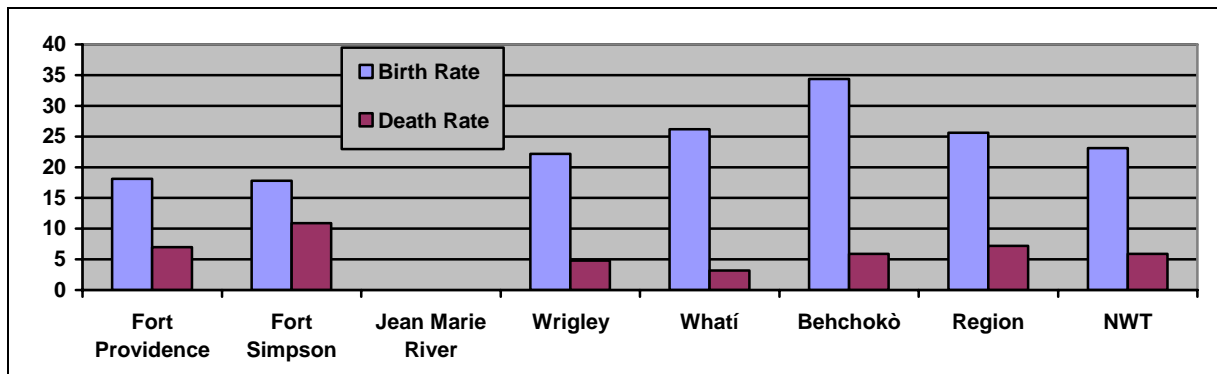
Figure 2-6: Population Change from 1991 to 2006



Source: Statistics Canada 1997, 2002, 2007

Population changes are due to two factors: natural increases (births minus deaths) and migration. Figure 2-7 shows that, for the period 2000 to 2004, the birth rates per 1,000 population have always exceeded death rates by a ratio of at least 2.5:1 for all communities except Fort Simpson. Birth rates for Behchokò were much larger than for each of the other communities.

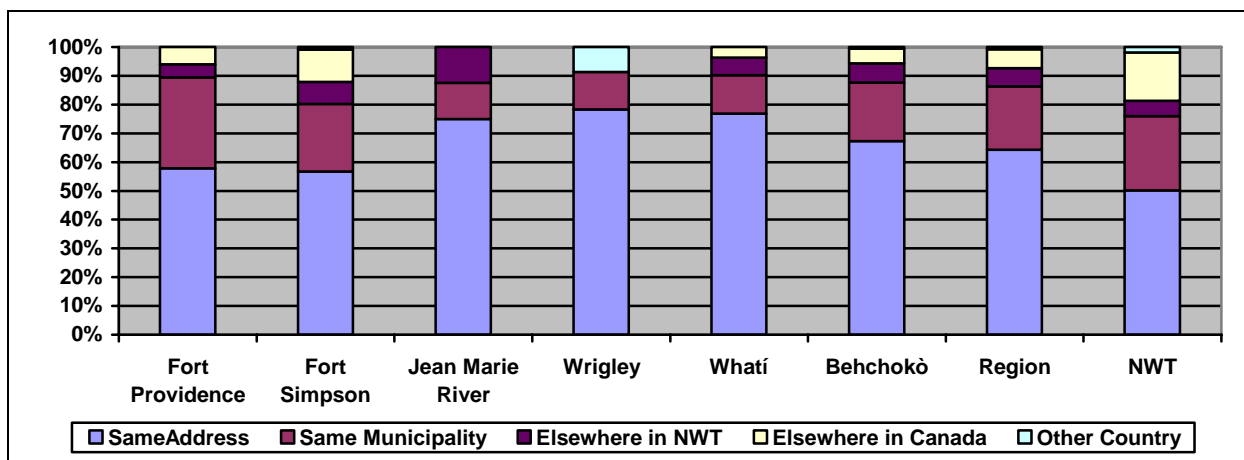
Figure 2-7: Average Birth and Death Rates (per 1,000 Population), 2000 to 2004



Source: Calculated using data from the GNWT Bureau of Statistics, 2007a

Based on births exceeding deaths, the population of each community is expected to be increasing rapidly. However, as the population of most communities is actually growing quite slowly or actually declining in some cases, it appears that people are moving out of the communities (migrating) at a faster rate than can be replaced by births. Statistics Canada has information on the numbers of people moving into the communities between 2001 and 2006. The 2006 Census showed that about 86% of regional residents had lived in the same municipality since 2001 (Figure 2-8). This percentage ranged from 80% in Fort Simpson to 93% in Wrigley, and was higher than the NWT average (76%).

Figure 2-8: Migration: Location in 2001

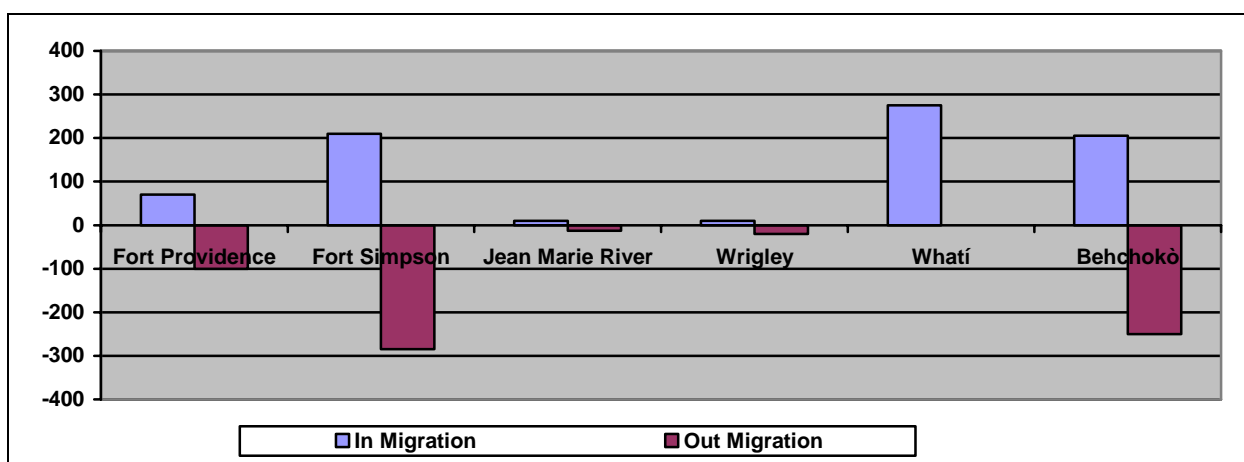


Source: Statistics Canada, 2007

The other 14% of regional residents had moved into the community from elsewhere in the NWT, Canada or the rest of the world. In total it is estimated that 780 people moved into the region between 2001 and 2006. The percentage of residents who had migrated into each community since 2001 is also shown in Figure 2-8. Most of the in-migration occurred in Whatí, Behchokò and Fort Simpson.

Knowing the rate of natural population increase and in-migration, it is then possible to estimate the number of people who moved out of the region over the last five years. Figure 2-9 shows that large numbers of people moved out of Fort Simpson and Behchokò, with the result that the populations of these two communities actually declined between 2002 and 2006.

Figure 2-9: Community Migration 2001 to 2006



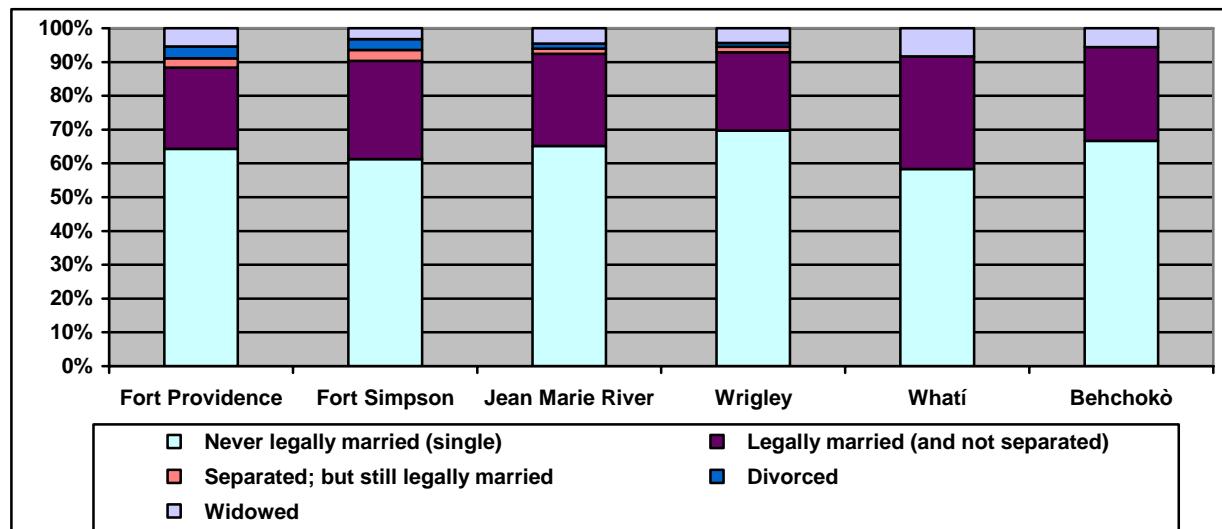
Source: Calculated using information from Statistics Canada, 2007 and GNWT Bureau of Statistics, 2007a

There appears to have been no out-migration from Whatí, so the population of that community increased. For the other three communities, the number of people migrating in and out of the community was relatively the same, such that the populations in relative terms either remained steady or declined slightly.

2.2.7 Marital Status

Figure 2-10 shows the marital status of the population aged 15 years and older in each community. It shows that legally married people accounted for 26% of the adult population, although this ranged from a low of 23% in Wrigley to a high of 33% in Whatí. The balance of the population is classified as being never legally married and this includes people who are single or people who are living in common-law relationships. People living common-law accounted for 25% of the adult population in the region, with the highest proportion being reported in Fort Providence. About 9% of the regional adult population was widowed, divorced or separated, although none of the adult population in Whatí or Behchokò identified themselves as being separated or divorced.

Figure 2-10: Marital Status of Population 15 Years and Older in Study Area Communities

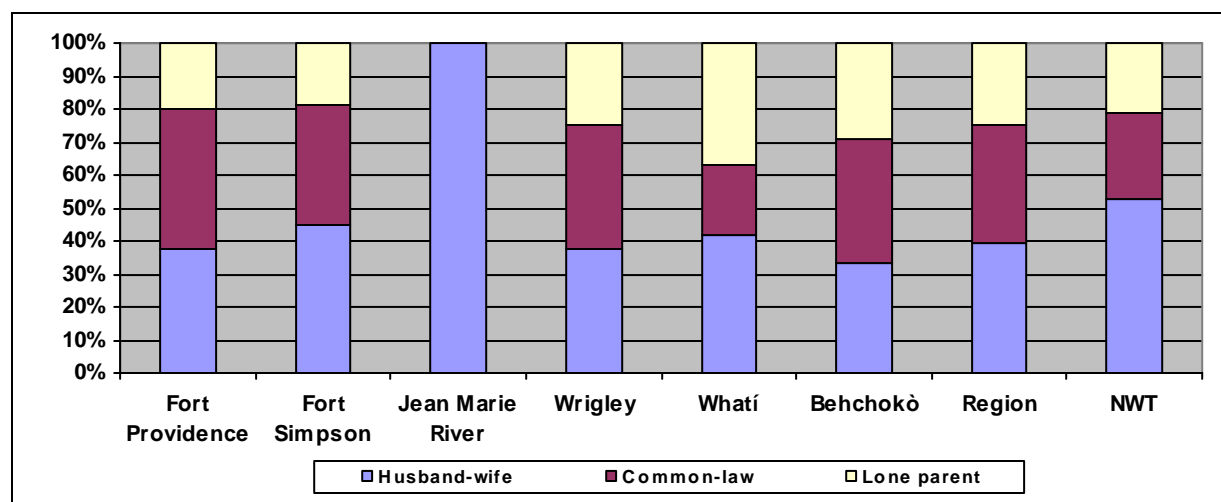


Source: Statistics Canada, 2007

2.2.8 Family Structure

There were 1,295 families in the region in 2006. Figure 2-11 shows that about 39% of families consisted of married couples, with 36% being common law couples and 21% being lone parent families. Compared to the average for the NWT, the region had a lower proportion of married couple families. Fort Simpson has the higher percentage of married couple families, while Fort Providence had the highest proportion of common-law families. Whatí reported the greatest number of long-parent households (37%). Statistics for Jean Marie River show all families as being husband-wife families.

Figure 2-11: Structure of Families in the Region



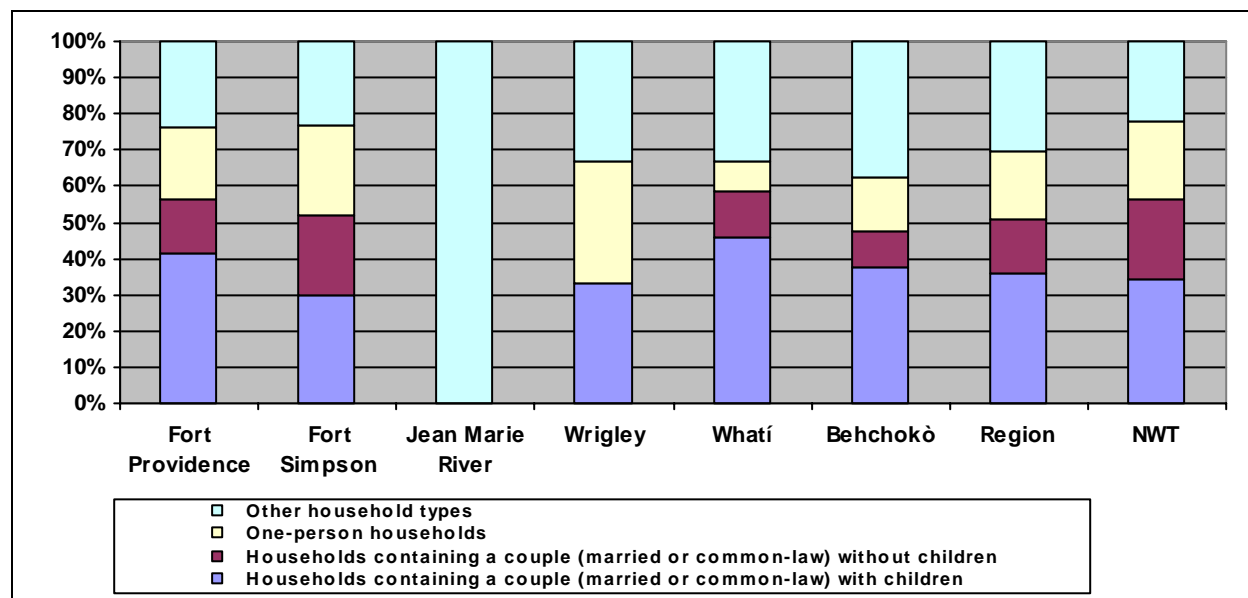
Source: GNWT Bureau of Statistics, 2007a

Data from the 2006 Census shows that the average family size in the region was 3.5 people. This ranged from an average of 3.2 people per family in Fort Simpson to 3.8 in Behchokò. The average family size in the NWT was 3.2 people while the average family size in Yellowknife was slightly smaller (3.1 people).

2.2.9 Household Structure

According to the 2006 Census there were 460 households in the region. Households can consist of one or more family units. Couples with children accounted for 34% of households while the balance of households consisted of nearly equal portions of couples without children, one-person households and other households, which includes multiple-family households, lone-parent family households and non-family households other than one-person households. Figure 2-12 shows that there was considerable variation in household structure among the communities. The highest percentage of couples with children and the lowest percentage of single-person households were found in Whatí. Wrigley, Whatí, Behchokò and Jean Marie River also reported percentages of other household types that were higher than the regional average. The highest percentage of single-person households was found in Wrigley, Fort Simpson and Fort Providence.

Figure 2-12: Structure of Households in the Region



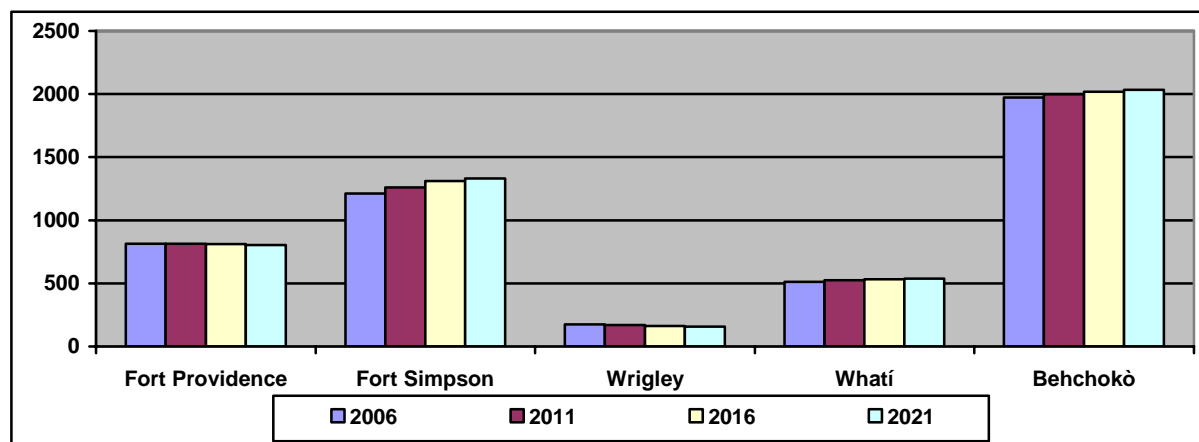
Source: Statistics Canada, 2007

The average household size ranged from a low of 2.7 in Fort Simpson and Behchokò to a high of 4.2 in Wrigley, with the regional average being 3.4 people per household. This was higher than the territorial average of 2.9 people per household. The average household size in Yellowknife was 2.8 people.

2.2.10 Population Projections to 2021

The GNWT has prepared population projections for five of the six communities for the period from 2006 to 2021. Data were not available for Jean Marie River. Figure 2.13 shows that populations are not likely to change dramatically over the next 15 years. The population of Fort Providence and Wrigley are expected to decline slightly, while Fort Simpson, Whatí and Behchokò are all expected to grow slightly.

Figure 2-13: Projected Population Changes, 2006 to 2021



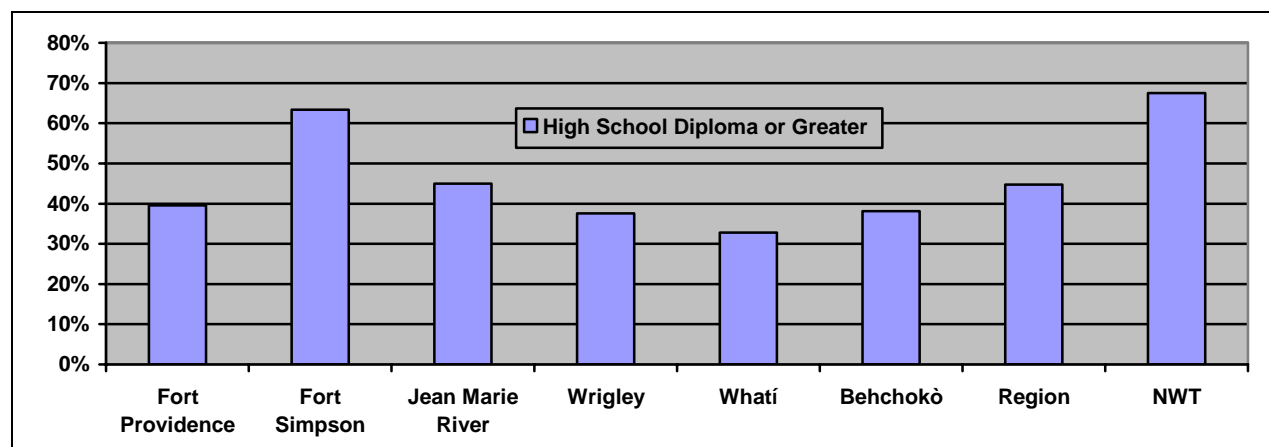
Source: GNWT Bureau of Statistics, 2007a

2.3 Education

2.3.1 Educational Attainment

Within the region, 45% of the adult population (aged 15+) has at least completed their high school education. Figure 2-14 shows that the percentage of adults residing in the region who had attained their high school diploma or greater was well below the NWT average of 68%. The lowest levels of educational attainment were reported in Whatí (33% had completed high school) and low levels were also reported in Wrigley and Behchokò. The highest educational attainment was reported by residents of Fort Simpson, with 63% having completed their high school education and this correlates with the observation that this community is a regional business and government service centre.

Figure 2-14: Educational Attainment, 2004



Source: GNWT Bureau of Statistics, 2007a

2.3.2 School Attendance

The GNWT collects information about full- and part-time school attendance for the population 15 years and older. The data show 17% of the regional population was attending school on a full-time or part-time basis (Table 2-3). This participation rate is higher than the territorial average of 13%. Within the region, Wrigley had the highest percentage attending school (24%); while available data indicate that none of residents of Jean Marie River over the age of 15 are attending school either full or part time.

Table 2-3: School Attendance of Population Aged 15+

	Attending Full Time	Attending Part Time	Percent Attending School
Fort Providence	65	10	13%
Fort Simpson	110	20	14%
Jean Marie River	0	0	0%
Wrigley	10	10	24%
Whatí	50	10	18%
Behchokò	180	25	16%
Region	415	75	17%
NWT	3,470	1,330	13%

Source: GNWT Bureau of Statistics, 2007

2.4 Regional Economy

2.4.1 Employment and Participation Rates

Participation rate is the number of persons aged 15 and older who are in the labour force, either employed or actively seeking employment. Table 2-4 shows that the highest participation rates in the study area communities are in Fort Simpson (76.8%) and Jean Marie River (75%) and are

comparable with the NWT as a whole. The lowest participation rate of the study area communities is found in Behchokò with 54.2%.

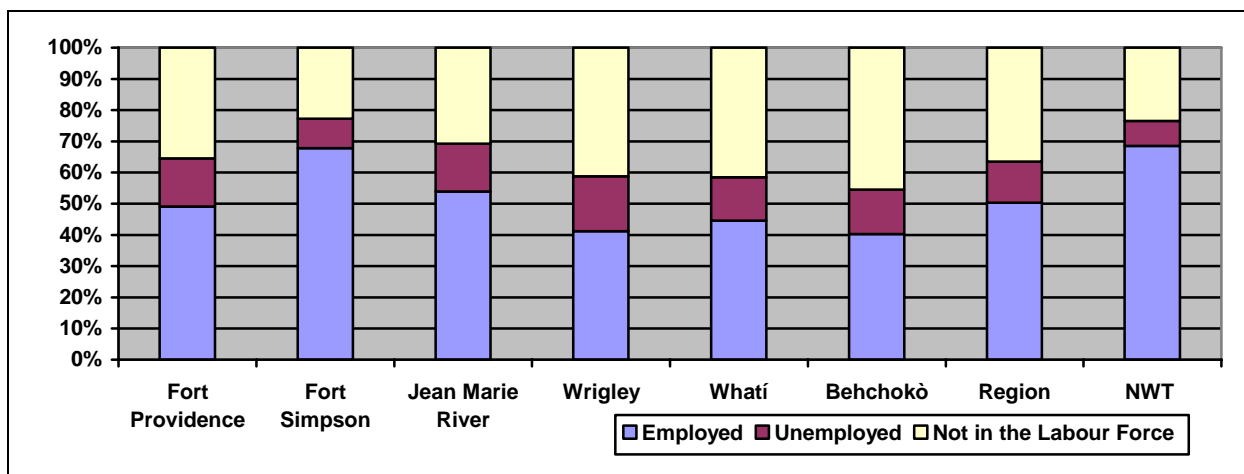
Table 2-4: Labour Force Participation Rates for Regional Communities

Community	Participation Rate		
	Male	Female	Total
Fort Providence	66.7%	60.4%	64.5%
Fort Simpson	81.7%	72.4%	76.8%
Jean Marie River	66.7%	57.1%	75.0%
Wrigley	60.0%	57.1%	58.8%
Whatí	63.9%	50.0%	56.9%
Behchokò	59.8%	48.3%	54.2%
REGION	67.7%	57.9%	63.2%
NWT	79.9%	72.9%	76.5%

Source: Statistics Canada 2007

The study area communities have higher unemployment rates than the NWT as a whole. Fort Simpson, as the regional government and business service centre has the lowest unemployment rate at 13% comparable to the NWT rate of 10.4%. Wrigley has the highest unemployment rate at 30% (Figure 2-15).

