

**ECONOMIC ASPECTS OF
WILDERNESS VALUATION AND
RECREATION USES BY
ABORIGINAL HOUSEHOLDS:
A CASE STUDY
OF PRINCE ALBERT**

K.G. LOEWEN and S.N. KULSHRESHTHA

Department of Agricultural Economics

University of Saskatchewan

Saskatoon, SK

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P.O. Box 2406

Prince Albert, SK

S6V 7G3

Telephone: (306) 922-1944

Fax: (306) 763-6456

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ABSTRACT

Forest values - economic, social, or environmental - are conventionally examined for typical households regardless of people's cultural heritage. The purpose of this study was to explore the cultural bias of aboriginal people toward forest values in order to enhance the cultural accountability of forest management. In the northern part of Saskatchewan, among various major users of the forests, aboriginal people stand out demographically and culturally.

A sample of 30 aboriginal families living off reserves was selected for this study. On account of non-availability of a list of aboriginal residents in the city of Prince Albert, a true random sample could not be drawn. Sample cases were selected using a random process without using a sampling frame.

The results of this study are compared to a concurrent study viewing a sample of general Saskatchewan residents. Both Saskatchewan and urban aboriginal residents identified the most significant recreational activities as being walking, wildlife viewing, camping, picnicking, swimming and fishing. Hunting, a somewhat important activity, was more significant to the aboriginal households than to the Saskatchewan resident sample. The most preferred aboriginal recreation sites were Prince Albert National Park, Emma and Christopher Lakes, Candle Lake and Big River. In contrast, Saskatchewan residents spent more time in various recreation sites and participated more in outdoor activities than Saskatchewan aboriginal residents. Saskatchewan households on average earned significantly more income than urban aboriginal households.

A Contingency Valuation Method was also employed to estimate the willingness-to-pay (WTP) for wilderness preservation. The estimated annual WTP to ensure current wilderness protection prevailed was approximately \$81 per aboriginal household. This result was nearly \$20

higher than the mean WTP per Saskatchewan household, even though the mean aboriginal income was significantly lower than the mean Saskatchewan income. The Tobit analysis showed that spirituality and home ownership positively influence the aboriginal households' WTP.

Only 7% of the aboriginal and a surprising 58% of the Saskatchewan sample were satisfied with current wilderness protection in Saskatchewan. The aboriginal sample are more concerned with the health of the environment for current and future generations, while the Saskatchewan residents placed greater emphasis on commercial aspects. Preserving wilderness for spiritual inspiration was more important to the aboriginal sample than preserving for tourism revenues, whereas the urban Saskatchewan residents rated spiritual inspiration as the least significant reason to protect wilderness. Thus, compared to Saskatchewan households, aboriginal families placed greater significance on preserving wilderness for environmental well-being.

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Chapter 1 INTRODUCTION

1.1 Need for the Study

Aboriginal influence in Saskatchewan is growing. According to Statistics Canada Census reports, the aboriginal population in the Province has increased by 19% from 1986 to 1991. The aboriginal proportion of the Saskatchewan population in the same time period increased from 5.51% to 6.70%.

In 1991, according to Statistics Canada (1994) the number of households with aboriginal identity was estimated at 27,385 dwellings. The total number of occupied dwellings in the province were 363,150. Thus, aboriginal dwellings constitute roughly 7.5% of the total. About three-quarter of all aboriginal dwellings are located off reserves and settlements. Thus, people of aboriginal origin living off reserve constitute an important and rapidly growing social group.

Knowledge of the social values held by various ethnicities or cultural segments of society is an important input in developing and selecting appropriate forest management options. Such knowledge should be acquired from those groups that are most likely to be users of the forest. Location theory as a principle would suggest those located nearby would most likely use the Prince Albert Model Forest (PAMF). The City of Prince Albert was selected as the location for further study of aboriginal families living off reserve.

Determining the significance of wilderness and its conservation as well as use of recreation facilities in the province by the aboriginal households is necessary to provide some insight into the social significance of the PAMF forest resources. In addition, it is important to investigate the

similarities and differences in the use of recreation sites by aboriginal households and others, to become aware of possible conflicts that may arise under different forest management options. The Prince Albert National Park (PANP) is a prominent Saskatchewan recreational destination and wildlife refuge. The park is also the location of aboriginal heritage sites as the Montreal Lake Cree Nation (MLCN) traditionally occupied this area. The establishment of the PANP in the 1930's led to the MLCN people being relocated to their present site (Saskatchewan Forest Conservation Network 1994; SENTAR 1994). The PANP may also be interested in examining the use of the park relative to other sites in the region.

Results of this report may infer that aboriginal households value the natural wilderness not only for its utility but also for its spiritual significance as an entity in itself. Such non-use values can also be important for local acceptance of forest management. Previous studies, forest related values in Alberta (Wilman and Perras 1987; Asafu-Adjaye 1989) and water-based recreation in Saskatchewan (O'Grady, Brockman and Kulshreshtha 1987) for example, have not distinguished between aboriginal and non-aboriginal families. Since this information is important in the context of the PAMF, the present study was carried out.