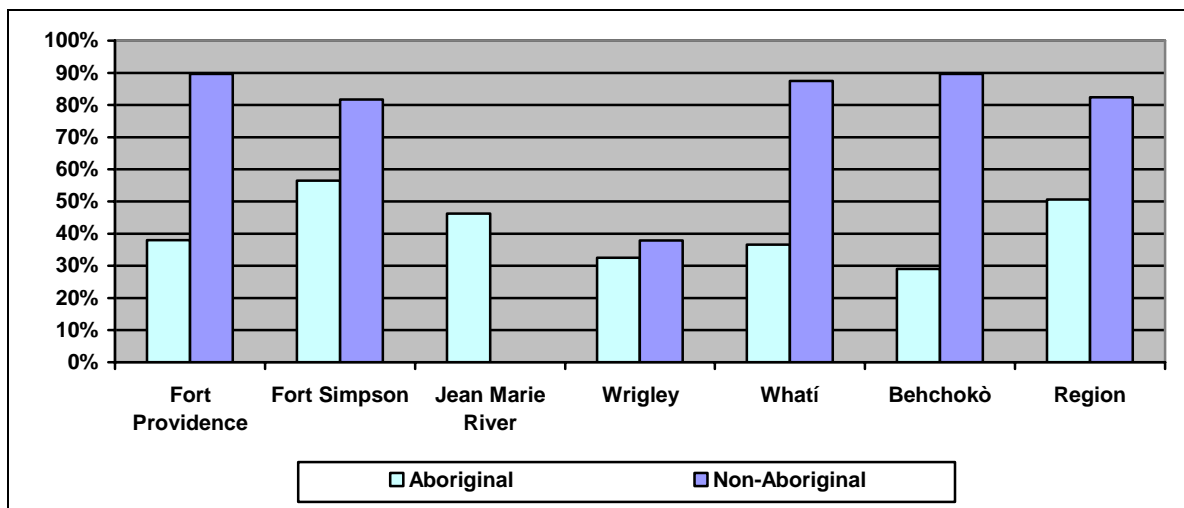
Figure 2-15: Labour Force Participation (2006)



Source: Statistics Canada, 2007

In all study area communities, Aboriginal people are less likely than non-Aboriginal people to be employed. Employment rates for 2004 are shown in Figure 2-16. For the region, 82% of the non-Aboriginal labour force was employed in 2004 compared to 51% of the Aboriginal labour force. The figure shows that the greatest differences in employment rates for the Aboriginal and non-Aboriginal components of the work force are in Jean Marie River, Fort Providence, Whatí and Behchokò. These communities also have a very low percentage of non-Aboriginal residents. Wrigley had the lowest overall employment rate for both components of the labour force.

Figure 2-16: Aboriginal and Non-Aboriginal Employment Rates (2004)

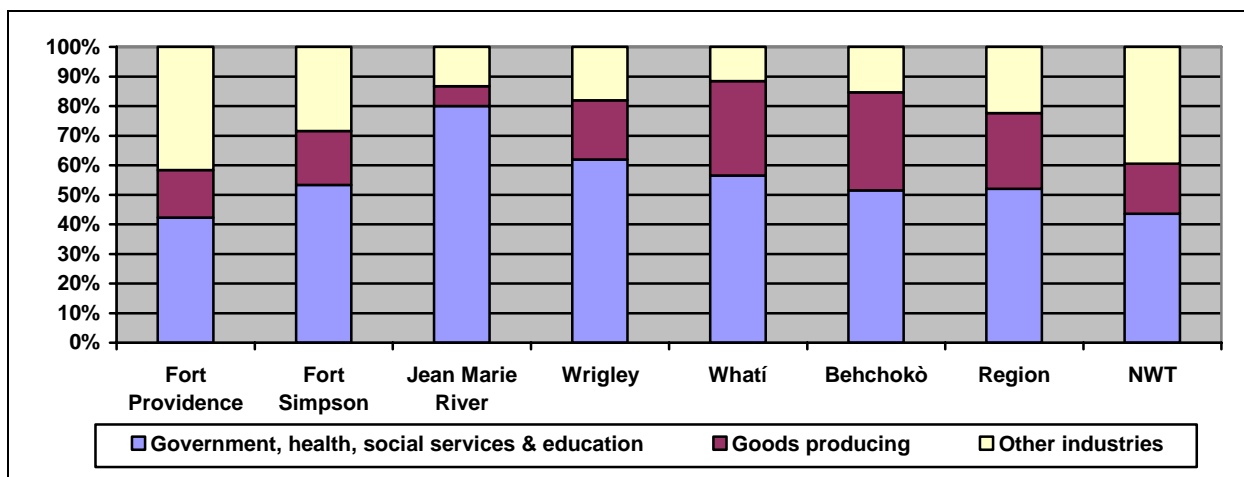


Source: GNWT Bureau of Statistics, 2007a

2.4.2 Employment by Industry

Both the GNWT Bureau of Statistics and the Canadian Census track employment by industry. The GNWT data show that in all study area communities, government, health, social services and education were the largest employers. In Whatí and Behchokò, goods processing was the second largest employer and in Fort Providence “other industries” was the second largest employer (Figure 2-17). The “other industries” classification includes retail and wholesale trades and various services, including services to business, financial and real estate.

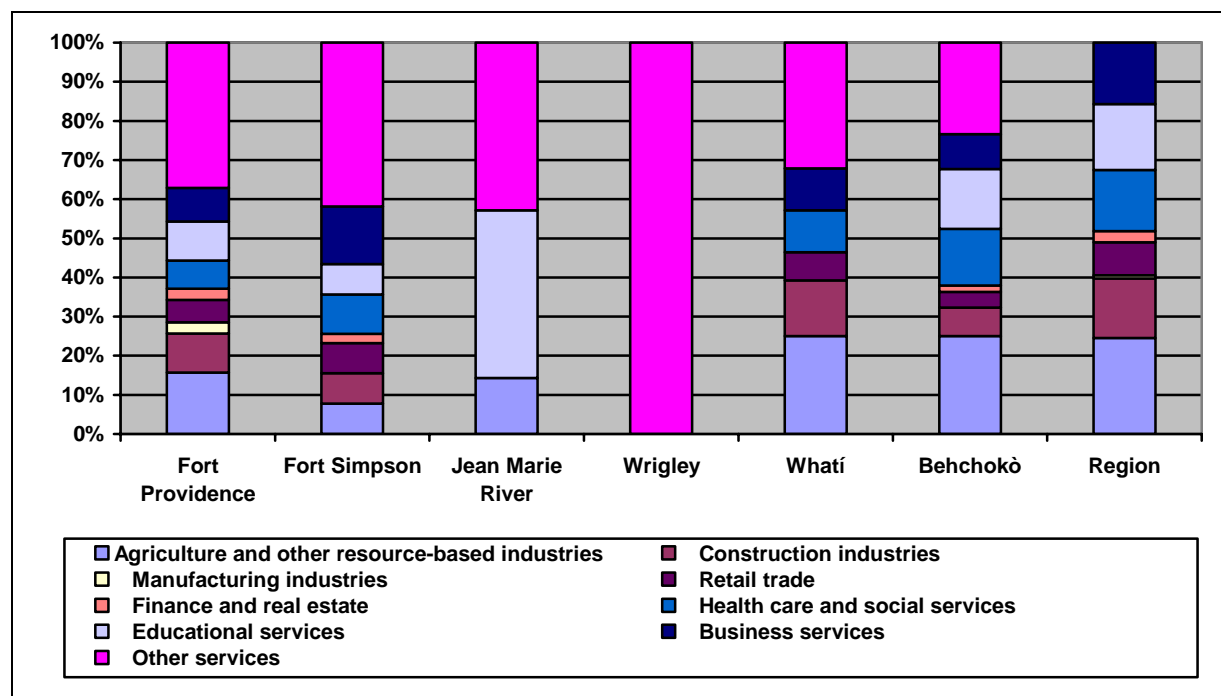
Figure 2-17: Employment by Industry, 2004



Source: GNWT Bureau of Statistics, 2007a

The 2006 Census data breaks down employment into more industry types and shows that the category “other services” is the largest employment sector in study area communities, followed by health and education services. The data suggest that the populations of Behchokò, Fort Providence and Fort Simpson have more diversified occupational skills since there are more employment types represented by the residents in these communities than in the other communities (Figure 2-18). Wrigley and Jean Marie River residents appear to have fewer occupational skills than the other study area communities.

Figure 2-18: Employment by Industry, 2006



Source: Statistics Canada 2007

2.4.3 Regional Businesses and Services

The GNWT gathers statistics on some businesses by community. The data show that all study area communities have local grocery stores, however only Fort Simpson has businesses related to government financing, and a bank. Most communities have automated teller services.

Table 2-4: Businesses in Study Area Communities

	Fort Providence	Fort Simpson	Jean Marie River	Wrigley	Whatí	Behchokò
Government financing	0	2	0	0	0	0
Chartered bank	0	1	0	0	0	0
Grocers	2	2	1	1	1	2

Source: GNWT Bureau of Statistics, 2007b

The GNWT department of Industry Tourism and Investment maintains a database compiled every two years of businesses and services by community. The most recent listing is from 2006, with another to be released in the summer of 2008. Fort Simpson has the largest listing of businesses and services of the study area communities and lists 98 companies or organizations providing a wide range of services. Behchokò has 49 business/service listings including a community learning centre, post services, health and wellness services, recreation, forestry, local government offices, communication services, video store, community services (including seniors centre, day care), professional services (engineering, construction), RCMP, transportation, accommodations and restaurants.

Fort Providence has 35 listings showing a wide range of services including a community learning centre, grocers, health and wellness services, local and Aboriginal government services, accommodations, post office and the RCMP. Whatí has 25 listings including basic community services, transportation, utilities, accommodations, local government and the RCMP. Wrigley has 12 listings including communications (radio), utilities, post office, communication services, and a grocer. Jean Marie River has the least number of services with four listings including a “health cabin”, the First Nation office, power and communication utility services (GNWT, 2006).

The NWT Tourism Association provides a listing of tourism related businesses, events and points in interest on their website and through visitor guides. Their website (<http://www.explorenwt.com>) shows slightly different information than was documented for tourism services by the GNWT Bureau of Statistics (Table 2-5). Overall, both sources of data show that Fort Providence, Fort Simpson and Behchokò, as the larger study area communities, have more tourism infrastructure and capacity.

Table 2-5: Tourist Services in Study Area Communities

	Fort Providence	Fort Simpson	Jean Marie River	Wrigley	Whatí	Behchokò
Lodges/outfitters	2	0	0	0	1	2
Accommodations	2	6	1	1	1	0
Campgrounds	1	1	0	0	0	1
Parks	3	1	0	0	0	3
Restaurants	2	2	0	1	1	2
Visitor centre	0	2	1	0	0	0

Source: GNWT Bureau of Statistics, 2007b

Fort Simpson has the most tourism infrastructure and services given its proximity to and role as the gateway to the Nahanni National Parks Reserve which is a UNESCO World Heritage Site. The town has two visitor centres one of which is for the National Park. There are three other territorial parks listed on the NWT Tourism Association website in the Deh Cho region: Blackstone Territorial Park, Fort Simpson Territorial Park and the Samba Deh Falls Territorial Park. While information from the GNWT Bureau of Statistics indicates that there are no outfitters in Fort Simpson, the community has at least two outfitter companies that provide wildlife, birding, cruises, sightseeing, camping, lodges, fishing, and ecotourism services,

including access to Nahanni National Park. One other company offers cross cultural and learning experiences. There are four businesses offering accommodations. Several points of interest are listed on the website including Virginia Falls, Fort Simpson's Heritage Park and the Nahanni Park Reserve. Three annual events are hosted in the town including a golf tournament, art festival and winter festival (NWT Tourism Association, 2007).

Fort Providence has a wilderness outfitter and inn, one annual event, one campground and the Mackenzie Bison Sanctuary and Old Fort Providence as points of interest. In Behchokò, the Sah Naji Kwe Wilderness Spa and Meeting Centre offers accommodations, health spa, cross cultural learning experiences, and camping. Camp Ekwo is the local outfitter offering hunting in the central barrenlands. There is one annual event in the town. Whatí has one bed & breakfast and a spring carnival and fishing derby. There is also a restaurant and general store in Whatí and the site states that there are local outfitters (NWT Tourism Association, 2007).

Wrigley has one airline charter service. While no tourism businesses are listed in the website for Jean Marie River, the site states that traditional crafts are made locally (NWT Tourism Association, 2007).

2.4.4 Historical Trends and Future Economic Developments

The GNWT Department of Industry, Tourism and Investment recently released a report entitled: "Economic Review & Outlook 2007: Investment and Economic Analysis" (Feb 2008). The report provides a recent (late 1990s to present) historical overview of the factors of production as well as an overview of the key industries in the NWT and the factors that affect their development.

The report outlines that while basic regional and community infrastructure (transportation networks, communications, basic community services) are now present in the NWT, a greater level of services for businesses, hydro power and the lack of an international airport hinders economic growth. Also slowing economic potential is the policy environment for development related to unsettled claims and the existing regulatory environment. Provincial and federal government agencies are working to resolve these issues.

Even with these challenges and limitations to the factors of production, the report also shows that private and public investment generally increased between 2003 and 2007, with the exception of public administration. Sectors receiving increases in investment include mining and oil and gas extraction, transportation and warehousing, educational services, real estate, information and cultural industries, finance and insurance and utilities. The report states that the total capital investment in the NWT is expected to be \$1.6 billion for 2007, of which, 71% is private investments linked to diamond mine development (GNWT 2008a).

GNWT ITI also released a partner report to that briefly summarized above entitled: "Economic Review NT Regions: Investment and Economic Analysis" (February 2008). This report provides economic profiles for the six economic regions in the NWT including "North Slave and Behchokò" (which also includes Whatí) and "Deh Cho and Fort Simpson" (which includes all other study area communities). The report indicates that in the North Slave/Behchokò region, the traditional economy remains strong, and there is strong population growth related to the

expansion of economic opportunities either directly or indirectly associated with diamond mining in the region. The report states that new diamond and gold mining projects will help to increase employment and business opportunities. The area is a major source of fur (marten) and opportunities exist for expansion of services, retail trade and tourism – particularly since the region is lacking in business services currently (GNWT 2008b).

In the Deh Cho/Fort Simpson region, tourism is the most promising economic sector with road access to British Columbia and Alberta and with attractions such as the Nahanni River, Virginia Falls, the Trout River and the Mackenzie Mountains. The report states that the region is poised to benefit significantly from expanded oil and gas development and exploration and is currently the region that produces the most gas in the NWT. The report states that if the Mackenzie Gas Project is approved the region will be a major staging ground for pipeline construction and services. There is one operating mine (Cantung) in the region and there is a proposal to expand and re-open the Prairie Creek mine. Other major industries include forestry, trapping and handicrafts (GNWT 2008b).

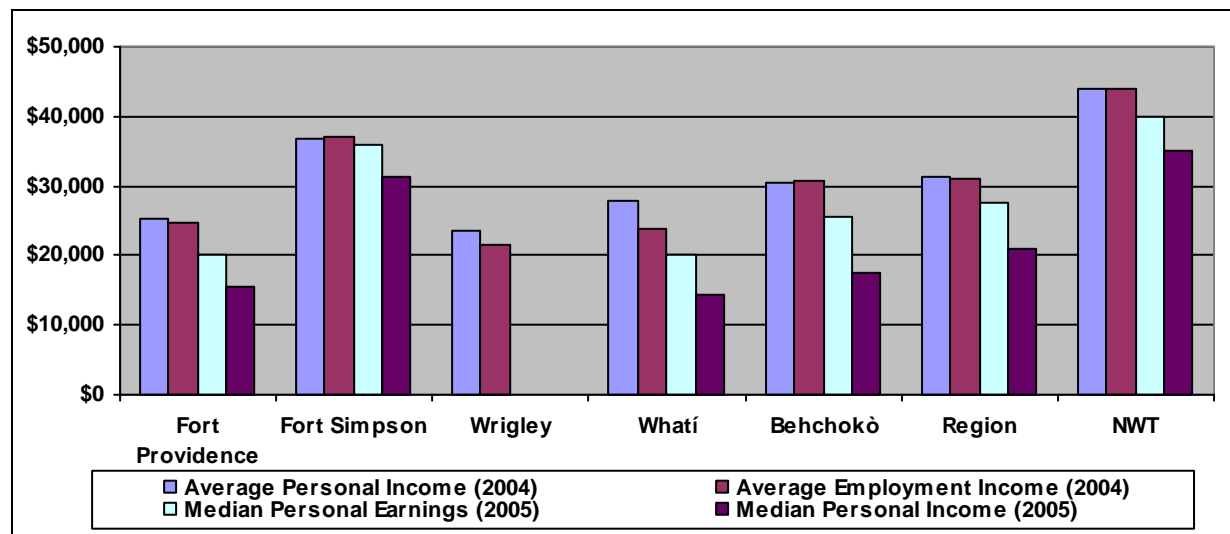
2.5 Health and Well Being

Various indicators are used to describe health and well-being at a community level. For example, Indian and Northern Affairs Canada define community well being in terms of four components: income, education, labour force activity and housing conditions. Labour force conditions in each of the communities have already been described (Section 2.4.1) and statistics on educational attainment were presented in Section 2.3. The following sections describe income, housing and other health related conditions in the region.

2.5.1 Income

In 2004, personal income in the region averaged \$34,340, of which \$30,930 came from employment. These amounts are about 70% of the NWT average. Income refers to all income from all sources while employment income is income received by person over the age of 15 from employment. Figure 2-19 shows average employment and personal income for all the communities in the region, except for Jean Marie River, for which information is not available. The figure shows that incomes in Fort Simpson were nearly 20% higher than the regional average, while average incomes in Wrigley were about 10% less than the regional average. Average incomes in Fort Providence were also below the regional average.

Figure 2-19: Personal Income and Earnings, 2004 and 2005

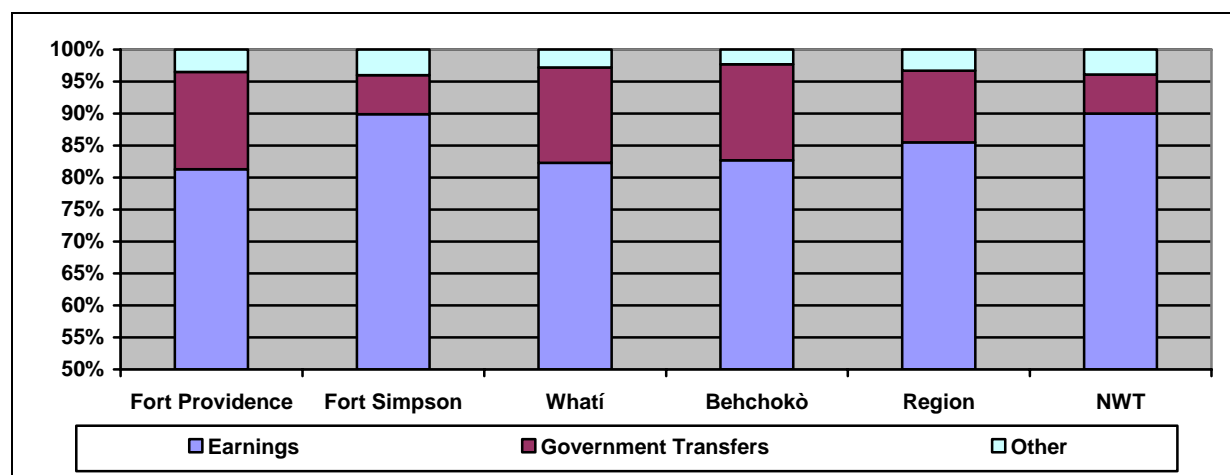


Source: GNWT Bureau of Statistics, 2007a; Statistics Canada, 2007.

Figure 2-19 also shows median personal earnings and incomes for 2005, as determined as part of the 2006 census. Median incomes represent the midpoint in the range of reported incomes and are typically less than average earnings (which can be skewed by one or more individuals with very high earnings). The information on median incomes shows the same overall pattern, with the median regional personal income (\$21,095, calculated as an average) being about 60% of the NWT median (\$35,006) and less than half of the Yellowknife median income (\$44,567). The income difference among communities is also consistent with the 2004 data. Median incomes were highest in Fort Simpson and very similar for Whatí and Fort Providence. Census income data were not available for Jean Marie River or Wrigley.

Figure 2-20 shows the composition of total income for people in four of the six communities; data were not reported for Jean Marie River or Wrigley.

Figure 2-20: Composition of Total Income, 2005

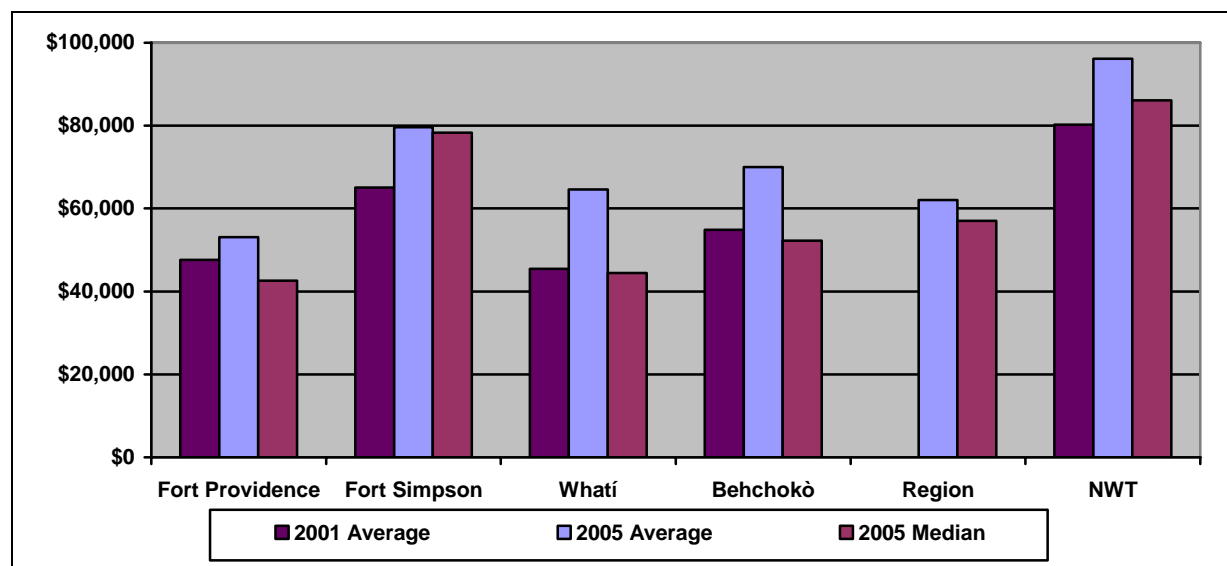


Source: Statistics Canada, 2007.

Overall, about 86% of personal income in the region came from earnings with another 11% from government transfers. Regional reliance on government transfers was higher than the NWT average (6%). Residents of Fort Simpson were the least reliant on government transfers (6% of annual income) while transfers accounted for about 15% of income in the other three communities. It should be noted that government transfers accounted for 8% of incomes reported by male residents and 16% of incomes for female residents.

In 2005, the average family income for the four largest communities in the region was about \$62,000 and the median income was about \$57,000. Both average and median incomes were about 35% less than for the NWT (average of \$96,200 and median of \$86,100). However, median incomes in the region were much lower than the median income for families in Yellowknife (\$110,135). During the period from 2001 to 2005, average family incomes in the NWT increased by about 20%. For the same period, average family incomes in Fort Simpson and Behchokò increased by 22% and 28%, respectively, and jumped by 42% in Whatí. However, in Fort Providence, average family incomes increased by only 11%. Despite these increases, Figure 2-20 shows that average and median family incomes in regional communities were all well below the territorial average. Average family incomes were highest in Fort Simpson (\$79,654) and lowest in Fort Providence (\$53,052). Data were not available for Jean Marie River or Wrigley.

Figure 2-21: Family Incomes, 2001 and 2005

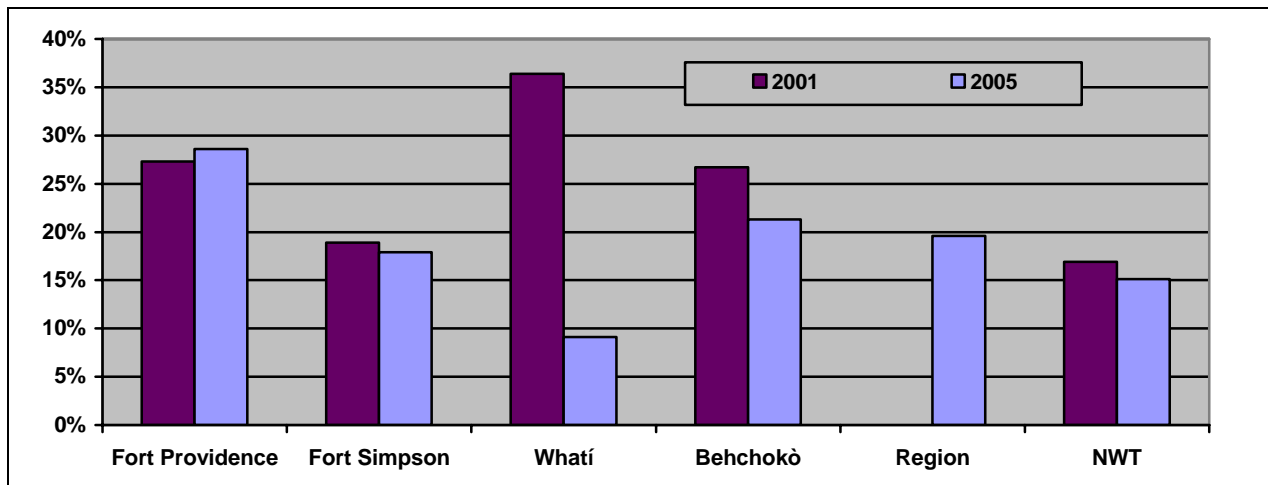


Source: GNWT Bureau of Statistics, 2007a; Statistics Canada, 2007).

A key measure of well being is the number of low income families. In 2005, about 20% of the families in the four largest communities in the region earned less than \$25,000. This proportion is about 5 percentage points higher than the NWT average (15%). Figure 2-22 shows that the percentage of families earning less than \$25,000 in 2005 was highest in Fort Providence and lowest in Whatí. The figure also shows that between 2001 and 2005 the proportion of low income families in the region dropped for most communities. For Whatí and Behchokò there was a greater reduction in the percentage of low income families than occurred in the NWT.

However, Fort Providence reported a small increase in the percentage of low income families. In general the data suggest that the relative economic situation of families in the study area communities has improved over time

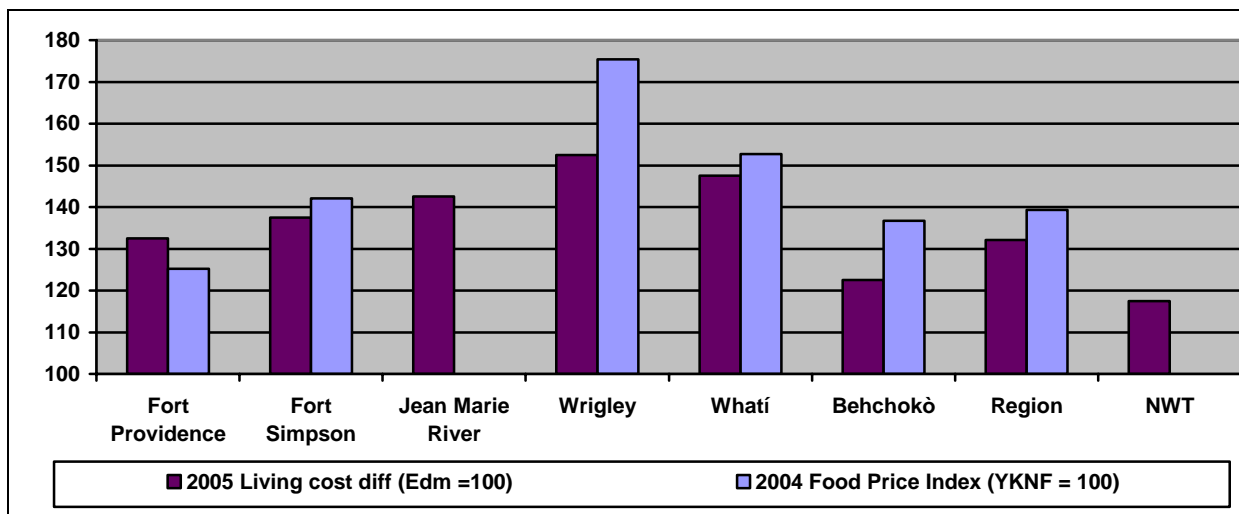
Figure 2-22: Percentage of Families Earning Less than \$25,000 in 2001 and 2005



Source: GNWT Bureau of Statistics, 2007a.
Note: Data were not available for Jean Marie River and Wrigley

While regional residents typically had incomes that were lower than the NWT average, they also faced higher costs to live in their communities. Figure 2-23 compares the costs of living in regional communities relative to the cost of living in Edmonton (index = 100) and food prices relative to equivalent food costs in Yellowknife (index = 100).

Figure 2-23: Cost of Living and Food Price Index in Study Area Communities



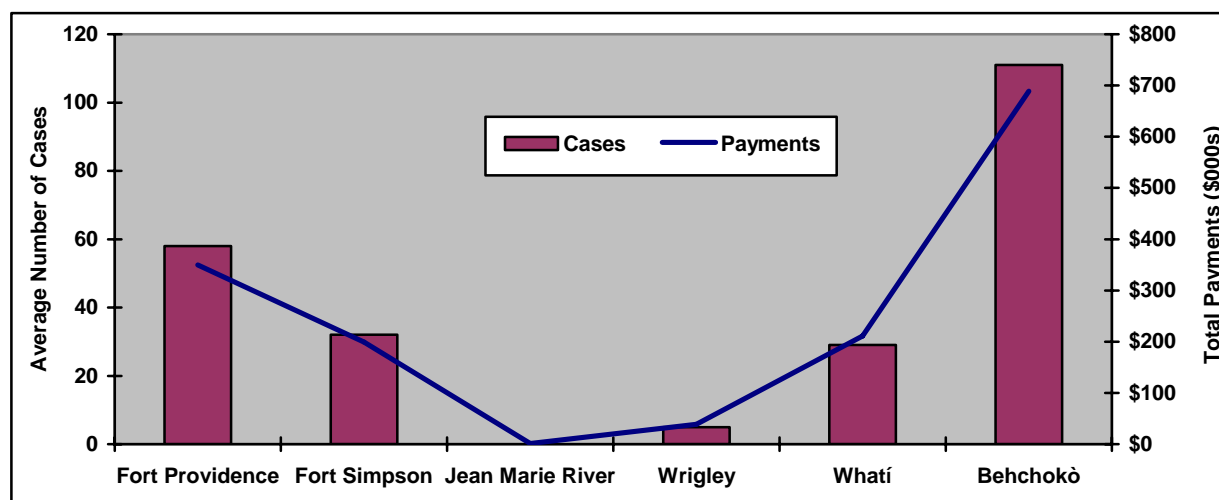
Source: GNWT Bureau of Statistics, 2007a.

The figure shows that all communities in the region had costs of living that were at least 25% higher than in Edmonton, and were relatively higher than the territorial average. The highest

costs of living were reported in Wrigley, while Behchokò, which is close to Yellowknife, had the lowest relative costs of living. Figure 2-23 also shows that food costs in Wrigley were about 75% higher than in Yellowknife. Food costs in all communities were at least 25% higher than in Yellowknife and, on average, were about 40% higher.

Another measure of economic well being is the number of community residents receiving income support and the total value of income support payments. In 2006, an average of 235 people received income support payments with a total value of \$1.489 million. As shown in Figure 2-24, the majority of people receiving income support lived in Behchokò which had twice as many recipients as any other community. The figure shows that very few residents of Jean Marie River or Wrigley received income support payments.

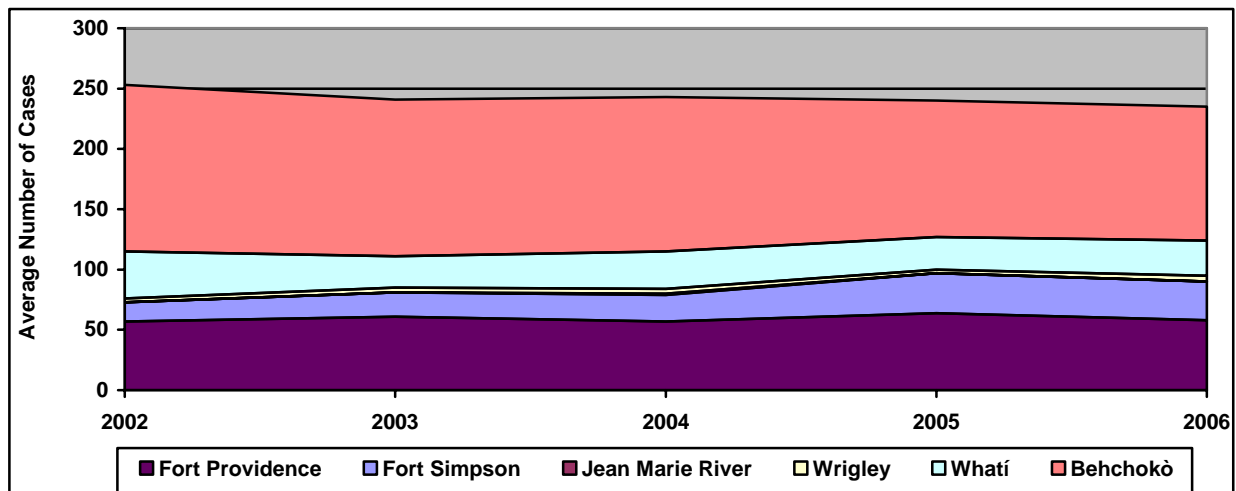
Figure 2-24: Number of People Receiving Income Support and Value of Payments, 2006



Source: GNWT Bureau of Statistics, 2007a.

Over time, there has been a slight reduction in the number of regional residents receiving support payments. Figure 2-25 shows that the average number of cases (monthly) has dropped from 250 in 2001 to 235 in 2006. It shows that the number of Behchokò residents receiving payments has dropped from 138 to 111, but part of this reduction has been offset by an increase in the number of Fort Simpson residents receiving income support payments. The number of people receiving income support in the other communities remained relatively constant over the five year period.

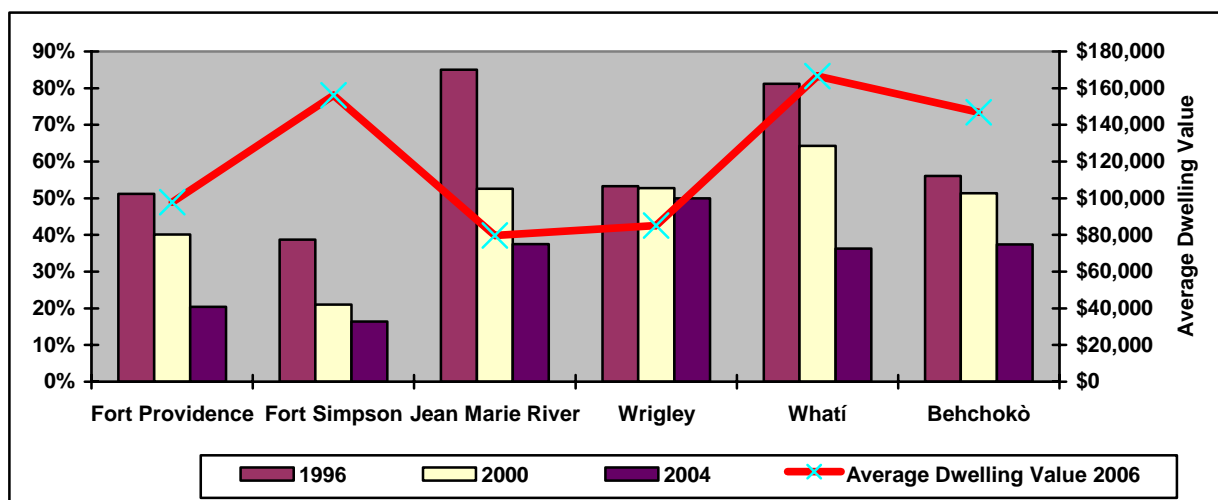
Figure 2-25: Number of Regional Residents Receiving Income Support, 2001 to 2006



Source: GNWT Bureau of Statistics, 2007a.

Core need is another measure of economic well being used by the GNWT Bureau of Statistics. Core need is the percentage of households with income less than the Community Core Need Income Threshold, which is defined as the income required by a household to own and operate a home or rent without government assistance. In 2004, 28% of regional residents were considered to be in core need, and this exceeds the territorial average of 16%. Figure 2-26 tracks the percentage of core need households in each community from 1996 to 2004 and also shows the average value of dwellings in each community. It shows that the percentage of households in core need has been steadily declining in all communities. The largest decline occurred in Jean Marie River while the least amount of change was reported in Wrigley. However, some of the communities with the highest percentage of households in core need also have some of the lowest housing costs.

Figure 2-26: Percentage of Households in Core Need

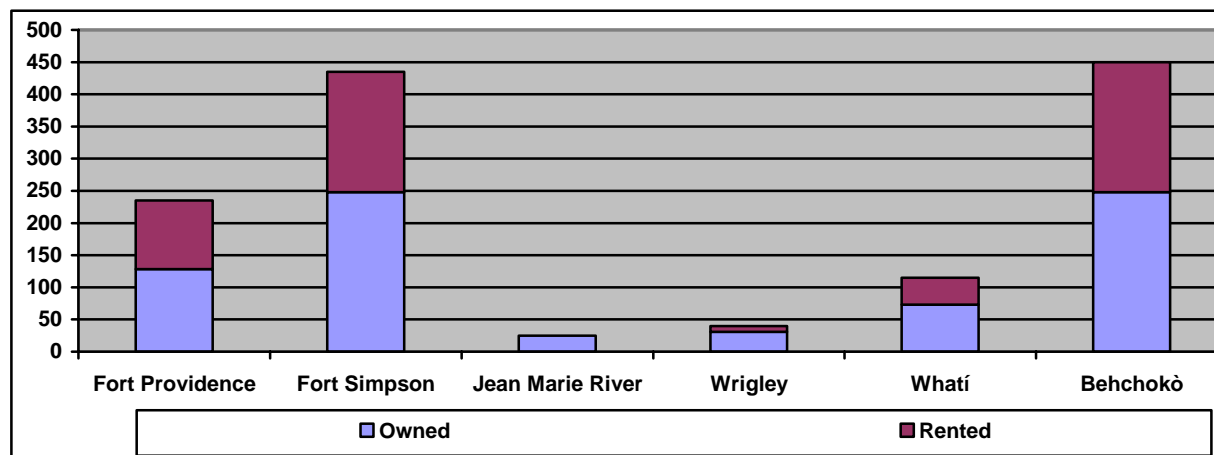


Source: GNWT Bureau of Statistics, 2007a; Statistics Canada, 2007.

2.5.2 Housing

According to the 2006 Census there were 1300 occupied dwelling units in the region. Figure 2-27 shows the number of units in each of the six communities, as well as the number of dwellings that were rented and the number that were owned. It shows that nearly half the occupied dwellings in each of the larger communities were rented, while the majority of dwellings in the smaller communities were privately owned and occupied. Overall, 58% of dwellings in the region were privately owned and this is slightly higher than the territorial average (53%).

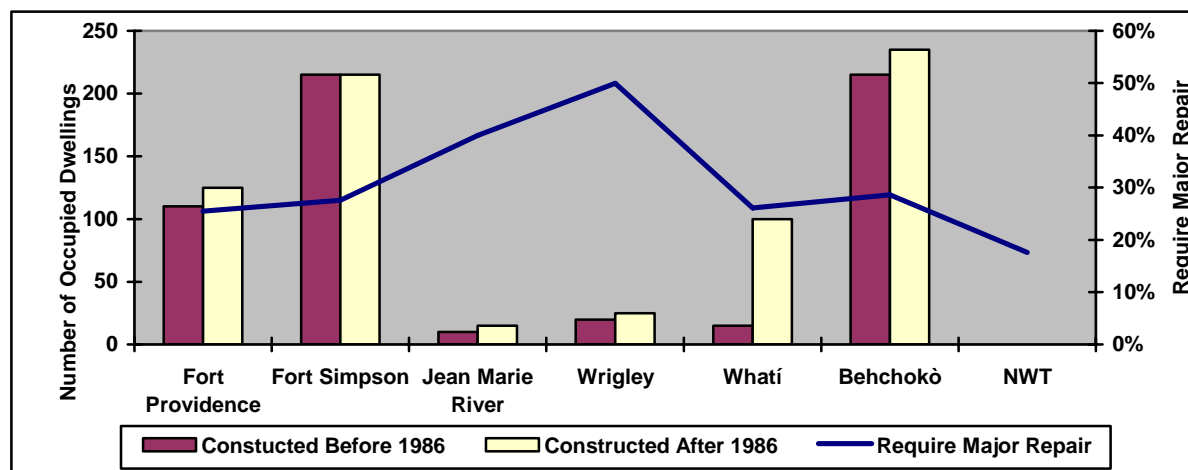
Figure 2-27: Number of Occupied Dwellings, 2006



Source: Statistics Canada 2007.

In general, housing in the region is newer than the NWT average. About 55% of dwellings in the region have been constructed since 1986, compared to only 44% of dwellings in the NWT. As shown in Figure 2-28, more than half of the dwellings in most regional communities have been constructed since 1986, although 87% of dwellings in Whatí are less than 20 years old.

Figure 2-28: Age of Dwelling and State of Repair, 2006

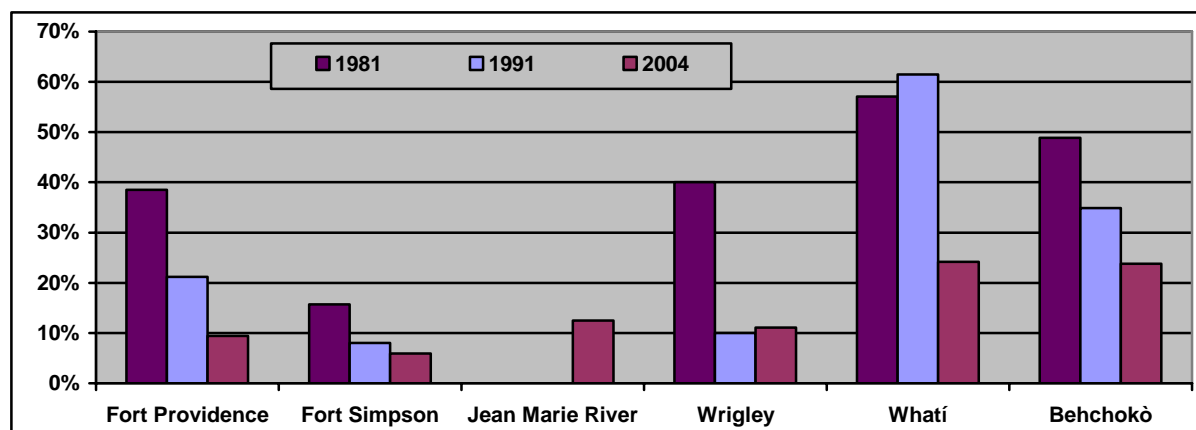


Source: Statistics Canada 2007.

Despite the housing being newer, 29% of dwellings in the region are considered to be in need of major repair. In the NWT, only 17% of dwellings are in need of major repair. In Whatí, which has the highest percentage of new houses, 26% of houses are in need of major repair. The communities with the higher percentage of dwellings needing major repair include Wrigley (50%) and Jean Marie River (40%).

Another measure of the adequacy of housing is availability and an indicator used to assess availability is the percentage of households that accommodate more than six people. In 2004, about 15% of regional households had more than six people; this was more than double the territorial average of 7%. Figure 2-29 shows how the percentage of households with more than 6 people has been changing since 1981. It shows that in all communities the percentage of households with more than six people had been reduced by half since 1981. In some communities this reduction had been gradual (Behchokò, Fort Providence and Fort Simpson). In other communities (Wrigley and Whatí), all of the reduction has occurred in one time interval. In 2004, Fort Simpson had the lowest percentage of households with more than six people (6%) while Whatí and Behchokò have the largest percentage or large households (24%).

Figure 2-29: Percentage of Households with More than Six People

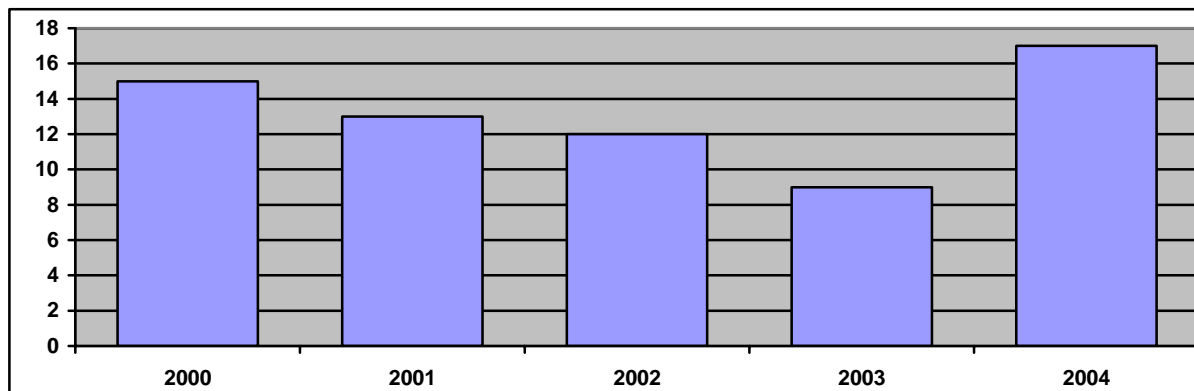


Source: GNWT Bureau of Statistics, 2007a.

2.5.3 Social Indicators

Social well being can be measured using numerous indicators. One of the indicators that can be used is the teenage birth rate. Figure 2-30 shows the number of births to teenage mothers in regional communities for the period from 2000 to 2004. It shows that the number of teen births declined between 2000 and 2003 and then increased in 2004. To put this into perspective, this represents a birth rate of 3.8 births per 100 teenage females based on 2001 population estimates. The equivalent rate for the NWT was 2.2 births per 100 teenage females.