1.2 Objectives

The major objectives of this study are virtually parallel to that of the Saskatchewan household reported by Loewen and Kulshreshtha (1995). Specifically, this study was carried out with the following objectives:

- i) to examine the nature and location of recreational use by aboriginal households living off reserve;

- ii) to investigate the pattern of recreation (in terms of various activities) by the above households;
 - iii) to estimate a non-use value associated with preservation of wilderness areas in the province;
- and
- iv) to compare the results for aboriginal households with those from the general Saskatchewan resident study (Loewen and Kulshreshtha 1995).

1.3 Scope of the Study

The present study is based on a sample of 30 households at present residing in the City of Prince Albert. These represent both treaty Indians as well as Metis. The former group also has a diverse First Nations background. Prince Albert was chosen as the location of this study because of its proximity to the PAMF.

1.4 Organization of the Study

This study is organized into 6 chapters. Chapter 2 focuses on study methodology and Chapter 3 summarizes recreation and participation, including the use of the Prince Albert National Park. Chapter 4 presents results for wilderness valuation. The last chapter summarizes the major findings of the study.

Chapter 2

STUDY METHODOLOGY

In this chapter, the method of data collection for the present study is described. As noted earlier, the City of Prince Albert was selected as the major focus of the study. This choice was based on the fact that the City of Prince Albert is the largest community in the vicinity of the PA Model Forest.

2.1 Overview of Methodology

The data for this present study were collected through face-to-face interviews during the fall of 1994 using a questionnaire which had been developed during the late summer of 1994.

2.1.1 Design of the Questionnaire

The major purpose of the study questionnaire was to solicit responses of the aboriginal households on matters pertaining to the amount of recreational activity, choice of sites, and the use of the PANP. In other words, it was designed to gather information on economic status, attitudes and behaviour from aboriginal households. The aboriginal family survey questionnaire was a shortened version of the Saskatchewan resident survey as used by Loewen and Kulshreshtha (1995) in a concurrent study. The questionnaire, in Appendix A, can be divided into 4 main sections. Section 1, questions 1 through 5, focuses on the significance of outdoor recreational activities and location of participation. The next section, questions 6 to 8, identifies the more significant features of Prince Albert National Park while the third section, questions 9 to 12, elicits wilderness and wildlife related information from the respondents. The survey for this study was carried out in

conjunction with an aboriginal family expenditure survey (Siemens and Kulshreshtha 1995). Demographic information from the expenditure survey was also used in this study.

2.1.2 Testing of the Questionnaire

The questionnaire was pre-tested using economists, University of Saskatchewan students and members of the general public. This led to identification of some unclear questions. These were modified to arrive at the final set of questions shown in Appendix A

2.2 Sampling Procedure

The study had initially considered selecting sample respondents using a random sampling process. However, in order to do this, a sampling frame (a list of potential candidates for selection) is needed. Potential sources of such a list were contacted including the City Hall of Prince Albert, P.A. Grand Council, Indian-Metis Friendship Center, and local cultural clubs, among others. Although many of these sources had lists, two major problems arose: (1) these were incomplete lists or had incomplete information for the purposes of this study. For example, City Hall could provide a list of customers, but could not identify them by cultural heritage. The PA Grand Council could provide names of treaty aboriginal people but not the non-treaty ones. (2) many of these lists were confidential and therefore could not be released to an external agency.

The sample selection process adopted for this study was not a "true" random one, although it used the underlying principles of randomness. The process adopted for this study was as follows: Mrs. Rose Henry of the Indian-Metis Friendship Center was hired for data collection. Mrs. Henry is very familiar with aboriginal households in the city. She also had knowledge of blocks within the

city where aboriginal families congregated. Study participants were selected in these quarters at random through knocking on doors until a sample of 30 was reached.

2.3 Data Collection

The surveys were carried out by Mrs. Rose Henry through personal interviews at the residence of respondents. Since no pre-selection of respondents was possible, sample bias, particularly non-response bias, cannot be ascertained.

2.4 Origin of Sample Respondents

The vast differences in backgrounds of the Prince Albert aboriginal sample has led to a diverse sample representing Métis and over 15 First Nations. Métis represented 20% of the sample and the remainder were North American Indian living off reserve or settlement. Statistics Canada (cat no. 89-533) reported 69% of the aboriginal households in Saskatchewan to be North American Indian and 31% to be Métis. Also, of the North American Indians in Saskatchewan, 48% lived on reserves or settlements.¹

2.5 Data Analysis

A spreadsheet was set up for the entry of questionnaire data as surveys were returned to the University of Saskatchewan. Data were analysed using various spreadsheet functions. On account of resource limitations, more sophisticated analyses of these data are left for future researchers.