Figure 2-30: Number of Teen Births for Study Area Communities 2000 – 2004

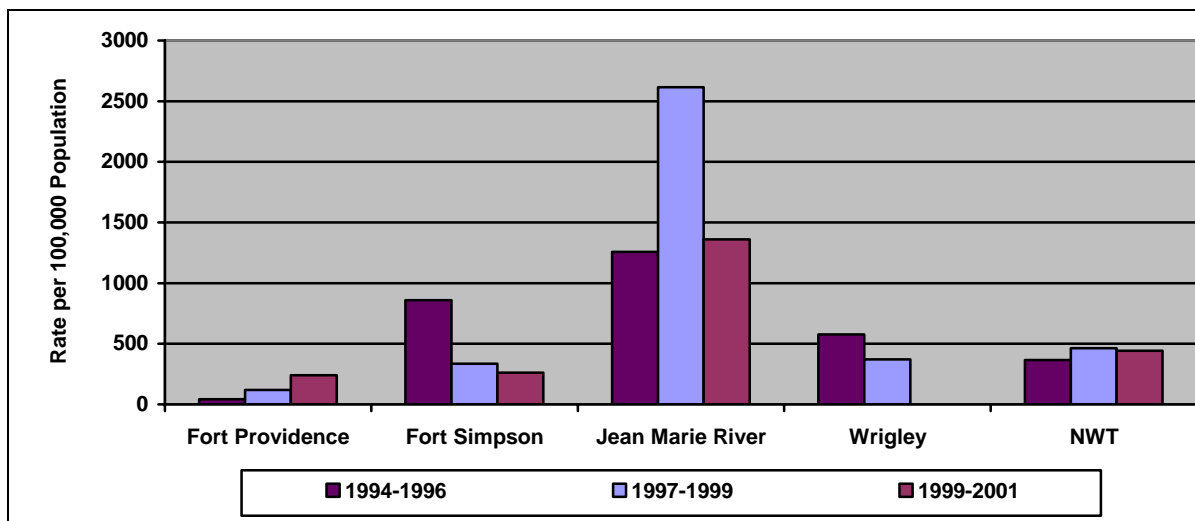


Source: GNWT Bureau of Statistics, 2007a.

The number of lone-parent families also provides an indication of wellbeing and stress in communities. This information was previously displayed in Figure 2-11. Overall, 25% of families in the region were consisted of lone-parent families; this was slightly higher than the territorial rate (21%). Within the region, the highest percentage of lone parent families was found in Whatí (37%) and Behchokò (29%). The communities with the lowest percentage of lone parent families were Fort Providence (20%) and Fort Simpson (19%).

The Environmental Impact Statement (EIS) for the Mackenzie Gas Project provides information on a variety of other indicators of community health and well being. It contains information for the Deh Cho communities on the incidence of respiratory diseases, infectious and parasitic diseases, sexually transmitted infections, accidents, injuries and poisonings, deaths from injuries, cases of mental disorder, hospitalizations for alcohol-related illness, spousal assaults, and children taken into care. The EIS states that “alcohol abuse is the source of most wellness and policing problems” in the Deh Cho Region and that over 90% of the work of the Fort Simpson RCMP detachment is a result of alcohol consumption and abuse. Figure 2-31 shows that the rate of hospitalizations for alcohol related illness was highest in Jean Marie River and lowest in Fort Providence. However, for the period from 1994 to 2001, hospitalization rates have fallen in most communities. Fort Providence is the exception, with rates increasing from 43 per 100,000 people in 1994-1996 to 239 per 100,000 people in 1999-2000. Despite the increase, Fort Providence has rates of hospitalization that are less that the overall rates for the NWT as well as for the other three listed regional communities.

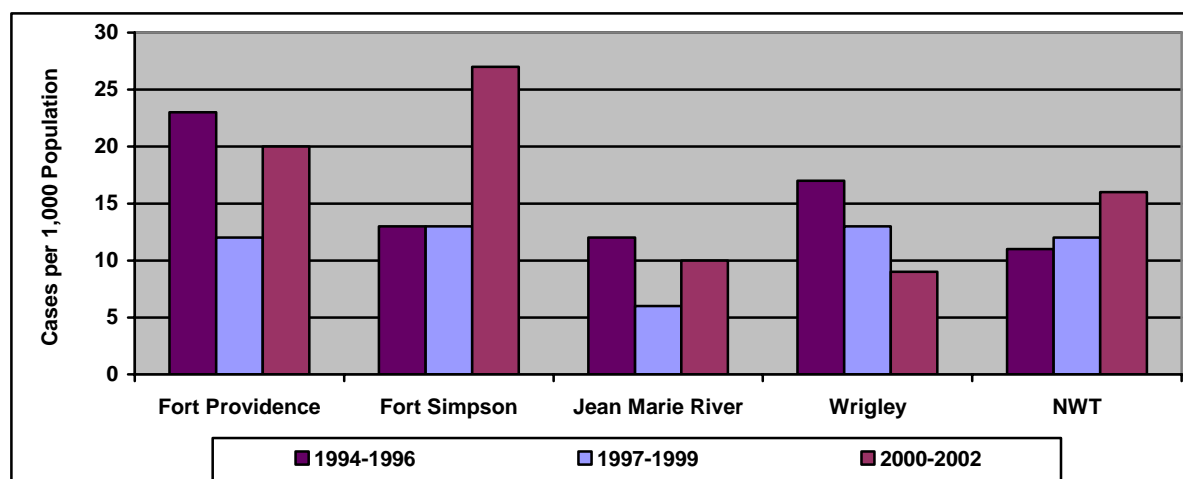
Figure 2-31: Hospitalization Rate for Alcohol Related Illnesses



Source: GNWT HSS, 2003 in MGP EIS Note: Data not reported for Whatí and Behchokò

The EIS for the Mackenzie Gas Project also reported the rate of sexually transmitted infections (STIs) in four of the regional communities, using unpublished data from GNWT Health and Social Services. Figure 2-32 shows the number of cases of STIs per 1,000 population for the period from 1994-1996 to 2000-2002. It shows that there are no consistent patterns of STI rates among the four regional communities. The most recent information shows that rates of STIs in Jean Marie River and Wrigley were less than the NWT average, while the rates in Fort Providence and Fort Simpson have been increasing and are well above the territorial average.

Figure 2-32: Rate of Sexually Transmitted Infections

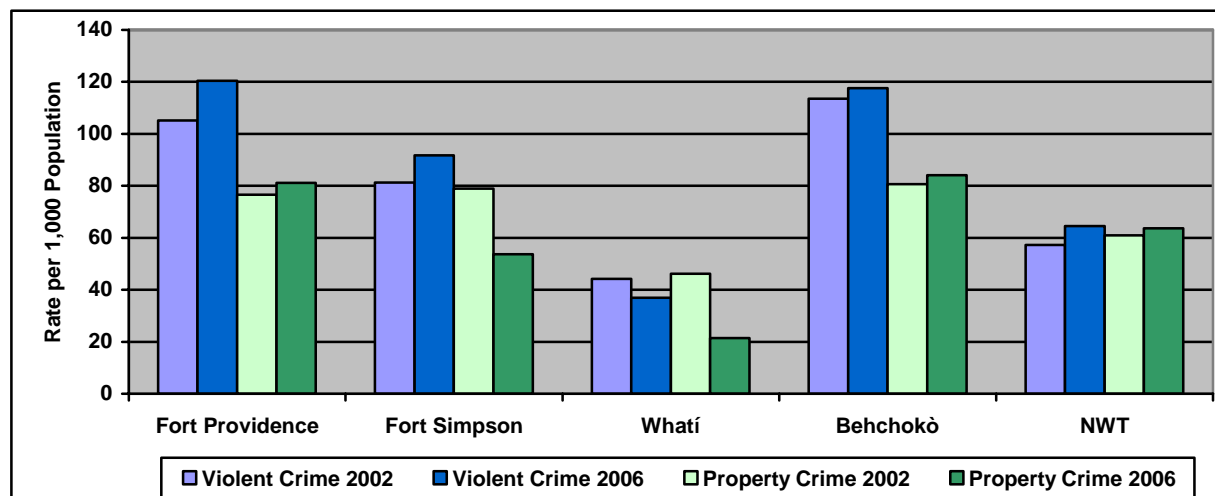


Source: GNWT HSS, 2003 in MGP EIS Note: Data not reported for Whatí and Behchokò.

2.5.4 Crime

Crime rates are another indicator of community well being. Figure 2-33 summarizes rates of violent and property crime rates per 1000 population for four of the six study area communities. It shows that, in general, crime rates for the regional communities are above the NWT average. Exceptions are Whatí, where crime rates for both years were less than the territorial average, and Fort Simpson, where the rate of property crime in 2006 was below the territorial average. Figure 2-33 shows that the rates of violent crime have risen in all communities except Whatí, but the NWT rate also increased between 2002 and 2006. While property crime rates have risen slightly in the NWT over the same period, Fort Simpson and Whatí reported a reduction in the rates of property crimes.

Figure 2-33: Violent and Property Crime Rates, 2002 and 2006



Source: GNWT Bureau of Statistics, 2007a.

2.5.5 First Nations Community Well Being

Indian and Northern Affairs Canada use a “Community Well Being index” (CWB) as an indicator of community wellbeing for First Nations. It combines income, education, labour force activity and housing conditions into a single score for each community. Scores fall in a range from 0 to 100 with 100 being the highest score of well being. The CWB is calculated using community data from the 2001 Census and is not reported for communities with less than 65 residents or those with data quality issues. Table 2-6 shows that Fort Simpson with a CWB score of 84 is the highest of the study area communities and Wrigley is the lowest with a score of 66. The CWB for all communities except Fort Simpson were slightly less than the NWT average.

Table 2-6: Community Well Being Index for First Nations in the Region

	Community Well-Being Index
Deh Gah Gotie Dene Council (Fort Providence)	69
Liidlii Kue First Nation (Fort Simpson)	84
Jean Marie River First Nation	NA
Pehdzeh Ki First Nation (Wrigley)	66
What Ti First Nation	68
Dog Rib Rae (Behchokò)	65
NWT Average First Nations	71

Source: INAC, 2004

2.6 Regional Infrastructure and Services

2.6.1 Municipal Services

Table 2-7 shows the level of municipal services for the study area communities. All communities have a basic level of fire protection, as well as waste water and solid waste disposal services.

Table 2-7: Municipal Services in Regional Communities

	Fire Hall	Sanitation	Waste Disposal	Road System
Fort Providence	1	Trucked	Solid/Sewage	Gravel
Fort Simpson	1	Trucked/Piped	Solid/Sewage	Gravel
Jean Marie River	1	Trucked	Sewage	Gravel
Wrigley	1	Trucked	Solid/Sewage	Gravel
Whatí	1	Trucked	Solid/Sewage	Gravel
Behchokò	1	Trucked	Solid/Sewage	Gravel

Source: GNWT Bureau of Statistics, 2007b.

A broader range of municipal recreation services are provided in the larger communities of Fort Providence, Fort Simpson and Behchokò. Smaller communities have gymnasiums (Table 2-8). The curling rinks and arenas use natural ice surfaces.

Table 2-8: Community Recreation Facilities

	Community Hall	Arena	Curling Rink	Gymnasium	Swimming Pool
Fort Providence	1	1	1	1	1
Fort Simpson	1	1	1	3	1
Jean Marie River	0	0	0	1	0
Wrigley	0	0	0	1	0
Whatí	0	1	0	1	0
Behchokò	1	1	1	3	2

Source: GNWT Bureau of Statistics, 2007b.

2.6.2 Transportation

Table 2-9 shows that all communities are accessible by road in all seasons by either a primary highway or all weather access road with the exception of Whatí which is only accessible by road in winter. All communities have regional airports.

Table 2-9: Transportation Systems in Study Area

	Primary Highway	All Weather Access Road	Winter Access Road	Marine Re-supply facility	Airport	Air Terminal Building
Fort Providence	No	Yes	No	No	Yes	No
Fort Simpson	Yes	No	No	Yes	Yes	Yes
Jean Marie River	No	Yes	No	Yes	Yes	No
Wrigley	Yes	No	No	Yes	Yes	Yes
Whatí	No	No	Yes	No	Yes	Yes
Behchokò	No	Yes	No	No	Yes	Yes

Source: GNWT Bureau of Statistics, 2007b.

There are two major roadway development projects that will influence the socio-economic environment in the Deh Cho region. In August 2007 a decision was made to construct the Deh Cho bridge project. The bridge will replace the current ferry access to the community of Fort Providence and provide more certainty in transportation access and reduce the cost of transporting goods and services to Yellowknife and Behchokò. It is scheduled to be completed in 2010 (GNWT Department of Transportation News release, Aug 30, 2007).

The second is a proposal to extend the Mackenzie Valley Highway to the Arctic coast. The proposal cites many benefits of the extension including facilitating resource development, ensuring Canada's sovereignty in the north, improving northern security and emergency response, supporting economic and social development of Northern residents, and improving capacity to adapt to climate change by reducing reliance on ice bridges and winter roads (GNWT, 2005).

2.6.3 Education and Health Care Services

Table 2-10 summarizes the education institutions available in each of the study area communities. Jean Marie River, the community with no direct local access to high school (grade 12) and post secondary institutions also showed the second highest percentage of high school attainment (45%) after Fort Simpson (63% high school attainment) as reported in Section 2.3. Fort Simpson has the greatest level of education services with high school, community learning centre and career centre in the community.

Table 2-10: Education Institutions in Study Area Communities

	Maximum Grade	Community Learning Centre	Aurora Campus	Aurora Research Centre	Career Centre
Fort Providence	12	Yes	No	No	No
Fort Simpson	12	Yes	No	No	Yes
Jean Marie River	10	No	No	No	No
Wrigley	10	No	No	No	No
Whatí	12	Yes	No	No	No
Behchokò	12	Yes	No	No	No

Source: GNWT Bureau of Statistics, 2007b

Table 2-11 shows that all study area communities have access to basic health care services through health centres or health stations. None of the communities has a women's shelter or a hospital.

Table 2-11: Health Care Facilities in Study Area Communities

	Hospital	Health Centres	Health Station	Women's Shelter
Fort Providence	No	Yes (3 nurses)	No	No
Fort Simpson	No	Yes (6 nurses)	No	No
Jean Marie River	No	No	Yes	No
Wrigley	No	Yes	No	No
Whatí	No	Yes (2 nurses)	No	No
Behchokò	No	yes (7 nurses)	No	No

Source: GNWT Bureau of Statistics, 2007b

2.6.4 Policing and Judicial Services

None of the study area communities has a correctional facility or a young offender facility. All but Jean Marie River and Wrigley have a Royal Canadian Mounted Police office within the community (Table 2-12).

Table 2-12: Policing and Judicial Services in Study Area Communities

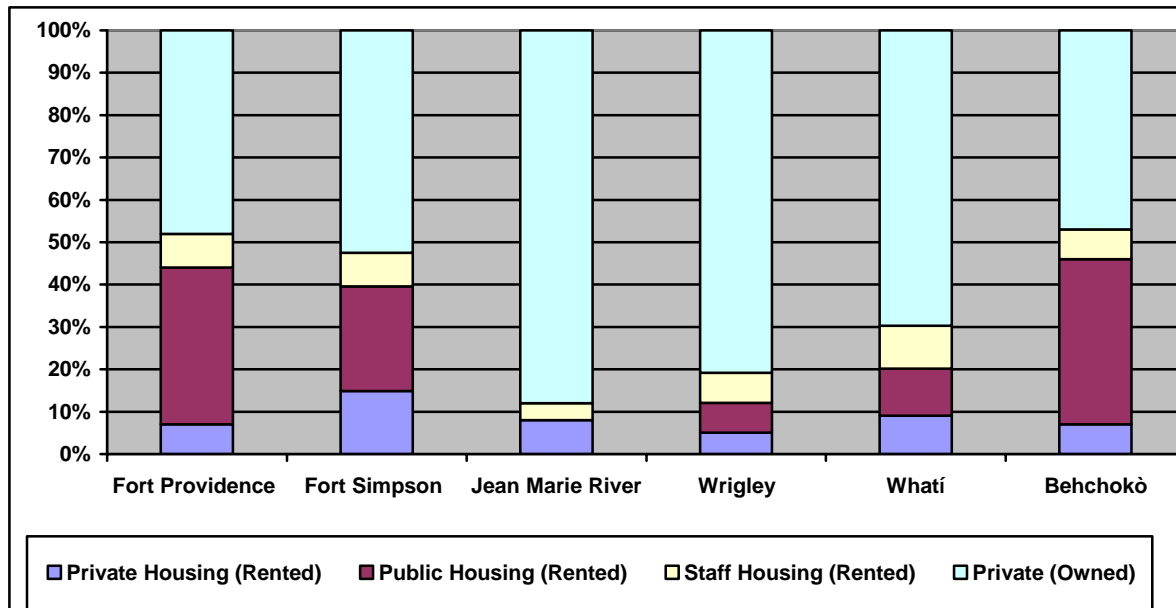
	Number of Police Officers	Correctional Facility	Young Offenders Facility
Fort Providence	3	No	No
Fort Simpson	6	No	No
Jean Marie River	0	No	No
Wrigley	0	No	No
Whatí	2	No	No
Behchokò	2	No	No

Source: GNWT Bureau of Statistics, 2007b

2.6.5 Housing and Accommodation

Figure 2-34 shows that most of the housing in study area communities are privately owned. The larger communities have a greater number of rental properties than the other communities. Jean Marie River is the only study area community with no public rental housing available.

Figure 2-34: Housing in Study Area Communities



Source: GNWT Bureau of Statistics, 2007b

2.6.6 Utilities

Tables 2-13 and 2-14 summarize the communications and electrical services for each of the study area communities. Television service within most communities is provided by cable and is important for community messaging boards.

Table 2-13: Communication Services in Study Area Communities

	Postal Service	Connectivity Speed	Satellite or Land line	Television	Telephone Features available
Fort Providence	Full	T1	Landline	Satellite	Full
Fort Simpson	Full	T1	Landline	Satellite	Full
Jean Marie River	Non-accounting	512K	Landline	Satellite	Full
Wrigley	Non-accounting	T1	Landline	Satellite	Some
Whatí	Non-accounting	256K	Satellite	Satellite	Some
Behchokò	Full	T1	Landline	Satellite	Most

Source: GNWT Bureau of Statistics, 2007b

Table 2-14: Electrical Services in Study Area Communities

	Type of Supply	Supplier
Fort Providence	Hydro	Northlands Utilities
Fort Simpson	Diesel	NTPC
Jean Marie River	Diesel	NTPC
Wrigley	Diesel	NTPC
Whatí	Diesel	NTPC
Behchokò	Hydro/Diesel back-up	NTPC

Source: GNWT Bureau of Statistics, 2007b

2.7 Regional Traditional Land and Resource Use

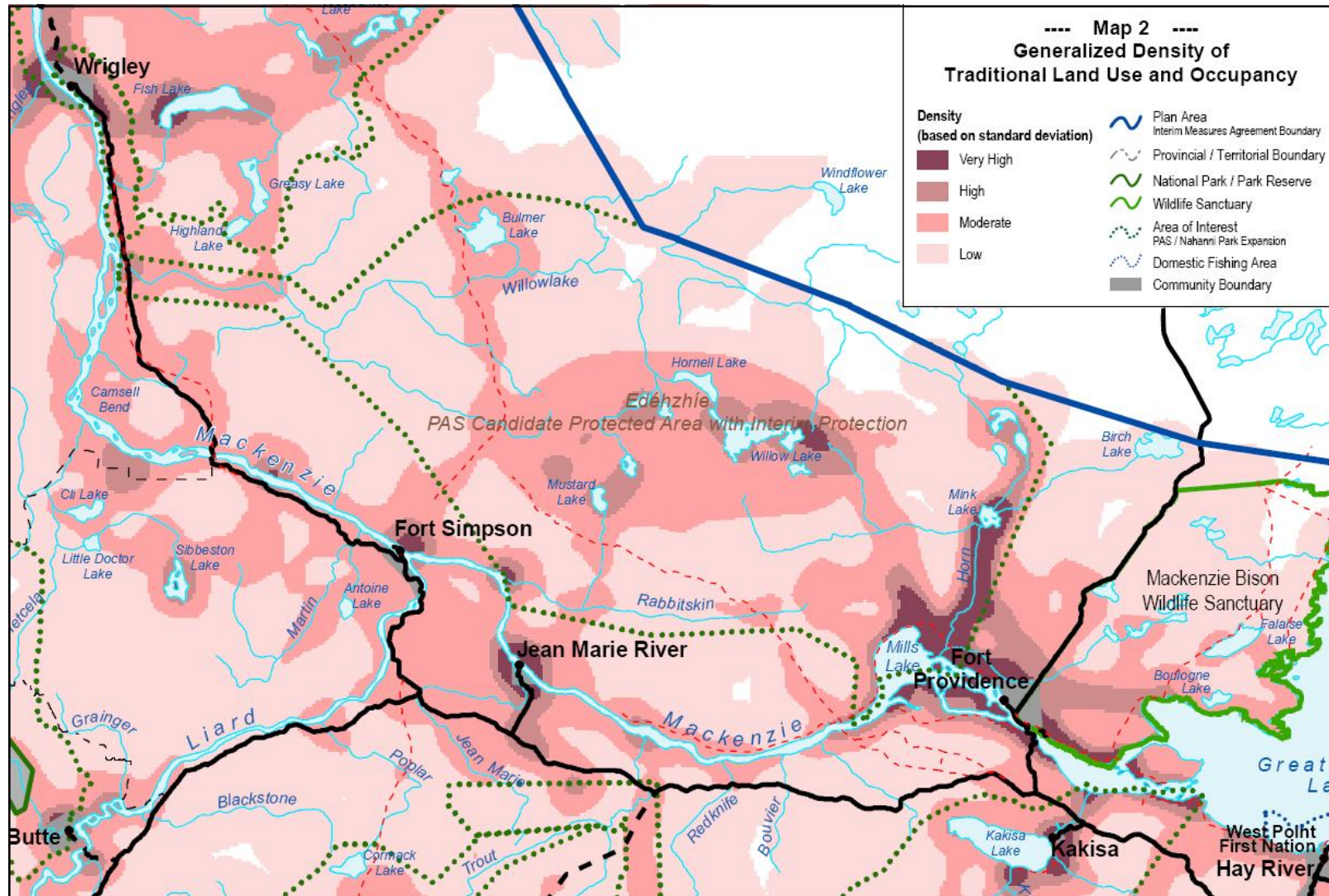
The Edézhíe area is considered by the local residents an important historical area upon which many generations of Aboriginal populations in the region practiced their culture, hunted, trapped and fished and lived their lives for part of the year. While traditional land use of Edézhíe has declined in recent years, it is still considered important – not only historically, but also for the future. Edézhíe is considered important for the future as a place where there will always be abundant wildlife and fish and clean, reliable water resources that may be called upon when and if needed. These features are a key part of the rationale for proposing that much of the Edézhíe area be designated as a National Wildlife Area.

Finding a balance between environmental protection and resource development is one of the objectives of the Deh Cho Land Use Plan (DCLUP). Some of the work undertaken in support of the DCLUP provides an overview of traditional use in the Deh Cho region and identifies areas that are of particular importance for traditional land use and occupancy. The Edézhíe Oral History Project Report also provides specific site names and describes traditional use sites in Edézhíe. Both reports were used to identify areas of high traditional use values.

Figure 2-35, which is taken from the DCLUP, shows the generalized density of traditional land use and occupancy in Edézhíe and surrounding areas. The map shows that most of the Edézhíe Candidate Protected Area had moderate density of use. However, the areas around Willow Lake, Bulmer Lake and other lakes had high density of traditional use with the east end of Willow Lake and the Mills Lake to Mink Lake corridor showing a very high density of use.