¹ The statistics for the aboriginals originated from 1991 Statistics Canada data (cat no. 89-533) and percentages were derived from the total population reporting aboriginal identity.

2.6 Significance of the Study

This is an innovative study that will enhance the cultural accountability of forest management in Saskatchewan. This study has applications for policy assessment and implications for future research in the Saskatchewan forestry sector. Because of methodological constraints, the results of this study should be considered in an exploratory rather than a definitive context.

Chapter 3 RECREATION PARTICIPATION

In this chapter, characteristics of sample households, their recreation use, and major recreational activities are presented. The chapter is divided into three sections. Section 3.1 describes characteristics of households included in the study, and a presentation of their recreation patterns follows in section 3.2. The use of the Prince Albert National Park (PANP) is highlighted in the last section.

3.1 Aboriginal Household Characterization

In terms of economic characteristics, the average aboriginal household was worse off than that of a typical Saskatchewan resident. For example, the average aboriginal family earned an income of \$17,000 per year, significantly lower than the estimated mean annual Saskatchewan household income of \$45,781. The head of the household had an education of 7 years on average. Home owners represented only 7% of the sample and nearly half the sample owned a vehicle. The aboriginal household family size averaged approximately 3.83 members. Table 3.1 summarizes some general characteristics of aboriginal households. As a measure of the level of economic well-being, the per capita income of the aboriginal household was only \$4,479 per person, compared to \$16,956 for the non-aboriginal households.

3.2 Nature and Scope of Outdoor Activities

Similar to Saskatchewan residents, the aboriginal families' most significant activities were walking, wildlife viewing, camping, picnicking, swimming and fishing. Skiing activity on water

**Table 3.1:
 Characteristics of Sample Respondents, PA Aboriginal Households**

	Mean	Min	Max
Annual Household Income	\$17,154	\$5,291	\$42,900
Education (Grade)	7.10	0	12
Family Size (# of People)	3.83	1	8
Av. Per Capita Income	\$4,479	n/a	n/a
Home Owner	7%	n/a	n/a
Vehicle Owner	47%	n/a	n/a

n/a not applicable.

or snow, hiking, sunbathing, mountain biking, golfing, tennis and sailing were significantly less important, whereas hunting was more significant to the aboriginal households than to the Saskatchewan households. Table 3.2 presents the importance of each activity to both groups. A statistical analysis of difference between two means was carried out. The test statistics was a t-statistics, and was calculated as:

$$t = \frac{\bar{C}_A - \bar{C}_N}{\sqrt{\frac{S_A^2}{22} + \frac{S_N^2}{90}}} \quad (3.1)$$

where,

- C is mean score,
- S² is variance of the characteristics,
- subscripts A and N are for aboriginal and Saskatchewan households,
- the numbers shown in the equation are size of sample.

**Table 3.2:
 Importance of Various Recreational Activities for
 PA Aboriginal and Saskatchewan Households^a**

Activity	Aboriginal Households		Saskatchewan Households	
	Mean Score ^b	St. Dev.	Mean Score ^b	St. Dev.
Walking	4.07	1.23	3.91	1.09
Viewing Wildlife	4.00	1.41	3.71	1.18
Camping	3.83	1.32	3.54	1.37
Picnicking	3.63	1.10	3.40	1.22
Swimming	3.60	1.54	3.42	1.32
Fishing	3.23	1.70	3.60	1.47
Ice Fishing	3.10	1.65	2.52	1.50
Boating	2.90	1.56	3.26	1.44
Hunting	2.83	1.74	2.16	1.63
Snowmobiling	2.77	1.76	2.18	1.42
Photography	2.73	1.68	2.86	1.17
Canoeing/Kayaking	2.47	1.46	2.63	1.39
Horseback Riding	2.27	1.41	1.86	1.11
Hiking	1.83	1.29	2.97	1.33
Sunbathing	1.67	1.18	2.43	1.34
Snowshoeing	1.53	1.31	1.62	1.02
Mountain Biking	1.50	1.01	2.10	1.22
Downhill Skiing	1.43	1.07	2.38	1.50
Cross-Country Skiing	1.27	0.78	2.57	1.40
Golfing	1.23	0.90	2.75	1.50
Water Skiing/Tubing	1.10	0.40	2.59	1.44
Tennis	1.10	0.40	1.65	1.04
Sailing/Windsurfing	1.03	0.18	1.95	1.21

^a A scale of 1 (not at all important) to 5 (extremely important) is used

^b Number of observations are 30 for the aboriginal sample and 207 for the non-aboriginal sample.

Detailed results of this analysis are presented in Appendix B. In general, aboriginal respondents participated in outdoor activities significantly less than Saskatchewan urban respondents. Aboriginal households had greater participation rates for only picnicking as shown in Table 3.3. Some of these results are as expected. Activities such as boating, golfing, mountain biking, among others, require some capital commitments for equipment and user fees. For this reason, households with lower economic means would tend to participate in these less often than those that are more well-to-do. Differences in wealth may have an influence on aboriginal bias towards forest use.

Location of participation for various recreational activities is shown in Table 3.2. Appendix C displays the Saskatchewan resident participation in various outdoor activities, while Table 3.4 presents the results for the aboriginal residents. Over half of the aboriginal respondents participated in picnicking, walking, swimming and camping. Surprisingly, fewer than half the sample households participated in fishing, ice fishing and hunting. Another major pattern was that aboriginal families rarely participated in any of the activities outside of Saskatchewan.

In the previous year, 77% of the aboriginal households in the sample visited a recreation area. Table 3.5 presents average days spent in various recreation areas throughout Saskatchewan for those respondents who had visited a recreation area in the previous year. Responses from Saskatchewan residents are also included in Table 3.5 to provide easy comparison. The area most frequently visited by the aboriginal respondents was PANP, followed by Emma and Christopher Lakes, Candle Lake and the Big River area. Similar days were spent by both groups at PANP; however the Saskatchewan residents spent much more time than the aboriginals at Emma/Christopher Lakes and Candle Lake. It should be noted that the aboriginal sample was from Prince Albert, thus the obvious bias towards the central/northern recreation areas. In all, Saskatchewan residents spent about 14 days more in recreation areas than aboriginal respondents.

Table 3.3:
Participation Rates in Various Recreation Activities,
PA Aboriginal and Saskatchewan Households

Activity	% of Total Respondents Participating	
	PA Aboriginal	Saskatchewan
Picnicking	83	70
Walking	69	84
Swimming	59	65
Camping	55	65
Fishing	38	63
Viewing Wildlife	34	67
Boating	31	63
Hiking	24	54
Photography	21	64
Ice Fishing	17	30
Hunting	17	22
Canoeing/Kayaking	17	19
Horseback Riding	14	10
Golfing	14	50
Sunbathing	14	52
Snowmobiling	10	25
Downhill Skiing	7	19
Mountain Biking	7	22
Water Skiing/rubing	3	30
Cross-Country Skiing	3	22
Tennis	3	11
Snowshoeing	3	5
Sailing/Windsurfing	0	9

Table 3.4
Percent* of PA Aboriginal Respondents Participating
at Specified Location in 1993/94

Activity	PANP	Sask. incl. PANP	Canada (Out of Sask.)	None
Picnicking	14	79	0	17
Walking	14	69	0	31
Swimming	10	55	0	41
Camping	10	52	3	45
Fishing	10	38	0	62
Viewing Wildlife	3	31	3	66
Boating	3	31	0	69
Hiking	0	21	3	76
Photography	0	21	0	79
Ice Fishing	0	17	0	83
Hunting	3	17	0	83
Canoeing/Kayaking	0	17	0	83
Horseback Riding	3	10	0	86
Golfing	0	14	0	86
Sunbathing	7	14	0	86
Snowmobiling	0	10	0	90
Downhill Skiing	0	3	3	93
Mountain Biking	3	7	0	93
Water Skiing/Tubing	0	3	0	97
Cross-Country Skiing	3	3	0	97
Tennis	0	3	0	97
Snowshoeing	0	3	0	97
Sailing/Windsurfing	0	0	0	100

* Number would not add up to 100 since some households may have used more than one location.

Table 3.5:
Average Number of Days Spent in Various Saskatchewan Recreation Areas in 1993/94^a

Recreation Areas	Aboriginal		Saskatchewan	
	Days	St. Dev.	Days	St. Dev.
Prince Albert Nat. Park	3.70	12.62	3.81	12.41
Emma/Christopher Lakes	1.39	2.98	5.24	14.36
Candle Lake	1.30	4.34	3.76	13.91
Big River Area	1.30	1.87	0.31	1.08
Narrow Hills	0.87	0.42	0.77	7.15
Anglin Lake	0.87	0.42	0.49	2.18
Lac La Ronge	0.57	1.24	1.51	4.64
Meadow Lake	0.30	1.06	1.82	7.20
Other	0.13	0.46	4.88	11.96
Cypress Hills	0.04	0.21	0.31	1.03
Total	8.91	13.39	23.53	25.92

^a Averages are for those who spent some time in a recreation area in 1993/94.