This density of use is corroborated by the Edézhíe Oral History Project Report (2005) which includes a map of cultural sites in the Candidate Protected Area. The concentration of use is around Willow and Bulmer lakes and the trails generally following the stream drainages into the Horn Plateau from the surrounding communities. The report documents sites for cabins, burial, campsites, ceremonies, teepees, old settlements and trading posts, as well as fishing camps, fish traps, traplines, meat caches and nesting sites.

Figure 2-35: Generalized Density of Traditional Land Use and Occupancy



Source: Deh Cho Land Use Plan (DRAFT), 2006

The following excerpt from the Edézhíe Oral History Project Report (2005) summarizes how the abundance of wildlife in the area attracted Aboriginal people to use the area and subsequently became culturally and historically valuable:

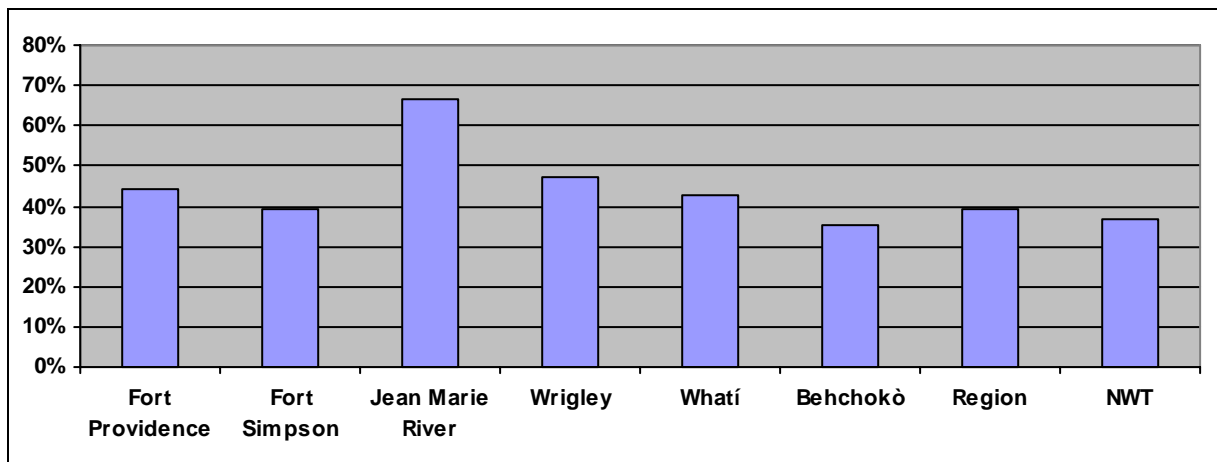
“It appears that the main reason people traveled into that area so extensively was the abundance of fish, game, and fur bearing animals, with fish being of primary interest. Given the abundance of wildlife, a number of traditional trails were established into the area from the surrounding ‘communities’ . . . Active, ongoing land use results in an intimate and spiritual connection to the area, manifested through birth and burial sites, unusual animal sightings, ik’oo (spiritual power), personal experiences, and cultural stories, many of which are shared by all communities.” (Crosscurrent Associates Ltd., 2005).

The following sections of the report describe participation in traditional activities by regional residents. A more detailed description of these activities and the economic values associated with them are provided in Section 3.1.

2.7.1 Hunting and Fishing

According to GNWT Bureau of Statistics (2007a) about 39% of the regional adult population (aged 15+) participated in hunting and fishing. This percentage relates to the number of people who participated in hunting and/or fishing. As shown in Figure 2-36 this is slightly higher than the territorial average of 37%. The highest rate of participation in hunting and fishing was reported by residents of Jean Marie River (67%), and more than 40% of adults in Wrigley, Fort Providence and Whatí also indicated that they hunted and/or fished. The lowest incidence of hunting and fishing was reported in Behchokò (35%).

Figure 2-36: Percentage of the Population (Aged 15+) Who Hunted and Fished, 2003



Source: GNWT Bureau of Statistics, 2007a

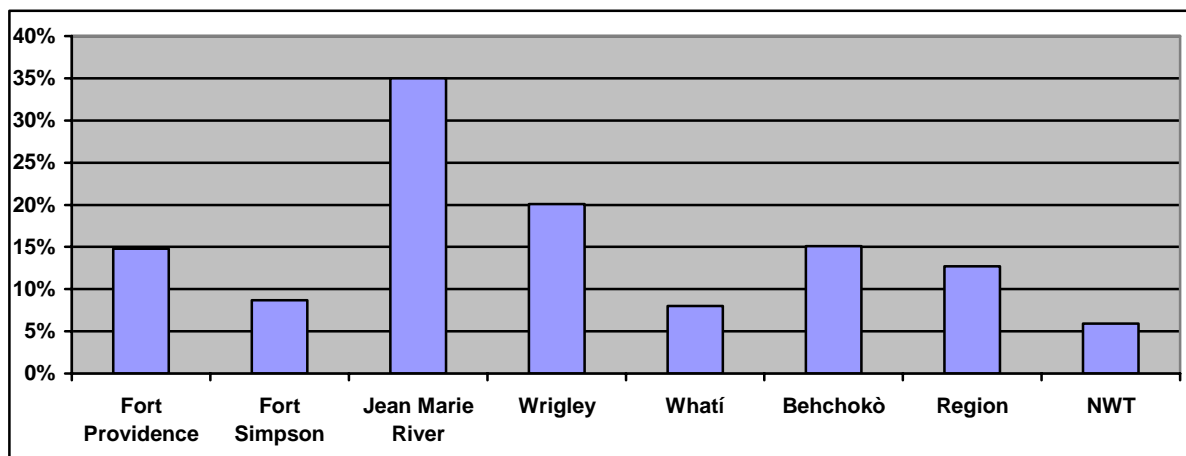
Lakes in Edézhíe were extensively used for fishing. Fish traps were established in the narrows between Willow and Point Lakes, along the north shore of Point Lake and at another small lake west of Willow Lake. Fish camps were identified on the Willow Lake River, Point Lake, Willow

Lake and Bulmer Lake. Moose, woodland and barren ground caribou and migratory birds were also harvested traditionally in Edézhíe. Moose were found along streams, while caribou were found on the plateau (Crosscurrent Associates Ltd., 2005).

2.7.2 Trapping

About 13% of the adult population in the region participated in trapping in 2003. This percentage ranged from a high of 35% of the population in Jean Marie River to 8% in Whatí and 9% in Fort Simpson. As shown in Figure 2-37, the proportion of adults who trapped was more than double the average for the NWT. Within the region the lowest participation in trapping was reported in Whatí and Fort Simpson.

Figure 2-37: Percentage of the Population (Aged 15+) Who Trapped, 2003



Source: GNWT Bureau of Statistics, 2007a

Additional information on trapping was reported by IMG-Golder (2006). According to that report there were 166 active trappers in the six communities, and they represent 5% of the adult population (aged 15+). These numbers are less than the 13% of the population that reported having trapped in 2003.

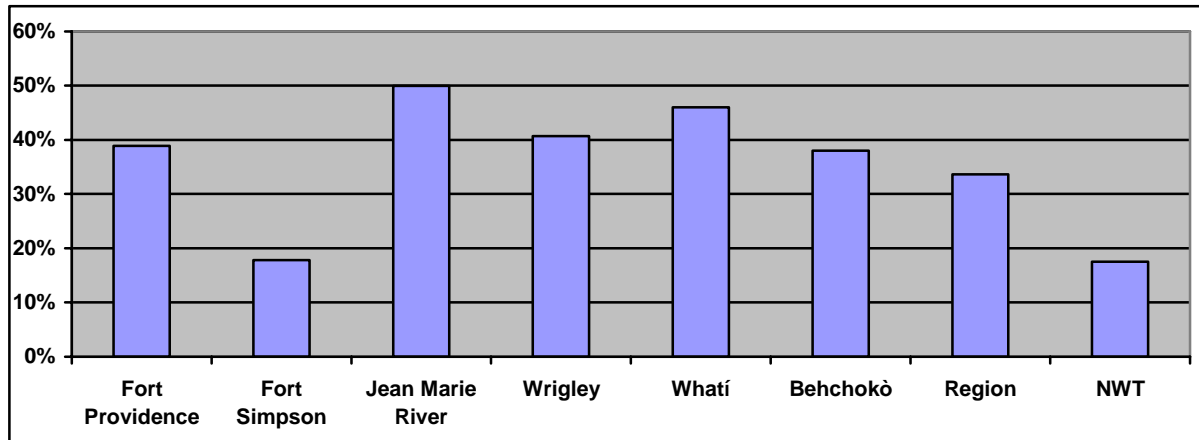
According to the Oral History Project Report Map, the traplines in Edézhíe were identified as being south of Willow Lake. However, trapping likely occurred throughout the area and along creeks for beaver. The report states that trappers focus on beaver, marten and lynx (Crosscurrent Associates Ltd., 2005).

2.7.3 Consumption of Country Food

About 34% of regional residents relied on country food for 75% or more of their meat or fish consumption. This is double the territorial average (17%). Among the communities, residents of Fort Simpson were the least reliant on country food (18%). The highest reliance on country food was reported in Jean Marie River and Whatí where 50% and 46% of adults reported that country food accounted for at least 75% of their meat or fish consumption (Figure 2-38). It is

noteworthy that the communities that were most reliant on country foods also reported the lowest personal and household incomes.

Figure 2-38: Percentage of the Population (Aged 15+) Who Consume Country Food, 2003



Source: GNWT Bureau of Statistics, 2007a

3.0 RESOURCE USE VALUES IN THE EDÉZHZHÍE CANDIDATE PROTECTED AREA

One of the objectives of the baseline assessment is to determine the total economic value of the Edézhzhíe Candidate Protected Area. The initial terms of reference described the total economic value of the area as being the sum of its use values but this was later amended to include various non-use values.

Use values are generated through direct harvesting or utilization of the landscape or resources on the landscape. These include activities like subsistence activities (harvesting country food and fuel), recreation and tourism, and various commercial activities, such as trapping, production and sales of arts and crafts, commercial logging, and mineral resources development.

In terms of non-use values, Edézhzhíe has been and continues to be an essential part of the history and culture of regional residents, and there are values associated with maintaining the area for the benefit of future generations.

Within the field of environmental economics there is growing recognition that ecosystems and landscapes directly and indirectly provide a range of goods and services beyond direct human use, some of which can be quantified in economic terms. These values are considered to be part of what is termed “natural capital” which, in addition to produced capital and human capital¹, contributes to the overall well-being of the human population. Maintaining all capital stock, including natural capital, is seen as a key requirement for sustainability.

Each of these three categories of values is described in this section of the report.

3.1 Use Values

Three categories of use values are examined in this analysis. The most obvious source of use values for the regional population is for subsistence purposes. As noted in Section 2.7, 34% of the regional population depends on country food sources and the region also provides fuel for heating and cooking. The second category of use value is the benefits that local residents derive from using the land for recreational purposes. The third category of uses relates to activities that can or could generate economic activity. This includes timber harvesting, oil and gas development, mineral development and tourism.

¹ *Produced capital* consists of buildings, machines, and technical equipment used in production plus inventories of raw materials, half-finished goods, and finished goods. *Human capital* consists of knowledge, skills, and experience of people that make them economically productive. Investing in education, health care, and job training can increase human capital.

3.1.1 Subsistence

3.1.1.1 Country Food

An estimate of the value of the Edézhzié Candidate Protected Area as a food source for regional residents was developed by IMG-Golder Corporation (2006). The study estimated the numbers of animals killed and fish caught by subsistence (Aboriginal) and recreational (non-Aboriginal) hunters and fishermen and the amount of edible meat that would be produced annually. The value of the harvest was then estimated using a meat replacement value that represents the cost of having to purchase an equivalent amount of meat from stores in the region. The prices used in that analysis reflect the higher cost of food in regional communities.

The IMG-Golder report was able to estimate annual harvests for some of the regional communities for both the subsistence and recreational hunts, for some game species. A summary of the resulting information is provided in Table 3-1, which shows the reported harvest by regional residents was at least 99,624 kilograms.

Table 3-1: Estimated Annual Edible Weight (kilograms) of Wildlife Harvested by Regional Residents

	Communities	Caribou	Moose	Small Game	Total
Subsistence Harvest	Wrigley, Fort Simpson & Jean Marie River	5,890	58,080	N/A	63,970
	Fort Providence	14,694	13,452	6,521	33,557
Resident Hunt	Wrigley, Whatí, Behchokò, Fort Simpson & Fort Providence	1,426	545	1,267	2,097
TOTAL		22,010	72,077	7,788	99,624

Source: IMG-Golder, 2006

This estimate of 99,624 kilograms was stated to be very conservative because the subsistence harvest has only been reported for four communities and was not reported prior to 2003, and the small mammal harvest is rarely reported. In addition, the estimates do not include harvests of wood bison which, based on full use of 23 tags issued to subsistence hunters, would have resulted in another 7,579 kilograms of meat.

The total value of the wildlife harvest was then estimated to be \$2.1 million, based on a replacement value of \$20 per kilogram of edible meat. As the harvest information for the communities of Whatí and Behchokò was incomplete, IMG-Golder concluded that the total value of wild meat harvested for subsistence purposes totaled \$2.1 million for the four other communities, or the equivalent of \$886 per person in these communities. IMG-Golder estimated the total value of edible meat obtained from the recreational hunt to be \$41,500 for all six communities or about \$9 per person. According to IMG-Golder, between 24 and 32% of the regional subsistence harvest and 10 to 20% of the recreational harvest occurs inside Edézhzié.

This suggests an annual value for wildlife harvests from Edézhíe of between \$472,000 and \$675,000 per year.

IMG-Golder also reported the value of fish harvests for residents of Fort Providence for the Mackenzie and Horn rivers. Harvest information suggested that residents of Fort Providence harvested an average of about 3,110 kilograms of fish per year and this was valued at \$42,000, based on a meat replacement value of \$13.50 per kilogram, or \$50 per person. Of this, between 24 and 27% of this harvest is believed to come from inside Edézhíe, suggesting annual values of between \$10,000 and \$11,000 per year. IMG-Golder note that, although the region has the potential to support additional fish harvests, the mercury concentrations in lake trout and northern pike exceeded the recommended limits and this could restrict future potential fish harvests.

The IMG-Golder study also noted that the Edézhíe area is an important source of berries and various plants with medicinal and spiritual value to residents of the six communities. Cizek Environmental (2001) reports that there are ratroot and sweetgrass gathering areas in Edézhíe on a small lake just west of Mustard Lake, on a creek just west of narrows in the north-west corner of Willow Lake and on a small lake on the southern edge of the plateau. The report states that there were no medicinal gathering sites in the Mills Lake area or along the Horn River. There is no information on the extent of traditional use of plants or of the economic values associated with the use of plants.

In combination, the information provided by IMG-Golder suggests that, at a minimum, the Edézhíe area generates annual benefits of between \$482,000 and \$686,000 per year, primarily for subsistence hunting of wildlife. However, for the reasons listed above, this range is believed to represent a conservative estimate of these values.

Another approach to measuring the potential value of country food produced by Edézhíe is to determine the extent to which households in the region have to supplement their food budgets with country food in order to enjoy the same level of nutrition as people living in Yellowknife. Information shows that, in 2005, Yellowknife households spent \$11,800 on food and health care (Northwest Territories Bureau of Statistics 2005) and had average family incomes of about \$117,000. Thus, purchased food accounted for 10% of their annual incomes and only 5.1% of people relied on country foods for 75% or more of their food supplies. Given that the average households in the NWT spent an average of \$11,600 on these items, this meant that households outside Yellowknife spent an average of about \$11,000 per year on food and health care, but received substantially less food because of the much higher cost of food in communities outside Yellowknife (see Figure 2-22).

Households in the region reported average household incomes of only \$65,040 in 2005. Annual expenditures of \$11,000 on food therefore accounted for 17% of their annual incomes and would purchase 39% less food than in Yellowknife because of higher costs. For regional households to enjoy the same standard of nutrition as households in Yellowknife, they would have had to supplement purchased food with country food worth an equivalent of \$3500 per household per year. For the 1,005 households in the region, the value of country foods,

including wildlife, fish and plants, would have totaled \$3.5 million. How much of this food come from the Edézhíe area is not known. However, information from the IMG-Golder report suggests that the Edézhíe area could have accounted for 25 to 30% of food for people in the communities of Fort Providence, Fort Simpson, Wrigley and Jean Marie River, and for between 10 and 15% of the country foods used by households in Whatí and Behchokò. On this basis, the annual value of country foods produced in Edézhíe would be in the order of \$632,000 to \$806,000. These numbers are about 25% higher than the estimates provided by IMG-Golder.

3.1.1.2 Fuel

According to NWT Bureau of Statistics (2004), 86 households in the six communities use wood as their main heat and fuel source while another 416 households rely on wood combined with some other heat source, such as heating oil or propane. Using this information and assuming that 10.5 cords of wood are used each year by households that are entirely reliant on wood and 5.5 cords are used by households that are partially reliant on wood, a total of about 3,200 cords of fuel wood are consumed each year. In 2004, regional residents are believed to have purchased 285 cords from commercial operators and harvested the balance (2,915 cords) themselves. It is believed that 5 to 12% of fuel wood harvested by regional residents comes from the Edézhíe area and all commercial harvesting occurs outside Edézhíe.

The value of wood used for fuel in the six communities can be determined in terms of the cost of purchasing an equivalent amount of fuel oil. IGM-Golder determined the value of fuel wood used by regional households was about \$1.4 million per year in 2006; this estimate compared the energy equivalents of fuel oil and wood and estimated the value of fuel wood based on \$1 per litre of fuel oil. While this estimate was reasonably accurate for 2006 (the cost of heating oil in Yellowknife was listed as \$0.85 per litre in 2006 (Statistics Canada, 2007)), fuel costs have increased by 28% in the last year (CBC News, 2008). Thus, the value of fuel wood harvested within Edézhíe is now estimated to be in the range of \$91,000 to \$219,000 per year.

3.1.1.3 Summary

Based on available information it appears that the Edézhíe Candidate Protected Area currently generates some where between \$723,000 and \$1,025,000 per year in terms of country food and fuel. The midpoint for this range is \$875,000.

3.1.2 Recreation

As shown in Figure 2-17, about 40% of the regional population hunted or fished. While some of these activities were undoubtedly part of harvesting native food, participants in these activities enjoy benefits over and above the value of the food they harvested. A nation-wide study conducted in 1996 by Environment Canada (1999) showed that Canadians benefit from nature in a variety of ways other than hunting and fishing. The study determined that 85% of Canadians aged 15 and older participated in some form of nature-related activities, including participating in an outdoor activity in a natural area (44%), residential wildlife-related activities (38%), wildlife viewing (19%), fishing (18%) and hunting (5%).² While the survey provided

² Percentages for individual activities do not add to 85% because some people participated in more than one activity.

results for individual provinces and the Yukon, residents of the NWT were not surveyed because of extremely high cost.

Nonetheless, it is possible to use the survey information to develop crude estimates of recreational use and values for the six communities in the vicinity of the Edézhíe Candidate Protected Area. One estimate was derived by using the Canadian average, while a second estimate was calculated using survey information for residents of the Yukon. The study showed that, when compared to the Canadian average (see Table 3-2), a slightly higher percentage of Yukon residents were involved in nature-related activities and they were more active (more days per year). Yukon residents also spent more money to participate in these activities. Based on their socio-economic characteristics, it is expected that residents of the NWT would have recreational patterns that more closely resemble Yukon residents than a national average.

Table 3-2: Participation in Nature-Related Activities by Residents of Canada and the Yukon, 1996

	Canada		Yukon	
	Participation Rate	Days per Person	Participation Rate	Days per Person
Participating in an outdoor activity in a natural area	43.7%	16.1	45.3%	23.5
Residential wildlife-related activities	38.3%	140.1	41.3%	155.5
Wildlife viewing	18.6%	17.6	27.9%	25.4
Fishing	17.7%	17.2	32.2%	19.7
Hunting	5.1%	16.9	11.0%	19.8

Source: Environment Canada, 1999

Based on NWT census information, there were 3,475 residents of the six communities were 15 years of age or older in 2006. Given the participation rates and per capita activity in Table 2-5 and adjusting for multiple activities, it is estimated that regional residents enjoy between 0.22 and 0.28 million days of nature-based recreation per year at all locations. Information from the survey also suggests that if residents of the study region had expenditures patterns similar to those of the average Canadian (\$549 per year), total spending on nature-related activities would total about \$1.6 million per year. Residents of the Yukon spend substantially more (\$1052 per year, with much higher spending on equipment and transportation), suggesting total expenditures by regional residents of about \$2.2 million.

These estimates of recreational activity and value relate to all nature-related activities at all locations used by regional residents and some adjustments are required to determine the potential recreational value associated with the Edézhíe Candidate Protected Area. First, the value of recreational and subsistence hunting has already been estimated in terms of food production, so the estimates need to be scaled down to exclude hunting. Second, it was estimated that the 10 to 20% of the recreational wildlife harvest and 20 to 30% of the recreational fish harvest by regional residents occurs within Edézhíe Candidate Protected Area. Third, as there are no communities in Edézhíe, none of the residential wildlife-related activities would occur in the area. When these adjustments are made, it is estimated that about 5 to 10% of regional recreational activity occurs in the Edézhíe Candidate Protected Area.

This translates into between 10,900 and 27,500 days of nature-related recreation in the Area. Spending on nature-related recreation would then be in the range of \$78,000 to \$258,000 per year. This spending would provide some employment and income for some residents of the region and the NWT, but these effects would be relatively small given that most of the recreational items purchased would have been made elsewhere and imported into the region.

While spending on nature-related activities is one measure of the economic value of the activities, recreationists usually enjoy benefits that are over and above the costs that they pay to participate in these activities. As there are no market-based daily charges to participate in these activities, there is generally little information available that describes the extent of these extra-market user benefits. In an attempt to measure these values, Environment Canada (2000) asked recreationists about the extent to which they would be willing to pay extra costs before they decide not to participate in that activity any longer. Analysis of the survey results suggest that, nation-wide, recreationists (excluding hunters) would be willing to increase their costs by a maximum of 22% before they would cease participating in the types of activities enjoyed by regional residents. This increment amounts to about \$144 per year over their existing expenditures. Yukon residents already pay much more per day to participate in nature-based recreation than does the average Canadian and, as a result, are less willing to pay additional changes for recreation. Yukoners reported that they would pay increased costs of about 11% or \$141 before ceasing to participate.

Assuming that residents of the region have a similar perception of the value of their experience, over and above what they actually pay, these extra-market user benefits amount to about \$236,000 per year and the total value of recreation for regional residents would increase to \$2.4 million per year. Recreational activities in the Edézhíe Candidate Protected Area are expected to generate extra-market recreational benefits ranging between \$17,000 and \$28,000 per year, so annual total recreational benefits would be in the range of \$94,000 to \$285,000.

3.1.3 Economic Activity

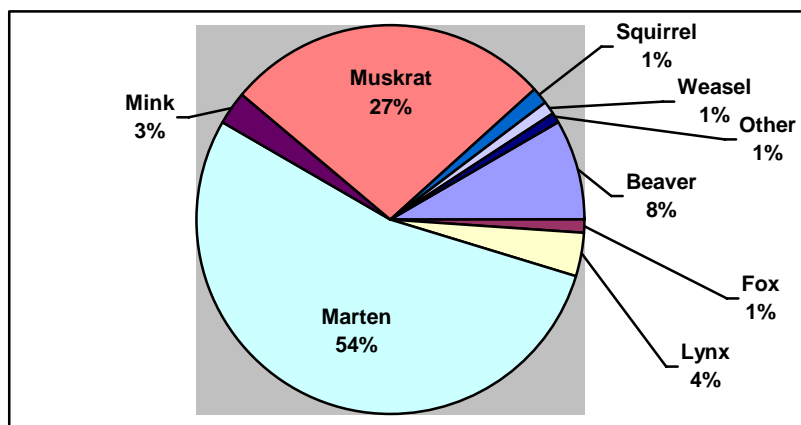
The Edézhíe area contains a variety of renewable and non-renewable resources that are either currently used as a sources of income for regional residents or offer the potential for generating employment and income. The key renewable resource activities in the region include trapping, arts and crafts, and commercial timber harvesting, all of which are described below. While there are known to be mineral and oil and gas deposits in the area, these deposits are not currently being developed.