Table 3.6:
Reasons Why Respondents Did Not Participate More in Recreation Activities

Reason	Aboriginal		Saskatchewan	
	Mean(%)	St. Dev.	Mean(%)	St. Dev.
Not Able	76	0.44	15	0.35
Too Expensive	12	0.33	49	0.50
Too Busy	12	0.33	31	0.46
Bugs	12	0.33	10	0.30
Not An Outdoors Person	12	0.33	5	0.22
Bad Experiences	6	0.24	2	0.13

A major difference between the aboriginal households and the Saskatchewan residents was evident in their respective reasoning for not participating more in recreation activities. Almost three-fourths of the aboriginal households indicated their inability to participate in such activity. The majority of aboriginal households responding "not able" to participate more in outdoor activities did not have a vehicle, while a couple of respondents could not because of illness. In contrast, expense and lack of time were the main factors inhibiting greater participation by the Saskatchewan residents. Table 3.6 summarizes these results.

3.3 Use of the Prince Albert National Park

The Prince Albert National Park is a major recreation destination for both Saskatchewan and aboriginal households. It is important to know what the key attributes are that attract people to the park. It is also important to discover why households do not want to visit the park.

The responses of P.A aboriginal households is used to rank various features of significance. Based on this criterion, these features can be divided into three basic types: (i) those which aboriginal households value most; (ii) those which are valued moderately; and (iii) those for which aboriginal valuations are low and are consistently lower than those of the Saskatchewan residents. A statistical analysis of the difference between the two means was carried out and the results of this analysis are presented in Appendix D.

**Table 3.7:
 Importance of Park Features for
 Aboriginal and Saskatchewan Households**

Features	Aboriginal ¹		Saskatchewan ²	
	Mean ³	Std. Dev.	Mean	Std. Dev.
Consistently Higher				
Scenery	4.82	0.50	4.72	0.52
Lakes	4.73	0.70	4.70	0.61
Forest	4.68	0.57	4.63	0.69
Grocery Store	4.59*	0.85	3.84	1.11
Other Wildlife	4.50	0.86	4.10	1.04
Moose	4.36*	1.00	3.88	1.16
Fish	4.27	1.32	3.73	1.37
Birds	4.18	1.18	4.11	1.09
Picnic Facilities	4.09	1.11	4.06	0.98
Moderate				
Camping Facilities	4.00	1.31	4.02	1.26
Bear	3.95	1.53	3.57	1.40
Beaches	3.95	1.46	4.09	1.06
Bison	3.77	1.54	3.68	1.20
Outside Town	3.68	1.39	3.98	0.89
Restaurants	3.68	1.62	3.62	1.13
Waskesiu Town	3.36	1.59	3.62	1.10
Hiking Trails	3.14	1.61	3.57	1.22
Trailer Park	2.73	1.64	3.07	1.54
Riding Stable	2.61	1.44	2.20	1.10
Consistently Lower				
Accommodations	2.45*	1.71	3.57	1.35
Boat Dock	2.45	1.50	3.06	1.46
Grey Owls Cabin	2.41	1.74	2.88	1.32
Rental Service	2.32	1.43	2.89	1.31
Boat Launch	2.27	1.45	3.12	1.46
Golf Course	1.86*	1.58	3.27	1.52
Paddlewheeler	1.50*	0.80	2.52	1.18
Tennis Courts	1.36*	0.95	2.00	1.17
Bar/Liquor	1.32*	0.72	2.49	1.24

1 Based on 22 observations.

2 Based on 90 observations

3 A scale of 1 (not at all important) to 5 (extremely important) is used.

* Significantly different from Sask. score.

Among the first category of PANP features, scenery, lakes and forests topped the list. The grocery store was the next attraction, and here the mean response of aboriginal households was significantly higher than that of Saskatchewan residents. Thus, the aboriginal household sample had surprisingly similar results to the Saskatchewan sample. The two groups only statistically differed with respect to seven features, namely, the grocery store, golf course, moose, accommodations, bar and liquor store, Paddle wheeler and tennis courts. Of the aforementioned features, all but the grocery store and moose were less important to the aboriginal households. The wilderness was of primary significance to the aboriginal and Saskatchewan samples, although commercial aspects of the park were still significant park attributes. However, many of these had lower preference scores for the aboriginal households.

Of the aboriginal households surveyed, only 20% indicated that they did not wish to visit Prince Albert National Park more. This is substantially lower than the Saskatchewan households, where nearly half of the residents did not want to visit the park more. The lack of knowledge and time were the most common reasons why aboriginals did not want to visit the park more. Interestingly, these reasons were rarely selected by the Saskatchewan resident sample. Similar to the Saskatchewan residents, the expense of and distance to the park were common reasons chosen a third of the time. Commercialization, park congestion and the use of a cabin elsewhere were other common selections by Saskatchewan households. Table 3.8 and Appendix E summarize the reasons for not wanting to visit the park more for aboriginal and Saskatchewan household responses, respectively.

Table 3.8:
Reasons for Aboriginal Households Not Wanting to Visit the Park More^a

Reason	Mean^b	St. Dev.
didn't know about the park	67%	0.52
not enough time	50%	0.55
too expensive	33%	0.52
too far	33%	0.52
too congested	17%	0.41

^a Responses do not add up to 100% because respondents were able to choose more than one reason.

^b Based on 20 observations.

Chapter 4

VALUE OF WILDERNESS

The primary objective of this chapter is to present the results for the non-use valuation of wilderness preservation by aboriginal families. The estimation is preceded by an account of the motivations for such preservation.

4.1 Preservation Of Wilderness

In general, the aboriginal household sample had significantly higher responses for the preservation reasons than the average Saskatchewan respondent. Reasons as such protecting water quality, air quality, wildlife habitat, rare and endangered species, wilderness for future generations, scenic beauty, existence of wilderness, and spiritual inspiration were all rated higher. Details on the statistical analysis are shown in Appendix F. Preserving wilderness for spiritual inspiration was more important to the aboriginal sample than preserving for tourism revenues, whereas the urban Saskatchewan residents rated spiritual inspiration as the least significant reason to protect wilderness. These results for both groups, displayed in Table 4.1, indicate that the aboriginal sample are more concerned with the health of the environment for current and future generations, while the Saskatchewan residents placed greater emphasis on commercial aspects such as tourism. Only 7% of the aboriginal and a surprising 58% of the Saskatchewan sample were satisfied with current wilderness protection in Saskatchewan.

**Table 4.1:
 Importance of Preservation Reasons by
 Aboriginal and Saskatchewan Households^a**

Reason	Aboriginal		Saskatchewan	
	Mean Score	Std. Dev.	Mean Score	Std. Dev.
Sample Size^a	27-29		213	
Water Quality	5.00	0.00	4.62	0.75
Future Generations	5.00	0.00	4.54	0.83
Knowing Wilderness Exist	4.97	0.19	4.29	1.05
Rare/Endang. Species	4.97	0.19	4.56	0.78
Air Quality	4.93	0.37	4.58	0.83
Wildlife Habitat	4.90	0.41	4.56	0.82
Scenic Beauty	4.90	0.31	4.43	0.79
Spiritual Inspiration	4.78	0.51	3.21	1.31
Unique Environments	4.61	0.88	4.34	0.91
Option to Visit in Future	4.61	0.99	4.34	0.93
Recreational Opportunities	4.21	1.07	4.35	0.84
Educational and Scientific Study	3.89	1.40	4.15	0.99
Revenue from Tourism	3.13	1.60	3.60	1.16

^a A scale of 1 (not at all important) to 5 (extremely important) is used. A range is reported because some respondents skipped some of the questions.

4.2 Estimation of Relationship between WTP and Respondents' Characteristics

The sample aboriginal households were asked to express their willingness-to-pay for preservation of wilderness. The format of the question was such that it was presented in three parts and respondents were requested to answer all three parts.

"Assume that the only way to protect wilderness areas is for Saskatchewan households to support a special fund to be used exclusively for the purposes of protecting and managing wildlife and nature reserves, parks and historical sites in Saskatchewan. Please answer all three parts.

- (1) What is the maximum amount you would pay annually to ensure that current levels of protection prevail?
- (2) What is the maximum amount you would pay to increase wilderness areas from 5% to 7.5% of Saskatchewan?
- (3) What is the maximum amount you would pay to increase wilderness areas from 5% to 10% of Saskatchewan?"

The bids received were taken as the willingness-to-pay for wilderness preservation. The range of the WTP was non-negative in this study, but contained several zero bids. Analysis by ordinary least squares (OLS), when the dependent variable can be observed to be zero, violates the linearity assumption and can result in biased and inconsistent estimates (Amemiya 1984; Judge et al. 1988). OLS is more commonly used with observations above zero. Probit and logit analysis are used when the dependent variable is binary, either 0 or 1. Since the WTP was both zero and positive, this study employed the Tobit technique to estimate a regression line, as the Tobit analysis uses those dependent variable observations at the limit (0) as well as those above the limit (>0).

The utility maximizing WTP function for preservation within the Tobit framework can be expressed by the following relationship (McDonald and Moffit 1980):

$$WTP_i = \begin{cases} x_i\beta + e_i & \text{if } wtp_i^a = x_i\beta + e_i > 0 \\ 0 & \text{if } wtp_i^a = x_i\beta + e_i \leq 0 \end{cases} \quad (3.2)$$

where X_i is a vector of independent explanatory variables, β is a vector of unknown coefficients and e_i is a vector representing the normally distributed disturbance. The predicted WTP can take on both

positive and negative values for a given observation; however, the observed WTP (WTP_i^0) can only take on non-negative values (Kulshreshtha and Gillies 1991). If the estimated WTP (WTP_i^a) is less than or equal to zero the amount actually observed is equal to 0.