3.1.3.1 *Trapping*

As reported in Section 2.5.2, about 13% of the adult population participated in trapping. IMG-Golder examined fur sales information for the six communities and determined that, on average, the annual harvest sold commercially consisted of 4,740 pelts with a value of about \$203,000. The composition of the harvest is shown in Figure 3-1. Marten pelts accounts for more than half of the pelts sold, while other important species include muskrat, beaver, mink and lynx. IMG-Golder noted that the number of pelts sold at auction understates actual harvests because local sales are not included and could represent a major portion of the harvest. IMG-Golder also

noted that harvests of major species fluctuate considerably from year-to-year, likely due to changing species population and fur prices.

Figure 3-1: Species Composition of Regional Fur Harvest: Pelts Sold to Fur Auctions



Source: IMG-Golder, 2006

Table 3-3 shows that average annual commercial fur harvest for each of the six communities. It shows that trappers in Behchokò accounted for nearly one-third of the total value of pelts sold.

Table 3-3: Average Fur Harvest by Community, 2000/01 to 2004/05

Community	Number of Pelts	Total Sale Price	Percent of Total
Fort Providence	863	\$43,721	21.5%
Fort Simpson	765	\$40,795	20.1%
Jean Marie River	94	\$5,640	2.8%
Wrigley	152	\$8,085	4.0%
Whatí	681	\$38,934	19.2%
Behchokò	2,185	\$65,804	32.4%
TOTAL	4,740	\$202,979	100.0%

Source: IMG-Golder, 2006

According to IMG-Golder, available information suggests that the Edézhíe area accounted for about 33% of the fur harvest by the six communities. On this basis, the average annual trapping income from Edézhíe is estimated to be about \$67,000 per year. IMG-Golder noted that this level of harvest is sustainable and could be expanded.

3.1.3.2 Tourism

Tourism activity in the region is difficult to determine with any accuracy because tourism statistics are reported for the five regions within the NWT and the six regional communities are situated in three of these regions. Fort Simpson, Jean Marie River and Wrigley are located in the Deh Cho Region; Fort Providence is in the South Slave Region; and Whatí and Behchokò are in the North Slave Region. To complicate matters further, Fort Providence and Behchokò are situated on the major highway that provides access to Yellowknife and it is impossible to

differentiate between the numbers of people who are visiting these communities as a destination or as a stopover en route to another destination. What is not accessible by road in the summer. Consequently, this assessment examines the role of the Edézhíe area primarily in the context of the Deh Cho Region.

According to the results of the 2006 Visitor Exit Survey, about 4,200 tourists visited the Deh Cho Region for leisure purposes (NWT Industry Tourism and Investment [ITI], 2007a). A summary of their origin, mode of travel and major visitation purposes is provided in Table 3-4. The table shows that 23% of visitors arrived by air and the balance traveled by road. About 78% of tourists to this region were Canadians, 7% were from the United States and the balance was from other countries. General touring was the reason why more than half of the tourists visited the area. Nearly 20% were involved in outdoor adventures, 12% were there for fishing, 8% to visit friends and relatives, and only 4% to hunt. It is estimated that tourists spent about 25,000 visitor–nights in the region.

Table 3-4: Visitors to the Deh Cho Region, 2006

Travel Mode	Origin	Fishing	General Touring	Hunting	Outdoor Adventure	Visiting Friends	Total
Air	Canada	188	193	14	313	54	762
	US			55	29		84
	Other			57	44		101
Road	Canada	305	1,561	20	386	247	2,519
	US		124	15	53	33	225
	Other		499	4			503
TOTAL	Total	493	2,377	165	825	334	4,194
	Percent of Total	11.8%	56.7%	3.9%	19.7%	8.0%	100.0%

Source: NWT ITI 2007a

Based on average daily expenditures for all visitors to the NWT and adjusting for some visitors having visited more than one region, it is estimated that visitors to the Deh Cho Region spent about \$2.2 million in 2006, or about \$88 per person per night. Total spending includes \$362,000 on accommodation, \$233,000 on restaurants and groceries, \$486,000 on airfare on trips in the NWT, and \$665,000 on various other items. It is estimated that tourism related spending created the equivalent of 30 person-years of direct and indirect employment in the region.³

Tourism is limited by available facilities in the region. Table 3-5 shows that only Fort Providence and Fort Simpson offer a full range of visitor services. Jean Marie River does not have a restaurant, and Behchokò does not have commercial accommodations. IMG–Golder describes current tourism as being practically non-existent in Wrigley because of its inaccessibility and very limited in Jean Marie River with incidental visits from travelers on the Mackenzie Highway and people traveling on the Mackenzie River.

³ Calculated use industry intensity ratios for the NWT for the retail, arts, and entertainment, and accommodation and foods services industries.

Table 3-5: Summary of Tourist Infrastructure in the Regional Communities

Infrastructure	Fort Providence	Fort Simpson	Jean Marie River	Wrigley	Whatí	Behchokò
Lodges/outfitters	2	0	0	0	1	2
Accommodations	2	6	1	1	1	0
Campgrounds	1	1	0	0	0	1
Parks	3	1	0	0	0	3
Restaurants	2	2	0	1	1	2
Visitor centre	0	2	1	0	0	0

Source: GNWT Bureau of Statistics 2007

Outdoor adventure tourism is very important to the region. As shown in Table 3-6, nearly 20% of the region's 4,200 tourists participated in outdoor adventures. This is much higher than anywhere else in the NWT.

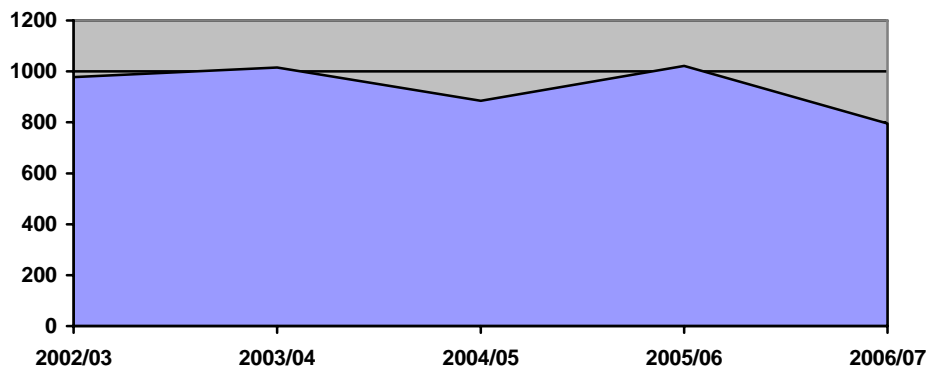
Table 3-6: Participation in Outdoor Adventure Tourism in the NWT

Tourism Region	Total Leisure	Outdoor Adventure Tourism	
	Visitors	Visitors	Percent of Total
Deh Cho	4,196	825	19.7%
Sahtu	2,883	363	12.6%
Inuvik	9,638	624	6.5%
South Slave	11,945	677	5.7%
North Slave	11,972	509	4.3%
NWT	28,157	2,079	7.4%

Source: NWT ITI 2007b

It is believed that Nahanni National Park Reserve draws most of these visitors. According to Parks Canada, between 800 and 1,000 people visit Nahanni National Park Reserve each year (Figure 3-2).

Figure 3-2: Reported Visitation to Nahanni National Park Reserve, 2002/03 to 2006/07



Source: Parks Canada 2007.

While data are not available on the exact nature of outdoor adventure tourism in the Deh Cho Region, territorial statistics indicate that about 60% of adventure tourists went on guided expeditions while the others traveled independently, although they may have rented equipment in the NWT (ITI, 2007b). Guided adventure tourists typically spent more in the NWT (\$1405) than did unguided tourists (\$862) or leisure travelers in general (\$821). According to IMG–Golder, five chartering and outfitting companies operate out of Fort Simpson and much of their activities focus on the Nahanni National Park Reserve.

Fort Providence is not known as a tourism destination area, but is a key stopover point for people traveling on the highway to Yellowknife. Fort Providence is also the terminus for the M. S. Norweta which offers passenger cruises between Yellowknife and Inuvik. The boat can accommodate about 20 passengers and makes three 7-day downstream tours and three 9-day upstream tours between the middle of June and the middle of August. The river cruise actually commences in Fort Providence and includes a stop in Fort Simpson (M.S. Norweta 2007).

The number of tourists visiting Behchokò or Whatí is not known. While people traveling the highway to Yellowknife may travel past Behchokò, the community has no commercial accommodation and Whatí is accessible by road only in the winter. According to IMG-Golder, it is unlikely that any tourists wishing to travel into the Edézhíe area would base their travels out of Behchokò or Whatí.

The Edézhíe area accounts for a very small portion of regional tourism. There are no actual tourism facilities in the area. According to IMG-Golder, one charter airline operating out of Fort Simpson takes up to 10 anglers per year to Willow Lake for day trips to fish for trout, northern pike and grayling. This probably accounts for about \$2,500 in visitor spending for an additional day/night in the region including air charters. With respect to hunting, no trophy hunting actually occurs in the Edézhíe area. In May 2004 the Deh Cho First Nation passed a resolution banning big-game outfitters from using the region because the outfitters have provided no benefits to First Nations. Other tourist activities including boating, fishing and eco-tourism on and around Mills lake, a widening of the Mackenzie River just downstream of Fort Providence. There is no information on actual use of the lake, but anecdotal information indicates that recently most of the visitors were from Alberta who had brought their own boats (IMG-Golder, 2006).

Overall, IMG-Golder estimated that 10 to 20% of total tourism dollars spent in the Deh Cho region were spent within the study area, but only 1% could be attributed to activities within Edézhíe. Based on 2002 visitor expenditure information, this amounted to about \$12,500. Using expenditure information from the 2006 Visitor Exit Survey (ITI, 2007a) suggests that spending associated with tourism activities in Edézhíe would be about \$22,000. However, based on the limited amounts of tourist activity that are known to occur in Edézhíe, this amount is considered to be generous.

The Edézhíe area is recognized to have some potential for tourism. A description of these key features and their potential for tourism, as provided by IMG-Golder (2006) are provided in Table 3-7.

Table 3-7: Potential Tourism Features in Edézhíe

Site	Attractions	Tourist Market	Tourism Potential
Mills Lake (Mackenzie River)	Migratory bird habitat terrestrial site Fishing and boating	Ecotourists making day visits, boaters	High
Horn River	Waterfowl habitat, cultural features, fishing	Ecotourists, day or overnight trips	Some
Mink Lake	Waterfowl habitat, cultural features	Too far for day trips; not far enough for overnight trips	Low
Rabbitskin Creek	22 small rapids, cultural features	Ecotourists for day or multi-day trips	Moderate
Bulmer Lake	Fishing	Fly-in fishing	Low
Willow Lake	Fishing, cultural features	Fly-in fishing	Low
Willowlake River	Boating, fishing, cultural sites	Multi-day boating and ecotourism trips	Moderate
Hornell Lake	Fishing	Fly-in fishing	Moderate
Horn plateau	Hiking, hunting	Hard ecotourism due to remoteness and muskeg	Low

Source: IMG-Golder, 2006

Additional information on the potential tourist potential in the Edézhíe area is provided in Table 3-8 and is based on a report by Deh Cho Environmental (no date) that categorized the tourism potential of sites in the Deh Cho Region based on a review of available literature review. The report notes that areas east of Wrigley and northeast of Fort Simpson generally had low potential for tourism because the areas are too far for tourists to travel or the product was not sufficiently appealing. The areas in the Deh Cho Region with the highest potential for tourism were established tourism corridors, including the Mackenzie and Liard Highways, and the Mackenzie, Liard, North Nahanni and South Nahanni rivers. Table 3-9 describes the suggested tourism market category for sites in the Edézhíe area. According to the assessment (Deh Cho Environmental, no date), eco-tourists and backcountry hard adventurers would suffer most of they were to come into contact with or be constrained by resource extraction industries while soft adventure tourists would be less affected by such development as long as viewscapes were not affected. The quality of highways and tourist infrastructure is of more concern for soft adventure tourism.

In general, the lakes and rivers in the Edézhíe region appear to offer the greatest potential for tourism, but the remoteness and lack of facilities are key factors that will limit their use for tourism. While there may be some future potential for outfitting in the region, especially for wood bison hunts, this will not be realized unless the ban on outfitting is withdrawn.

Table 3-8: Tourism Potential Rankings for Sites in the Edézhíe Candidate Protected Area

Name	Activity	Market-ability	Econ. Benefits	Sources	Access	Overall Ranking	Quick and Dirty Rationale
Willow Lake	Fishing backpacking hiking	Poor	Poor	2 to 3	Fair	Low	Proximity to Fort Simpson makes this an option for fly-in sport fishing. A great deal of local use with cultural significance. Not compatible with tourists or sportfishermen. Location would experience no hiking from tourists as the area cannot compete with the backcountry hiking northwest of Fort Simpson
Hornell and Willowlake Rivers/Lakes near the Horn Plateau	Fishing, lodge	Fair	Fair	1	Fair	Moderate	No commercially active use. Within reasonable flying distance from Fort Simpson. Other more marketable opportunities exist closer to Fort Simpson
Bulmer Lake northwest of the Horn Plateau	Fishing	Fair	Fair	4 to 5	Good	Moderate	Accessed from Wrigley. Wrigley's low level of visitation makes it prohibitive as a stand-alone product. No regular commercial product. Few independent travelers that take the route. Other more marketable fishing lakes are close to other Deh Cho communities
Willowlake River (Mackenzie River to will Lake or Hornell Lake)	Canoeing/ rafting/sea kayaking, boating, fishing	Fair	Poor	6 or more	Good	Moderate	Accessed from Wrigley. Wrigley's low level of visitation makes it prohibitive as a stand-alone product. No regular commercial product. Few independent travelers that take the route. Other more marketable rivers in the Deh Cho exist
Rabbitskin River	Backpacking/ hiking, interpretive attraction, fishing	Fair	Good	2 to 3	Good	Moderate	River can be offered as part of a guided day or multi-day boating tour from Jean Marie River. Can also be accessed from Fort Simpson. Would require strong interpretive component. Also requires some infrastructure or camping along the way
Mills Lake	Boating, wildlife viewing	Good	Good	2 to 3	Fair	High	Active and commercially sold. Would be a great day product match for the "rubber tire" market. The bird and bison sanctuary would also be very marketable. Requires strong interpretive component and local guide.
Mink Lake	Hunting, interpretive attraction, boating	Poor	Fair	1	Fair	Low	Too far a distance for the "rubber tire" traveler and not enough for the long-haul adventure or multi-day tourist. Local use is prevalent.

Source: Deh Cho Environmental (no date)

Table 3-9: Market Category for Sites in the Edézhíe Candidate Protected Area

Name	Product/Market Category	Day, Multi-Day Product	Additional Information
Willow Lake	Hard adventure, fishing	Multi-day product	Used by residents of Fort Simpson or Fort Providence for sport fishing of lake trout and grayling. Traditional use site and considered sacred by residents.
Hornell and Willowlake Rivers/Lakes near the Horn Plateau	Fishing, eco-tourism	Multi-day product	Dene camp opportunity where guests live in traditional tents and participate in traditional activities.
Bulmer Lake northwest of the Horn Plateau	Fishing	Day	Access available via river between Willowlake River. Fly-in from Wrigley (can be day product).
Willowlake River (Mackenzie River to will Lake or Hornell Lake	Hard tourism	Multi-day product	Heritage canoeing attraction. Established canoe route. With travelers either going to the base of Gun Rapids (3-4 day return trip with outboard motor) or longer to the Willowlake River to Hornell Lake and Willow Lake. 61 km from Wrigley.
Rabbitskin River	Soft adventure, fishing, eco-tourism	Day, multi-day product	50 km from Jean Marie River. River is fast moving with 22 small sets of rapids. Good for boat and motor. Mouth of the River site of the former Northwest Company Pose. Possibly the first post on the Mackenzie River
Mills Lake	Soft adventure, eco-tourism	Day	Mack Travel offers this boat tours from Fort Providence through Aurora Sport Fishing and Tours. Part of a waterfowl migration route and bison sanctuary
Mink Lake	Soft adventure, eco-tourism	Multi-day product	Accessed from Fort Providence. Locals use the lake.

Source: Deh Cho Environmental (no date)

3.1.3.3 *Arts and Crafts*

Another form of use value derived from the Edézhíe area relates to its importance as a source of raw materials for the regional arts and crafts industry. These raw materials includes things such as bones and antlers, feathers, fur, animal hair and hides, porcupine quills, sinew, birch bark and materials use to construct baskets, plants used for dyes, wood from trees, and stones. The importance of the arts and crafts industry in the region was described by IMG-Golder, which cited a study indicating that 621 adults (aged 15+) were involved in making arts and crafts in the Deh Cho Region in 2002. As two-thirds of the population of the Deh Cho Region lives in Fort Simpson, Fort Providence, Jean Marie River or Wrigley, this suggests that about 420 regional residents were involved in making arts and crafts and this represents about 12% of the adult population of these communities.

Arts and craft production is an important economic generator in the NWT. The total value of arts and crafts sold to tourists visiting the NWT the totaled \$1.9 million in 2006 (ITI, 2007a). Additional arts and crafts were also purchased by wholesalers and retailers who then sell these goods at locations outside the NWT. According to a recent survey of the North American visitor market (Zieba, 2005), actual and potential visitors to the NWT were most interested in spending money on handcrafted items such as pottery, baskets, and woven items and regional food specialties than on souvenirs, jewelry or local clothing. Based on its share of tourism in the NWT, it is estimated about \$87,000 was spent on arts and crafts by tourists visiting the Deh Cho Region. About two-thirds of this (\$60,000) could be attributed to tourism in Fort Providence, Fort Simpson, Jean Marie River and Wrigley.

IMG-Golder reports that although the Edézhíe area may be a source of raw materials for the regional arts and crafts industry, the extent to which artists in the community depend on raw materials from this area is not known and there appear to be many other locations where these materials are also available. However, it is likely that much of the material collected for arts and crafts purposes would be collected as part of subsistence activities. Thus, the Edézhíe area could then account for between 18 and 23% of these raw materials. As a consequence, between \$11,000 and \$14,000 worth of arts and crafts could be attributed to raw materials collected from the Edézhíe area. This number is considered conservative because it does not include the value of any arts and crafts sold outside the region or to NWT residents. While this analysis ignores the value of labour involved in making the arts and crafts, it also ignores the additional costs that would have to be incurred to find these materials as part of subsistence activities in other parts of the NWT.

3.1.3.4 *Commercial Logging*

There is one commercial logging operation in the region. It is located at Jean Marie River and harvests about 1,000 cubic metres per year of white spruce. According to estimates from an assessment of commercial logging in the Deh Cho region, (Meyers Norris Penney 2005), this timber would have gross value of \$45,750. Based on industry intensity ratios for the forestry and logging industry in the NWT (Bureau of Statistics, 2007), this level of activity would generate about 0.24 person-years of employment. Once the costs of felling, skidding, processing, reforestation, hauling and other costs are subtracted, the net value of the timber is

about \$9,250. However, all commercial timber harvesting occurs outside the Edézhíe area so no commercial logging benefits can be ascribed to the area. While the forest resources in Edézhíe are projected to be sufficient to support commercial logging and there is increasing interest in Deh Cho communities to develop logging operations, high costs and poor accessibility will limit forestry development in the region (IMG-Golder, 2006).

3.1.3.5 *Petroleum Resources*

The Edézhíe area is situated about 50 to 150 kilometres north of recognized gas pools and gas fields in the NWT (Morrow, 2007). In the 1960s and 1970s, about 40 exploratory wells were drilled in the Edézhíe area, mostly in the southeast corner. Five of these wells showed oil and gas in trace amounts. While the Mink Lake gas pool is located a few kilometres east of the Edézhíe area, there are no recognized oil or gas pools within the borders of the proposed candidate protected area.

While some earlier assessments of potential petroleum resources rated parts of the area as having a high potential (Gal and Lariviere, 2004), based on a qualitative assessment that identified an number of overlapping potential plays, the results of more recent more quantitative studies have downgraded this potential to rather low (Morrow, 2007). Available evidence now suggests an ultimate potential of about 0.23 trillion cubic feet of natural gas underlying the Edézhíe area and about 0.5 million barrels of oil.

While the area has some potential for development of gas and oil resources at some times in the future, there are no immediate plans to produce these results because there are more significant gas and oil plays elsewhere in the NWT and there is, as yet, limited capacity to move produced gas or oil to southern markets.

3.1.3.6 *Mineral Resources*

An assessment of the mineral resources of the Edézhíe area was recently completed by the Northwest Territories Geoscience Office (NTGO). This was based on geochemical sampling in the western portion of Edézhíe in 2003 and the eastern portion in 2005 that evaluated mineral potential by examining stream sediment and water chemistry. The assessment examined the distribution of zinc, lead, and gold in the sediments and the distribution of uranium in water. The studies identified three areas having moderate potential for lead-zinc: two along the south facing escarpment and on northwest of the Horn Plateau. It determined that there was moderate potential for uranium in the north, east and south perimeter of the plateau, but there was low potential for copper or gold.

The mineral assessment also examined the potential for diamonds by identifying minerals that are indicative of kimberlites. Samples of surface materials were taken in 2006 and one diamond was actually recovered. Analysis of the results suggests that, while there is evidence of diamondiferous kimberlitic material in Edézhíe, the source and location of potential diamond sources is not known. Olivut Resources Ltd., a publicly traded company, has exploration interests in more than 1 million hectares in the Interior Plains region of the NWT including lands in the northeast corner of the proposed Edézhíe Candidate Protected Area (Olivut Resources

Ltd, 2008). Olivut considers this area to be “favourable for the emplacement of diamond bearing kimberlites” and has defined numerous targets defined for drilling.

While there is potential for mineral development in the Edézhzié area, there is no production at present and no immediate plans to develop these resources pending the final determination and acceptance of the boundaries of the protected area.

3.1.4 Summary

At the present time, the key uses of the Edézhzié area are limited to use of renewable resources, primarily for subsistence purposes. Based on available information, it is estimated that the Edézhzié area annually contributes between \$1.0 and \$1.5 million per year in user benefits for regional residents. This range of values is not absolutely accurate because there are many unknowns in the calculations and many of the values are based on assumptions that may or may not be valid. However, for purposes of assessing the potential effects of potential future land and resource development scenarios, these values provide a useful baseline against which the benefits and costs of future development can be assessed.

As shown in Table 3-10, the majority of quantifiable resource use values are associated with subsistence activities. The value of country food used by regional residents accounts for between 55% and 66% of the total. Recreational activities, as measured in terms of what people pay to participate in these activities, account for another 8% to 18%. Fuel from the area and used for heat homes accounts for another 9% to 15% of total user benefits. Other significant use values include trapping and commercial logging.