The respondents' WTP estimates for current preservation were used as the dependent variable. Different socio-economic characteristics of the respondents were included as independent variables. In particular, the following variables were specified:

PARK MORE	Binary variable, denoting the desire to visit the PANP more (takes a value 1=visit more, 0=otherwise);
FAMILY SIZE	A discrete quantitative variable denoting the number of members in the family;
SPIRITUAL	Variable expressing the spiritual importance of nature, measured as the score of the respondent on a scale of 1 (not important) to 5 (very important) of preserving wilderness;
OUTSIDE	Combined score of wilderness related activities for the respondent using a scale of 1 (not important) to 5 (very important). Activities included camping, picnicking, wildlife viewing, fishing, canoeing, swimming, and hiking.
ANNUAL INCOME	Average annual income of the respondent in dollars
HOUSE	Binary variable for home ownership; takes a value 1 if the respondent is a home owner, 0 otherwise.

Table 4.2 presents the results from the Tobit analysis using the computer software package SHAZAM (White et al. 1990). Three variables, "Park More", "Spiritual" and "House", positively influenced the respondents' WTP. The more important wilderness was for spiritual inspiration, the higher was the respondent's WTP for preservation. The binary variable for home ownership,

Table 4.2:
Factors Influencing Residents' Willingness-to-Pay for Current Protection

Variable	Normalized Tobit Coefficient	Standard Error	t-value
Constant	-11.84	3.22	-3.68
Park More	0.90	0.56	1.60
Family Size	-0.22	0.13	-1.68
Spiritual	2.87	0.69	4.15
Outside	-0.09	0.05	-1.95
Annual Income	2E-05	3E-05	0.88
House	3.13	0.854	3.67
Likelihood Function = -128.05			
Sample Size = 26			
r ² between observed and expected values = 0.90			

"House", positively influenced the WTP amount as well. Family size had a negative effect on the dependent variable, which implies a lower WTP for preservation as family size increases. Income was not a significance factor in the aboriginals' WTP for preservation. The aboriginal WTP decision relies more on a respondent's social values than on economic well being.

4.3 Estimation of Willingness-to-Pay (WTP)

Of respondents, 17% were not willing-to-pay anything for current wilderness preservation and 76% were willing-to-pay between \$1-\$100. The distribution of responses is illustrated in Figure 4.1. The remaining 7% of aboriginal households had a WTP exceeding \$100. The mean response for the amount an aboriginal household was willing to pay annually to ensure current conditions prevail

(approximately 5% protection) was \$81.38, about \$20 greater than the average for Saskatchewan households. For comparison, Saskatchewan household responses are provided in Figure 4.2. The highest bid from each group for current preservation was \$1,000 per year. One observation from the aboriginal sample had to be excluded as the bid amount was too high a portion of the respondent's income.

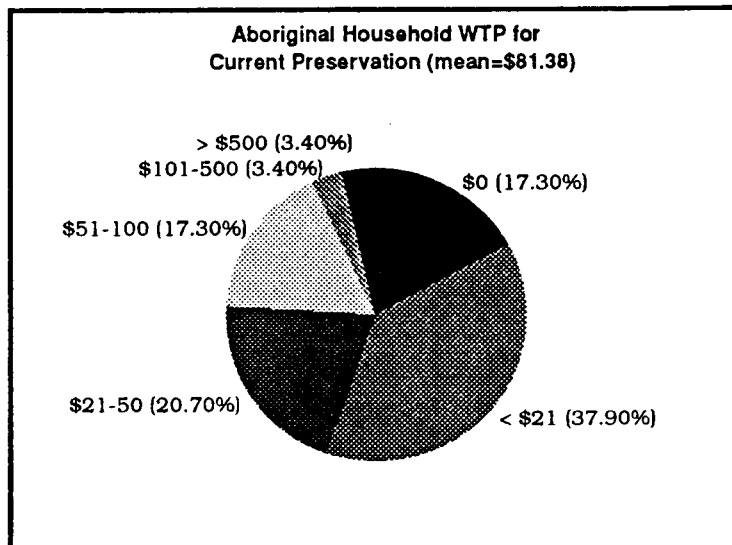
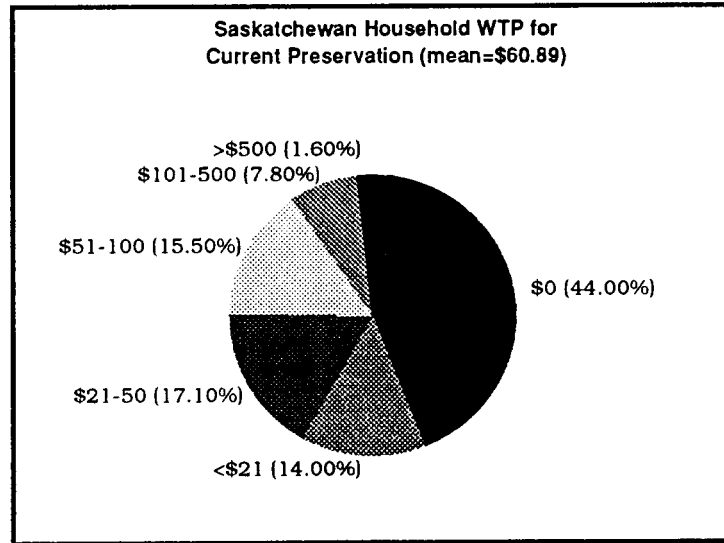