Table 3-10: Current Resource Use Values in Edézhzié

Use Values	Nature of Benefit	Low Estimate	High Estimate
Subsistence	Country food	\$632,000	\$806,000
Subsistence	Fuel	\$91,000	\$219,000
Trapping	Commercial sales	\$67,000	\$67,000
Tourism	Spending	\$22,000	\$22,000
Arts and Crafts	Tourist sales	\$11,000	\$14,000
Commercial Logging	Value of production		
Recreation	Expenditures	\$77,000	\$258,000
Recreation	Extra-market benefits	\$17,000	\$28,000
Petroleum Resources	Value of production		
Mineral resources	Value of production		
TOTAL		\$917,000	\$1,414,000

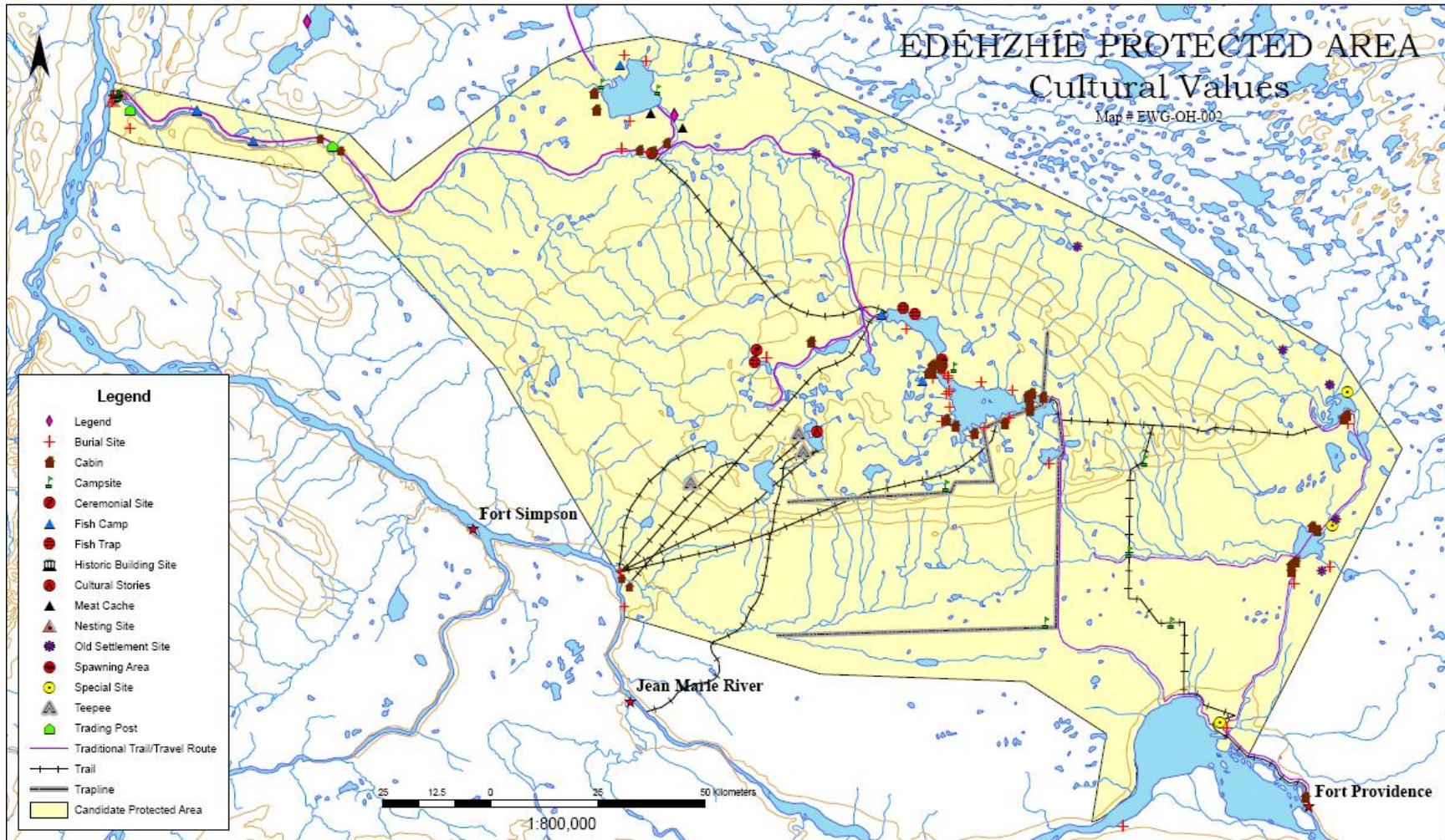
It should be noted that available evidence suggests that all current uses of the Edézhzié area are sustainable; the current patterns and rates of use of the plant, animal and water resources of the area can continue on an ongoing basis without damaging the productive capacity (natural capital) of the area. The evidence also suggests that, in the past, the levels of use have been greater than at present, and that there is potential to increase use of the renewable resource base and still remain sustainable. Thus, the annual values shown in Table 3-10 are expected to continue in perpetuity.

3.2 Cultural Values

The Edézhíe Candidate Protected Area is recognized by regional residents for its cultural values. The area is seen as a “food basket”, especially when there are shortages of game in the Mackenzie Valley, and residents of all six communities have a long history of using the area for subsistence hunting, fishing and gathering other food and resources. The current value of the area as a food source has already been described (Section 3.1.1). However, the long history of use has left a legacy of old settlements, burial sites, camps and cabins, trails, and special sites that are part of the culture of the Dehcho and Tlicho peoples. Key features are located around Willow, Hornell, Mustard, and Bulmer lakes, the corridor between Mills Lake to Mink Lake, and along the Willowlake River, especially at its junction with the Mackenzie River. Figure 3-3 shows the location of some of these key and valued cultural resources. The location and density of cultural and historic features is consistent with the generalized density of traditional land use and occupancy in Edézhíe and surrounding areas (Figure 2-35).

There is no satisfactory method of placing an economic value on the area. However, the importance of the area is reflected by the desire of the local communities to protect the natural and cultural features of the area, even if it means foregoing economic development that may generate jobs and income for local residents and revenues for local and territorial governments.

Figure 3-3: Cultural Values in the Edézhíe Candidate Protected Area



Source: Crosscurrent Associates Ltd. 2005.

3.3 Non-Use Values

As noted previously there is growing recognition that ecosystems and landscapes provide a range of goods and services beyond direct human use. The most comprehensive overview of natural capital and the resulting ecosystem goods and services and their values was developed by Costanza *et. al.* (1997). This study identified 17 types of ecosystem goods and services and attempted to quantify the worldwide annual contributions of aquatic and terrestrial ecosystems. The list of ecosystem goods and services includes the following:

1	Atmospheric regulation	Regulation of atmospheric chemical composition
2	Climate regulation	Regulation of global temperature, precipitation, and other biologically mediated climatic processes at global or local levels
3	Disturbance regulation	Capacitance, damping and integrity of ecosystem response to environmental fluctuations
4	Water regulation	Regulation of hydrological flows
5	Water supply	Storage and retention of water
6	Erosion control and sediment retention	Retention of soil within an ecosystem
7	Soil formation	Soil formation processes
8	Nutrient cycling	Storage, internal cycling processing and acquisition of nutrients
9	Waste treatment	Recovery of mobile nutrients and removal or breakdown of excess or xenic nutrients and compounds
10	Pollination	Movement of floral gametes
11	Biological control	Trophic dynamic regulation of populations
12	Refugia	Habitat for residents and transient populations
13	Food production	The portion of gross primary production extractable as food
14	Raw materials	That portion of gross primary production extractable as raw materials
15	Genetic resources	Sources of unique biological materials and products
16	Recreation	Providing opportunities for recreational activities
17	Cultural	Providing opportunities for non-commercial uses

Not all ecosystems provide the full range of services. Based on a review of literature that quantified these ecosystem goods and services, Costanza *et. al.* estimated that, worldwide, these goods and services had an average value of about \$33 trillion per year, which is 1.8 times the value of the measured goods and services produced by global economies (\$18 trillion). These numbers clearly attest to the value of natural goods and services that fall outside our conventional measure of economic well-being (gross domestic product) that are based on actual use of the environment.

In 2007, the Canadian Boreal Initiative used a similar approach to assess the natural capital values of the northern boreal ecosystem in the Mackenzie watershed (Anielski and Wilson, 2007). This study used information from the Costanza *et. al.* study, estimates of GDP per hectare for industrial and commercial land and resource, and data from various Canadian studies to develop estimates of the value of ecosystem services per hectare for various types of ecosystems in the Mackenzie watershed. The first draft of the study estimated that the Mackenzie watershed produces ecosystems services worth about \$484 billion per year, or the

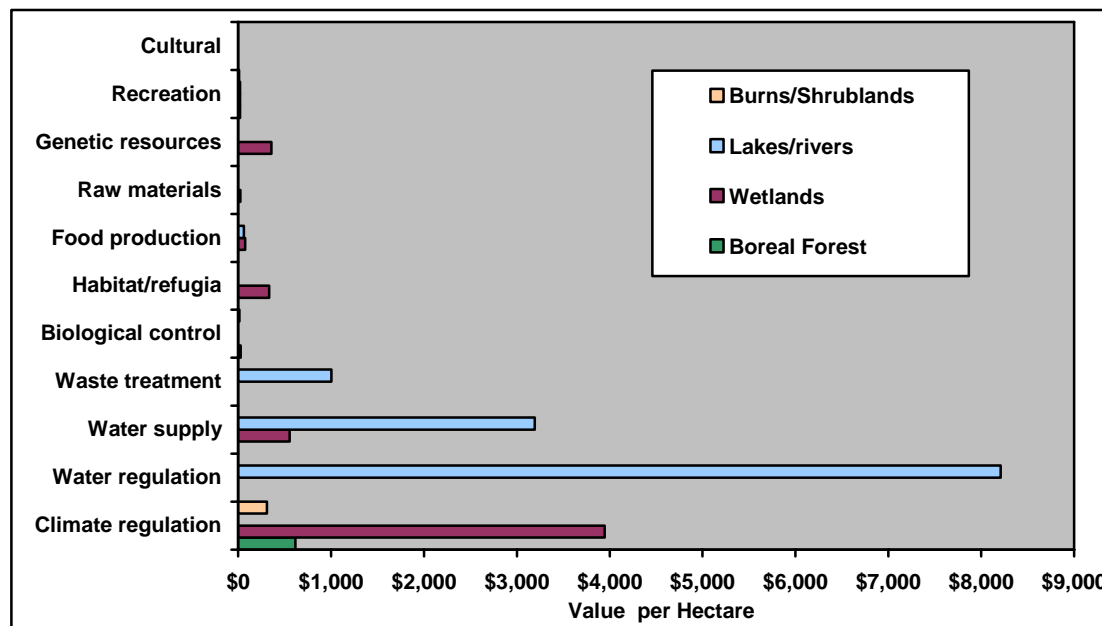
equivalent of \$2,839 per hectare. However, our knowledge of the services provided by natural ecosystems and the value of these services is evolving, so there is considerable uncertainty inherent in these estimates. A second assessment of the ecosystem services provided by the Mackenzie watershed is due to be released shortly. According to the authors (Anielski, pers. comm.), the major changes will be in carbon values (the values used in the first draft were very conservative) and some revised water values.

Of interest to the assessment of the value of the Edézhíe Candidate Protected Area is that Anielski and Wilson determined the average value per hectare for four general types of ecosystems found in the Edézhíe area for 11 of the 17 ecosystem goods and services. The four ecosystems included:

- the boreal forest, which was estimated to have an average annual value of \$666 per hectare,
- burns and shrub land - \$333 per hectare;
- wetlands - \$14,014 per hectare; and,
- lakes and rivers - \$12,484 per hectare.

The mix of ecosystem goods and services provided by these four types of ecosystems and an estimate of their annual contributions per hectare are provided in Figure 3-1.

Figure 3-4: Annual Values of Ecosystem Goods and Services Provided by Ecosystems Found in the Edézhíe Candidate Protected Area



Source: Anielski and Wilson (2007)

The figure shows that the key functions of the four ecosystems relates to water regulation and supply and waste treatment by lakes and rivers, climate regulation, water supply, habitat and genetic resources for wetlands, and climate regulation for boreal forests and burns and

shrublands. Figure 3.1 shows that, based on available information, the direct use values (raw materials, food production, recreation and culture) are relatively small compared to the other ecosystem services.

If it can be assumed that these values also apply to the mix of ecosystems in the Edézhíe Candidate Protected Area, the resulting estimates (see Table 3-11) suggest annual contributions of \$2.7 billion per year, or an average of \$1,085 per hectare per year.

Table 3-11: Estimated Value of Ecological Goods and Services of the Edézhíe Candidate Protected Area

Ecosystem ⁴	Area		Average Value per Hectare	Total Value	
	Hectares	Percent		Total (millions)	Percent
Boreal Forest	995,062	39.6%	\$666	\$662.2	24.3%
Burns & Shrublands	1,239,137	49.3%	\$333	\$412.3	15.1%
Wetlands	57,930	2.3%	\$14,014	\$811.8	29.8%
Lakes/rivers	67,446	2.7%	\$12,484	\$842.0	30.9%
Other	155,195	6.2%	\$0	\$0.0	0.0%
TOTAL	2,514,770	100.0%	\$1,085	\$2,728.4	100.0%

Source: Based on values in Anielski and Wilson (2007)

There is some risk in applying basin-wide estimates to a specific sub-basin that may or may not have characteristics that are different from the overall basin. For example, the estimates based on the values in Anielski and Wilson suggest that recreational values in the Edézhíe Candidate Protected Area are \$32.2 million (1.2% of the total), food production is valued at \$12.6 million per year (0.5%), and the value of raw materials is calculated to be \$1.4 million. This compares to Table 3-10, which shows recreational values being \$286,000 at most and food production being valued at \$806,000. Thus, the values shown in Table 3-11 may overstate the value of ecological goods and services provided by the Edézhíe Candidate Protected Area.

While there is clearly some inconsistency in the absolute value of the ecological goods and services provided by the Edézhíe Candidate Protected Area, the important conclusion to be drawn from the analysis is that natural ecosystems do provide goods and services that can indirectly benefit regional residents (water quality and quantity) as well as residents of the entire world (air quality and carbon sequestration). Research to date suggests that non-use values of ecosystems, which are typically not quantified, can be at least the same size or even much larger than the use values related to food production, raw materials, recreation, culture, water supply and water treatment that can be quantified. Unfortunately, there is insufficient information about the biophysical contribution of habitats in the Edézhíe area for non-use values to be quantified with any certainty. The information provided by Anielski and Wilson suggest that the non-use values for typical boreal forest, burns and shrublands, wetlands, lakes and rivers can be up to 50 to 60 times greater than the use values. This would suggest that non-use values in the Edézhíe Candidate Protected Area are on the order of \$45 to \$78 million per year and can be sustained in perpetuity. However, as a minimum, it is likely that the non-use

⁴ Based on Table 7 in EBA Engineering Consultants and Canadian Wildlife Services (2006). Boreal forest includes land classified as black spruce-lichen boreal forest, white spruce forest, jack pine forest, deciduous forest, fire regeneration/sparsely vegetated, and mixed forest. Burn and shrubland includes fire regeneration/low shrubland open, low shrubland, tall shrubland open/immature deciduous. Other, herbaceous, lichen dominant, unclassified, non-vegetated and sphagnum moss.

values are the same as the use values: somewhere in the range of \$1.0 to \$1.5 million per year. Overall, it is expected that the annual contribution of the Edézhíe Candidate Protected Area in terms of ecological goods and services is somewhere between these two extremes.

4.0 SUMMARY AND RECOMMENDATIONS

4.1 *Summary of Socio-Economic Conditions*

Based on the information presented in the Section 2.0 it is possible to describe the socio-economic characteristics of the regional population compared to the overall population of the NWT. The assessment showed that, when compared to the NWT, the regional population:

- Is growing more slowly
- Is younger than NWT
- has a high ratio of males to females
- consists mostly of Aboriginal people (87%)
- is less educated than NWT average
- is less likely to be employed
- is more likely to be employed in other service sector (34%)
- had an average family income in 2005 that was 35% lower
- faces higher costs of living
- has more housing in need of major repair (29%)
- has a higher percentage of households in core need
- has higher crime rates
- is more likely to participate in traditional land uses

The overall picture is that regional communities are primarily Aboriginal, have limited economic development opportunities (especially goods producing industries, face a high cost of living with limited amenities, and are still heavily reliant on traditional activities for food and some income generation.

While this provides an overview of the regional population, the statistics also show that there are some very significant differences among the six communities. Table 2-15 summarizes 17 socio-economic indicators for the six communities.

The table shows that Fort Simpson has probably the best developed economy of all the communities, with its residents being better educated, employed, and with higher incomes. It has better housing, fewer residents in core need, and lower rates of alcohol-related disease. Fort Simpson does have higher rates of sexually transmitted diseases and a higher rate of violent crime, and its residents are less reliant on country foods and less likely to participate in traditional land uses.

On the other hand, Wrigley is a community in decline, with large and older Aboriginal population with low educational attainment and limited participation in a wage economy. It has a very high cost of living, more residents in core need and poor housing. A much higher percentage of Wrigley residents participate in traditional activities and rely on country foods.

Table 4-1: Comparative Assessment of Socio-Economic Conditions in Study Area Communities

Attribute	Fort Providence	Fort Simpson	Jean Marie River	Wrigley	Whatí	Behchokò
Population Growth	Declining	Declining	Growing	Declining	Growing	Growing
Percentage of young people	Lower	Lower	N/A	Lower	Higher	Higher
Male/female imbalance	Imbalance	Balanced	N/A	Imbalance	Imbalance	Balanced
Percentage of Aboriginal people	Higher	Lower	Higher	Higher	Higher	Higher
Educational attainment	Lower	Higher	Average	Lower	Lower	Lower
Labour force participation	Average	Higher	Lower	Lower	Lower	Lower
Employment in primary sector	Average	Lower	Average	Lower	Higher	Higher
Average family income 2005	Lower	Higher	N/A	N/A	Average	Higher
Costs of living	Average	Higher	Higher	Higher	Higher	Lower
Housing in need of major repair	Lower	Lower	Higher	Higher	Lower	Average
Households in core need	Lower	Lower	Higher	Higher	Higher	Higher
Hospitalization for alcohol-related disease	Lower	Lower	Higher	N/A	N/A	N/A
Rate of sexually transmitted infections	Higher	Higher	Average	Average	N/A	N/A
Violent crime rates	Higher	Higher	N/A	N/A	Lower	Higher
Property crime rates	Higher	Lower	N/A	N/A	Lower	Higher
Participation in traditional land uses	Higher	Lower	Higher	Higher	Higher	Lower
Reliance on country food	Higher	Lower	Higher	Higher	Higher	Higher

In many ways the community of Jean Marie River is like Wrigley. It is also mainly Aboriginal, with less participation in the wage economy and high participation in traditional land uses. It faces high costs of living, has housing in need of repair and a high percentage of households in core need. However, residents of Jean Marie River are better educated than Wrigley, there is more employment in the primary sector, and the population is increasing.

Fort Providence falls somewhere between Fort Simpson and Wrigley in terms of socio-economic characteristics. Compared to Fort Simpson, Fort Providence has a higher percentage of Aboriginal people, higher reliance on country foods, higher participation in traditional land use, lower educational attainment, and lower incomes. When compared to Wrigley, Fort Providence has a lower percentage of poor quality housing and households in core need and the costs of living are relatively low. In a regional context, Fort Providence has higher violent and property crime rates and higher rates of sexually transmitted infections.

Behchokò is a young and growing Aboriginal community with high employment in the primary sector, higher incomes and a relatively lower cost of living. However, Behchokò residents have lower educational attainment, below average participation in the labour force, and a higher percentage of households in core need. It has high reliance on country food but lower participation in traditional land uses, and has rates of violent and property crime that are higher than the regional average.

Whatí is like Behchokò in that it is young and growing, with high participation in the primary sector and average family incomes. Being more remote it has higher costs of living and a greater percentage of residents participate in traditional land uses and rely on country food. While Whatí also has a high percentage of households in core need, the crime rates are lower than in Behchokò.

4.2 Total Value of the Area

The total economic value of the Edézhíe Candidate Protected Area is estimated to be at least in the range of \$1.8 to \$2.8 million per year. This includes \$0.9 to \$1.4 in user benefits, which mainly relate to use of the area for subsistence (food and fuel) and recreation, with very low values for commercial activities like trapping and tourism. While the area has some potential for mineral and oil and gas development, there is currently no activity occurring aside from some mineral exploration on claims that were issued prior to the interim land withdrawal for the protected area. The estimate also includes \$0.9 to \$1.4 million for non-use values, specifically for ecological goods and services related to water regulation and supply and waste treatment by lakes and rivers, climate regulation, water supply, habitat and genetic resources for wetlands, and climate regulation for boreal forests and burns and shrublands.

The estimate of \$1.8 to \$2.8 million is known to be highly conservative, however. It does not recognize any of the cultural or historical values, which are known to be important but are very difficult to quantify. This range uses the minimum values for ecological goods and services, which could be 50 to 60 times greater. Thus, the true value of the Edézhíe Candidate Protected Area could be as high as \$80 million per year.

Based on available information it is not possible to be more definitive in quantifying the total value of the Edézhíe Candidate Protected Area. There is some uncertainty in the values for which there is relatively abundant information (use values) and very high uncertainty for non-use and cultural values for which there is very little information. However, for purposes of understanding the effects of allowing development in all or parts of the Edézhíe Candidate Protected Area, it is not essential that its value be known with absolute certainty. The values identified in this analysis simply provide a yardstick by which the marginal or incremental changes associated with development can be compared. The values can also be used to demonstrate the trade-offs associated with different types of development: for example, a gain in employment and income resulting from mineral development could lead to reductions in cultural and non-use values.

4.3 Data Gaps

4.3.1 Socio-Economic Information

For the most part, available information provides a fairly current and comprehensive overview of social and economic conditions in the region. This was partly due to the timing of this study, which was being undertaken at the same time the results of the 2006 census were being released. However, as is evident from Table 4-1, a complete socio-economic profile could not be prepared for some communities. A complete profile could only be prepared for Fort Simpson and Fort Providence; information was incomplete for the other communities. Part of the problem is that some communities, specifically Jean Marie River and Wrigley, have very small populations and Statistics Canada will not release certain types of information for small communities because of concerns about confidentiality. There is no way of working around this problem other than by undertaking a separate survey of regional residents but this too would be subject to regulations related to confidentiality.

The profiles for Whatí and Behchokò were incomplete because there was no information related to health indicators. Data for the other communities was available because of special analysis of health conditions in the other four communities were conducted as part of the Mackenzie Valley Project. While the missing data for Whatí and Behchokò could be obtained by special request, it is not clear that the lack of information would hamper an analysis of the socio and economic effects of different development scenarios. The problem is that there is very little information that clearly and directly links health issues with development. High rates of sexually transmitted infections or hospitalization rates for alcohol related diseases may be due to multiple factors, most of which are inter-related, and it is not possible to conclude that one type of development will definitively lead to increases or reductions in these indicators. Thus, the lack of comprehensive health data is not seen to be a major limitation for this analysis.

Based on previous experience analyzing the potential social and economic effects of other proposed developments, the biggest data limitation relates to clearly understanding the factors underlying low labour force participation and unemployment in individual communities. Are people not working because they don't have any skills, their skills don't match the demands of current businesses, or are there other reasons? In some cases, more detailed labour force surveys can be used to better understand whether targeted training will assist unemployed or

under-employed residents in qualifying for better jobs and incomes or where there are other factors limiting labour force participation. However, such surveys are also subject to confidentiality restrictions and will not be feasible in the smaller communities. Another second limitation relates being able to accurately predict future economic conditions in individual communities. The list of possible developments that might compete for labour and other resources is often unknown or incomplete, or is prepared at a regional level, which makes it very difficult to estimate effects in individual communities. A third problem is that socio-economic data become inaccurate very quickly because socio-economic conditions are very dynamic, especially for individual communities.

It should be noted many of the above-noted data gaps were also identified in the “Socio-Demographic and Job Creation Needs Analysis for the Deh Cho Territory, Northwest Territories” undertaken for the Deh Cho Land Use Planning Committee in 2003 (PACTeam Canada, 2003). The issues and research priorities identified in that study included:

- no data for incorporated communities
- lack of information for small communities due to confidentiality issues
- regional data hide local conditions
- some data are only available for much regions or the entire NWT
- data were only available for the oil and gas sector and not for other sectors.

These same issues continue to limit the ability to prepare comprehensive socio-economic profiles for individual communities and to accurately assess the potential effects of new types of economic development.

4.3.2 Resource, Cultural and Environmental Values

Many of the issues related to socio-economic information also apply to the determination of resource, cultural and environmental values. While reasonably reliable regional resource use was collected for each of the six communities, there is still considerable uncertainty about how much of this activity actually occurs in the Edézhíe Candidate Protected Area. The estimates are based on educated guesses (i.e. between 24% and 32% of the regional subsistence harvest comes from Edézhíe) and the reliability of these guesses is unclear. Thus, an assessment of understanding of the potential effects of resource development in Edézhíe would greatly benefit from better information about how much subsistence and other activity is currently occurring in Edézhíe and where this activity is actually occurring.

Another limitation of the analysis relates to the valuation process. Ideally, it would be desirable to understand the value of the Edézhíe Candidate Protected Area for subsistence and other uses in comparison to costs and benefits of using the next best site. Knowing these marginal or incremental values would help us to better understand the economic implications of losing all or part of Edézhíe to development, but almost nothing is known about the relative merits of other sites and the conditions under which they are used. Anecdotal information suggests that Edézhíe is used for subsistence activities when game populations are low in the Mackenzie valley, but where would people go to hunt if conditions were poor in the Mackenzie valley and all or parts of Edézhíe were no longer capable of supporting existing game or fish populations.

Without this knowledge, it is not possible to comment on the relative importance of Edézhíe to residents of the surrounding communities.

A third limitation relates to the uncertainty of the value of ecological goods and services being produced by Edézhíe. As noted above, the value could be as low as \$1 million per year but as high as \$90 million. This is not so much an economic problem as it is an environmental issue. Without further studies on the availability, productivity and functionality of different types of ecosystems in Edézhíe, it is simply not possible to develop value estimates that are any more reliable than the ones cited in this report. It may be that designation of Edézhíe as a National Wildlife Area will attract scientists who will eventually better understand the extent and value of ecological goods and services produced in the protected area. However, it is expected that the process used to review the environmental effects of any proposed development in the Edézhíe area will generate sufficient information about ecosystems and their functions to determine whether the advantages of development will outweigh any impairment of ecosystems or their functions.

These problems are not particularly unique to this study of the Edézhíe area; similar data limitations occur during the assessment of the environmental, resource use and socio-economic effects of any major project. In the case of Edézhíe, the determination of values may only be apparent after the decision on boundaries and development exclusion zones has been completed. A conscious decision to preclude development in one area in order to protect and maintain current environmental conditions is explicit recognition that the value of protection exceeds the value of development, even though the actual measure of these competing values is never quantified.

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APPENDIX A: TERMS OF REFERENCE

Final Terms of Reference
Socio-Economic Assessment of Edézhzié Candidate Protected Area
November 28, 2007

1. Purpose

As part of the Northwest Territories Protected Areas Strategy (NWT-PAS) a series of assessments must be undertaken before an area can advance to a desired designation. A socio-economic impact assessment of the Edézhzié Candidate Protected Area is required in establishing Edézhzié as a National Wildlife Area, under the *Canada Wildlife Act*.

2. Background

Introduction to the Edézhzié Candidate Protected Area

The Edézhzié Candidate Protected Area (26,000 sq km) is located in the Dehcho Region of the NWT. It consists of the Horn Plateau, a 500 m escarpment rising above the surrounding Mackenzie Valley, and the surrounding area of boreal forest drained by the Horn and Willowlake rivers. It lies within the Taiga Plains Ecozone which consists of the Horn Plateau and Hay River Lowland Ecoregions.

The Edézhzié Candidate Area arose from two separate initiatives. The community of Fort Simpson was interested in protecting the Horn Plateau and the community of Fort Providence wished to protect Mills Lake and the Horn River drainage. In February 2001, the two communities agreed to work towards a single, consolidated protected area. In February 2002, Environment Canada/Canadian Wildlife Service (CWS) agreed to be the 'sponsoring agency' for Edézhzié through the NWT Protected Areas Strategy. This means that CWS will work with its partners to designate the site, through the steps outlined in the Protected Areas Strategy, as a National Wildlife Area under the *Canada Wildlife Act (Wildlife Area Regulations)*.

In October 2002 a five-year land withdrawal was granted by DIAND to allow for further assessment of the Edézhzié candidate protected area. This withdrawal was extended for one-year and is set to expire in October 2008. A one-kilometre-wide corridor at the western edge of Edézhzié was exempted from the land withdrawal to allow for the passage of the proposed Mackenzie Valley Pipeline. A Working Group (representing CWS, Fort Simpson, Wrigley, Jean Marie River, Fort Providence, Rae/Edzo, Wha'ti, GNWT, World Wildlife Fund, Ducks Unlimited Canada, Canadian Association of Petroleum Producers, and NWT Chamber of Mines) has been established to oversee the ecological and mineral assessment of the area. The Working Group will make a recommendation to the federal and territorial governments on the establishment of a permanent protected area, based on the results of these assessments. Both the ecological and mineral resource assessments are being completed.

Time is of the essence because of impending termination of the land withdrawal in October 2008. As a result, the Edézhzié Working Group wishes to see as much progress as possible made on the socio-economic assessment up to November 2007 when a key background document "Non-renewable Resource Assessment of the Edézhzié Candidate Protected Area (Phase II)" will be available. Once this document is available, the Edézhzié Working Group will be in a position to use this,

plus other information (see Background Materials), to develop a proposal for submission to the Minister of EC with respect to boundaries and management of Edézhzié by October 2007. The Working Group anticipates the completion of the socio-economic assessment by the contractor by March 31, 2008.

The NWT PAS Process: Requirements for Designation

NWT-PAS outlines a series of eight steps for the planning and establishment of protected areas, one of which (Step 5) calls for a detailed evaluation of the area's ecological, cultural and economic values. The evaluation of the economic values includes the assessment of the social and economic effects that establishing a protected area might have upon the proposed area as well as the local and nearby communities.

As part of the requirements of establishment of a protected area through the NWT Protected Areas Strategy, the Edézhzié Working Group requires information on the potential social and economic impacts of the designation on the surrounding communities including Fort Simpson, Wrigley, Jean Marie River, Fort Providence, Rae/Edzo, and Wha'ti, and the NWT region as a whole.

3. Objectives

The objectives of this contract are to:

- i. Develop socio-economic profiles based on indicator statistics for each of the communities surrounding the Edézhzié Candidate Protected Area (including Fort Simpson, Wrigley, Jean Marie River, Fort Providence, Rae/Edzo, and Wha'ti) based on existing published information. Where possible, information specific to the Edézhzié Candidate Protected Area is to be highlighted.
- ii. Develop consistent data baselines. Identify and/or develop measurement parameters by which indicators can be assessed.
- iii. Identify Socio-economic data gaps specific to the Edézhzié Candidate Protected Area and develop strategy to address data gaps.
- iv. Calculate the Total Economic Value of the Edézhzié Candidate Protected Area based on the available information.
- v. Develop models that predict potential social and economic impacts on the surrounding communities (including Fort Simpson, Wrigley, Jean Marie River, Fort Providence, Rae/Edzo, and Wha'ti), the southern NWT, the entire NWT, and nationally based on the following scenarios:
 - a. The designation of Edézhzié as a National Wildlife Area with current boundaries intact
 - b. The designation of Edézhzié as a National Wildlife Area with boundaries modified due to hydrocarbon and/or mineral potential (maximum 25% area lost),
 - c. No formal protection of Edézhzié
- vi. Produce plain language version of report tailored to First Nation organizations and the general public.
- vii. Attend a workshop and deliver a presentation that will allow interested stakeholders, local communities and First Nations to better understand the local economy and factors that could influence future economic direction

given the proposed designation of Edézhíe Candidate Protected Area as a National Wildlife Area.

All research and modelling is to be conducted using state of the art research methods and best practices established for developing socio-economic impact assessments for wilderness/protected areas from the present (2007) to 2025, including an estimate of the number of jobs created and economic spin-offs in the surrounding communities.

The study will assess existing government, Dehcho, Tlcho, and Mackenzie Gas Project Joint Review Panel economic and statistical information, as well as develop and implement primary sources of qualitative and quantitative data where feasible.

The perspective of First Nations is a key consideration and is essential to successfully estimating the impact protected area designation.

The regional economic impacts and profile of the local economy need to consider links and ties to larger regional, territorial and international economies.

The contractor will be made aware of other ongoing projects in relation to the Edézhíe Candidate Protected Area. The contractor will ensure that data collection methods and the data itself will, where possible and reasonable, be complimentary to and available for use by other NWT PAS initiatives.

4. Scope of Work

1. Develop socio-economic profiles based on indicator statistics for each of the communities surrounding the Edézhíe Candidate Protected Area (including Fort Simpson, Wrigley, Jean Marie River, Fort Providence, Rae/Edzo, and Wha'tl) based on existing published information. Where possible, information specific to the Edézhíe Candidate Protected Area is to be highlighted. This information is to provide the basis of Volume 1 of the Socio-Economic Assessment report.

Community Social and Economic Profiles

- Population
 - 2005 Population
 - 1990 – 2005 Population
 - Population Projections to 2025
 - 2005 Population by age group
 - Population by Ethnicity
 - Number of births per year
 - Number of deaths per year
 - Life expectancy at birth
 - Marital status
 - Population Mobility (Place of residence 1 year ago, 5 years ago)

- Education
 - % of Population Aged 15+ Years with High School or More
 - % of Population Aged 20-29 with High School or More
 - K-12 Enrolment
 - K-12 Enrolment as a % of Population Aged 5-24 Years
- Traditional Culture
 - % of Aboriginal Population aged 15+ Years who speak an Aboriginal Language
 - % of Households where half or more of Meat and Fish Consumed is Harvested
 - % of Population Aged 15+ Years who Hunt and/or Fish
 - % of Population Aged 15+ Years who Harvest Medicinal and Food Plants, and/or Timber
- Labour Force
 - Employers (including self employment such as trapping)
 - Employment By Sector
 - Employment Rate
 - Aboriginal Employment Rate
 - Unemployment Rate
 - Aboriginal Unemployment Rate
 - Participation Rate
 - Aboriginal Participation Rate
 - % of Population who Work More Than 26 Weeks in Year
 - Distribution of Skill Types in Employed Population
 - Number of residents engaged in unpaid work (e.g. volunteerism, housework), by community
 - Revenue generation and local retention of revenue by businesses and industries (resource and non-resource based)
 - Description of labour force by income, age, gender, ethnicity
 - Description of historical economic trends related to all labour sectors
 - Description of historical economic trends related to employment
- Income
 - Price Index, Food (compared to Yellowknife)
 - Price Index, Cost of Living (compared to Yellowknife)
 - Average Employment Income
 - % of Tax Filers Earning More Than \$50,000
 - Average Family Income
 - Median Family Income
 - % of Families Earning Less Than \$25,000
 - Average Monthly Income Support Cases Per 1,000 People
- Health and Wellbeing
 - % of Families with a Single Parent
 - Teen Births as % of Total Births (3-Year Moving Average)
 - Rate of Sexually Transmitted Infections Per 1,000 People
 - Rate of Diabetes per 1,000 People
 - Rate of Heart Disease per 1,000 People

- Rate of Cancer per 1,000 People
- Potential Years of Life Lost Per 1,000 People
- % of Households in Core Need¹
- % of Households in Need of Major Repairs
- % of Households with Suitability (Crowding) Problems
- % of Households Owned
- Rate of Violent Crimes Per 1,000 People
- Rate of Property Crimes Per 1,000 People
- Number of Youths Aged 12-17 Years Charged Per 1,000 People
- Transportation and Infrastructure
 - All weather and Seasonal Roads
 - Shipping Routes
 - Air Transportation
 - Community Resupply by Season
 - Schools and Educational Capacity
 - Communications
 - Electricity Generation and Capacity
 - Water Supply
 - Businesses
 - Industrial Infrastructure
 - Tourism Statistics
- Key Social concerns/issues (contextual description)
- Key Economic concerns/issues (contextual description)
- Key Environmental concerns/issues (contextual description)

b. Resource Use Patterns in the Edézhíe Candidate Protected Area

- Overview of non-commercial resource use in study area
 - % of Population Aged 15+ Years who Hunt and/or Fish in Edézhíe
 - % of Population Aged 15+ Years who Harvest Medicinal and Food Plants, and/or Timber in Edézhíe
 - Residence of Harvesters
 - Cabins/Camps/Trails
 - Drinking Water Sources
 - Key Hunting Areas
 - Economic Value of Game Harvested in Edézhíe
 - Key Fishing Areas
 - Economic Value of Fish Harvested in Edézhíe
 - Key Timber and Plant Harvesting Areas
 - Economic Value of Timber and Plants Harvested in Edézhíe
 - Areas of Cultural Significance

¹ If a household has any one housing problem (suitability, adequacy, or affordability) or a combination of problems, *and* a total household income below the minimum level needed to run the household, the household is considered to be in core need (NWT Housing Corporation).

- Overview of commercial land use and land use opportunities in study area
 - Key Trapping Areas
 - Commercially Harvested Furbearers
 - Economic Value of Trapping
 - Commercial Fishing Areas²
 - Commercially Harvested Species
 - Economic Value of Commercial Fisheries
 - Active and Potential Tourism Activities
 - Economic and Potential Economic Value of Tourism Activities
 - Mineral Deposits³
 - Potential Economic Value of Mineral Deposits
 - Oil and Gas Plays
 - Potential Economic Value of Oil and Gas Plays
 - Forestry
 - Current and Potential Economic Value of Forestry Activity

Results are to be incorporated into Volume 1 of the Socio-Economic Assessment Report.

Statistical data are to be presented in Tabular form within the Report, and will be incorporated into an updateable MS Excel Spreadsheet, an electronic version of which will be submitted with the report.

- ii. Develop consistent data baselines. Identify and/or develop measurement parameters by which indicators can be assessed.
 - Baseline timeframes are to be as consistent as possible.
 - Measurement parameters should facilitate hindcasting, forecasting, and the ability to track trends and changes over time.

Results are to be incorporated into Volume 1 of the Socio-Economic Assessment Report.

Data baseline and measurement parameter work is to be done conjointly with the community profiles. Results will also be incorporated into the MS Excel Spreadsheet.

- iii. Identify Socio-economic data gaps specific to the Edézhzié Candidate Protected Area and develop strategy to address data gaps.
 - Based on the Community Profiles, identify potential Socio-Economic indicators specific to Edézhzié for which insufficient information exists to develop effective baselines and/or measurement parameters.

² If applicable.

³ Incorporated as information becomes available.

- Develop a strategy, including methodology and timeline, by which the data gaps could be addressed.

Results are to be incorporated into Volume 1 of the Socio-Economic Assessment Report.

- iv. Calculate the Total Economic Value of Edézhzié Candidate Protected Area based on the available information.
 - The Total Economic Value of a protected area is the sum of its use values.

Results are to be incorporated into Volume 1 of the Socio-Economic Assessment Report.

- v. Develop models that predict potential social and economic impacts on the surrounding communities (including Fort Simpson, Wrigley, Jean Marie River, Fort Providence, Rae/Edzo, and Whatl), the southern NWT, the entire NWT, and nationally based on the following scenarios:
 - a. The designation of Edézhzié as a National Wildlife Area with current boundaries intact;
 - b. The designation of Edézhzié as a National Wildlife Area with boundaries modified due to resource development potential (maximum 25% area lost);
 - c. No formal protection of Edézhzié.

Consideration should be given to the following economic factors when determining the economic impacts (positive or negative) of each scenario.

- Overview of economic characteristics for the study and surrounding area.
- Key social concerns/issues by community.
- Key economic concerns/issues by community.
- Opportunities presented by each scenario.
- Potential number of jobs created and economic spin-offs as a result of each scenario.
- Estimate of wages and salaries (average and cumulative) associated with each scenario.
- Identification of labour demand (number of jobs available) by business, non-resource based industries, resource industries and government within the communities.

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- Estimate of capital expenditures associated with each scenario.
 - Estimate of stakeholder (tourists; exploration, mining and hydrocarbon companies, others) expenditures within the communities.
 - Businesses and non-resource based (Includes tourism) industries:
 - Number and type; number of people employed; value; key trends.
 - Resource based industries (include sub-sectors of resource based industries):
 - Percentage of wealth generated extracted from the study area that can be expected to be retained by study area residents or residents of the surrounding area (earning of residents);
 - number and type of jobs;
 - economic value;
 - number of people employed;
 - number of local people employed;
 - local employment opportunities (type of employment available to local residents);
 - key trends.
 - Government jobs:
 - Number and type;
 - economic value;
 - number of people employed locally;
 - local employment opportunities (type of employment available to local residents);
 - key trends.
 - Geographic and economic analysis of key habitat, harvesting and cultural areas within Edézhzié:
 - Identification of available substitute harvesting areas;
 - Analysis of financial cost (money spent, time, harvest success rates, etc) associated with use of substitute areas.

Where required, the contractor will propose a research method for assessing these values (such as contingent valuation, travel cost, etc) and the means of collecting and analysing data.

- Geographic and economic analysis of key tourism and non-resource areas within Edézhzié:
 - identification of available substitute areas;
 - Analysis of financial cost (accessibility, etc), associated with use of substitute areas.

- Geographic and economic analysis of key mineral, hydrocarbon, and other resource potential areas within Edézhzié:
 - Identification of available substitute resource development areas;
 - Analysis of financial cost (money spent, time, infrastructure development requirements, etc) associated with use of substitute areas.
- Any lost opportunity costs to other industries associated with each scenario.

Results are to be incorporated into Volume 2 of the Socio-Economic Assessment Report.

The exact research methodology will be developed by the contractor and approved by CWS/INAC on behalf of the Working Group prior to initiating the work. The methodology should take into account the following steps:

- Evaluate the economic feasibility of renewable and non-renewable resource development within the region under the current regulatory conditions.
- Develop a single best estimate of future exploration and development scenario that takes into account:
 - Estimated resources
 - Open land dispositions
 - Existing regulatory regime
 - Existing infrastructure
 - Anticipated future prices and costs.
- Use the selected scenario to
 - Predict future development
 - Estimate royalties payable to the crown.
- Incorporate the foregoing into an assessment of local economic implications of each development scenario.

The Development Scenarios will form the basis of Volume II of the Socio-Economic Assessment Report.

- vi. Produce a plain language version of Volume 1 and Volume 2 tailored to First Nation organizations and the general public.
- vii. Deliver a presentation and attend a workshop that will allow interested stakeholders, local communities and First Nations to better understand the local economy and factors that could influence future economic direction given the proposed National Wildlife Area designation.

A workshop will be held in a site to be determined and will be one day in duration. The contractor will make a presentation of the findings to date, and serve as a technical resource. CWS/INAC will make all arrangements relating to the workshop, including facilities and invitations.

The following sources of information should be considered:

- i. Dehcho Land Use Plan: Final Draft Plan June 2006 and associated background reports (<http://www.dehcholands.org/home.htm>).
- ii. World Commission on Protected Areas (WCPA) report, "Sustainable Tourism In Protected Areas: Guidelines for Planning and Management" that outlines some of the best practices for assessing TEV. The document was prepared for the United Nations Environment Programme (UNEP), the World Tourism Organization (WTO) and the IUCN – The World Conservation Union.
(http://www.unep.org/pc/tourism/library/st%20in%20prot_areas/Best-Practices-8.pdf)
- iii. Census Canada.
- iv. Socio-Economic submissions to the Joint Review Panel of the Mackenzie Gas Project.
- v. Renewable Resource Councils and Community Corporations
- vi. PAS Ecological, Cultural, Renewable and Non-Renewable Resource Assessments, and Mineral and Hydrocarbon Economic Assessments of the Edézhzié Candidate Protected Area.
- vii. Other sources to be determined by Contractor and INAC/CWS.

5. Details of Products

Deliverables include:

A copy of a workplan, outlining identified sources of information and research contacts, and a draft outline of the proposed report (including maps, sections, figures) to the Departmental Representatives on or before December 7, 2007.

Edézhzié Candidate Protected Area Socio-Economic Assessment:

- Volume 1 – Community and Protected Area Profile.
- Volume 2 – Analysis of Potential Socio-Economic Impacts.
- Plain language Version of Volumes 1 and 2.
- Electronic Socio-Economic Database in MS Excel format.

The Contractor will deliver three (3) paper copies of Draft Report Volume I for review and an electronic copy in MS Word format by January 7, 2008.

The Contractor will deliver three (3) paper copies of a second Draft Report Volume I for review and an electronic copy in MS Word format by February 1, 2008.

The Contractor will deliver three (3) paper copies of Final Draft Report Volume I for review and an electronic copy in MS Word format by March 31, 2008.

The Contractor will deliver three (3) paper copies of Draft Report Volume II for review and an electronic copy in MS Word format by February 1, 2008.

The Contractor will deliver three (3) paper copies of a second Draft Report Volume II for review and an electronic copy in MS Word format by February 29, 2008.

The Contractor will deliver three (3) paper copies of Final Draft Report Volume II for review and an electronic copy in MS Word format by March 31, 2008.

The Contractor will deliver three (3) paper copies of Draft Plain Language Report Volumes I and II for review and an electronic copy of same in MS Word format by March 31, 2008.

The Contractor will deliver an electronic copy of Socio-Economic Database in MS Excel format for review by March 31, 2008.

The contractor will Present the Results of the Edézhíe Socio-Economic Assessment to the Edézhíe Working Group in April 2008 (Date and venue TBD).

The Contractor will deliver five (5) paper copies of Final Report, Volume I and II, and one electronic version of same in PDF format; 5 paper copies of Final Plain Language Report, Volume I and II and one electronic version of same in PDF format; and one copy of the Socio-Economic Database in MS Excel format by April 25, 2008.

The Contractor will deliver any maps and electronic shapefiles produced through this contract.

6. Departmental Responsibilities

CWS/INAC will:

Designate an official (the Departmental Representative) to administer the Contract with the Contractor;

Coordinate and provide technical input during all phases of the project. This will include participation at any meetings required by the contractor to fulfill the scope of work.

Supply the following Edézhíe assessment reports:

- Cultural Assessment
- Ecological Assessment
- Renewable Resource Assessment
- Non-Renewable Resource Assessments Phases 1 & 2
- Hydrocarbon Assessment Report
- Strategic Environmental Assessment
- Draft Management Plan

Coordinate and provide technical input during all phases of the project. This will include participation at any meetings required by the contractor to fulfill the scope of work.

Confirm date and provide venue for presentation to Edézhle Working Group

Provide other support as required to fulfill the scope of work.

7. Intellectual Property

The Department of Indian Affairs and Northern Development has determined that any Intellectual Property arising from the performance of the work under the contract will vest in Canada for the following reason: the main purpose of the contract or of the deliverables contracted for is to generate knowledge and information for public dissemination.

8. Terms and Conditions

All terms and conditions as set out in the original Supply Arrangement, 00-06-5001-2, between the Supplier and the Crown are hereby incorporated into this document.

9. Contractor's Proposal

The Contractor's proposal, dated October 24, 2007, insofar as it is not at variance with anything contained in this document, shall apply to and form part of the Supply Arrangement Contract Award.

10. Departmental Representatives

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