Figure 4.1:
Distribution of Aboriginal Household WTP for Current Preservation



**Figure 4.2:
Distribution of Saskatchewan Household WTP for Current Preservation**

Chapter 5

SUMMARY AND CONCLUSIONS

Knowledge of economic values associated with forests and other wilderness areas is an important ingredient in the manner future forest management strategies are developed. These economic values have their origin in the use of the forests (and wilderness areas) as well as in the nonuse. Although investigating such values has been a subject of past studies (although none in the context of Saskatchewan wilderness areas), none of these has focused its attention on such values held by aboriginal households. This study was designed to estimate the nature of recreation activity, particularly in the northern wilderness areas, and a non-use value for the preservation of the wilderness in the province. Another major objective of the study was to compare the responses of the aboriginal households with those of Saskatchewan residents.

This study is based on 30 aboriginal households living in the city of Prince Albert. Families were selected at random and information was gathered through face-to-face interviews using a questionnaire.

Similar to Saskatchewan families, walking, wildlife viewing, camping, picnicking, swimming and fishing were the most significant outdoor recreational activities of aboriginal households. In addition, hunting was a more significant activities to the aboriginal sample. The aboriginal households rarely participated in recreational activities out of Saskatchewan and in general participation rates by aboriginal families in outdoor recreation, picnicking being the exception, were lower.

The mean days spent in recreation areas by aboriginal households was much lower than the average spent by Saskatchewan households. An aboriginal household spent an average 8.9 days, in contrast to 23.5 days by a typical Saskatchewan household. The most visited areas by the aboriginal

households, in a descending order, were PANP, Emma and Christopher Lakes, Candle Lake and Big River. Similarly Emma and Christopher Lakes, PANP, Candle Lake, Meadow Lake and Lac La Ronge were the more frequently visited sites by Saskatchewan households.

The PANP was a popular destination for both groups. Wilderness in the park was of primary importance and the town of Waskesiu was also a significant park attribute. A much higher percentage of Saskatchewan households (52%) versus aboriginal households (20%) did not want to visit the park more. Aboriginal families did not want to visit more mainly due to lack of time and knowledge about the park. Expense and distance were also common reasons selected.

Preserving wilderness for spiritual and environmental health had greater significance to the aboriginal than to the Saskatchewan households. Even though the mean aboriginal household income was substantially lower than the mean Saskatchewan household income, the aboriginal families were willing to pay on average \$81 for current preservation to prevail, \$20 more than the Saskatchewan household average. Spiritual inspiration and home ownership proved to be significant and positive influences on the amount the aboriginals were willing to pay for wilderness preservation.

Although aboriginal families tended to use wilderness and recreation areas less than Saskatchewan residents, the aboriginal families valued wilderness more highly. The majority of Saskatchewan households (58%) were satisfied with current wilderness protection, while only 7% of the aboriginal households were content with the status quo. Simply put, wilderness is more significant, and recreation is less significant, to the aboriginal households in the city of Prince Albert. The results suggest that differences in forest use recreational activities may not simply be related to ethnicity. To further examine the correlation between ethnicity, wealth and the use of

forests for recreation by aboriginal households, a more extensive study involving a larger sample of aboriginal households of diverse incomes would be required.

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APPENDIX A SURVEY QUESTIONNAIRE

**SASKATCHEWAN RECREATION
 SURVEY OF ABORIGINAL FAMILIES
 PRINCE ALBERT MODEL FOREST STUDY**

1. In the space provided beside each activity below, please indicate the importance of each activity to you, on a scale of 1 to 5, where: 5=very important 2=not very important
 4=important 1=not at all important
 3=somewhat important

1	2	3	4	5	Camping	1	2	3	4	5	Fishing
1	2	3	4	5	Hiking	1	2	3	4	5	Waterskiing/Tubing
1	2	3	4	5	Picnicking	1	2	3	4	5	Boating
1	2	3	4	5	Walking	1	2	3	4	5	Canoeing/Kayaking
1	2	3	4	5	Photography	1	2	3	4	5	Sailing/Windsurfing
1	2	3	4	5	Wildlife Viewing	1	2	3	4	5	Swimming
1	2	3	4	5	Mountain Biking	1	2	3	4	5	Ice Fishing
1	2	3	4	5	Hunting	1	2	3	4	5	Snowshoeing
1	2	3	4	5	Horseback Riding	1	2	3	4	5	Cross Country Skiing
1	2	3	4	5	Golfing	1	2	3	4	5	Downhill Skiing
1	2	3	4	5	Tennis	1	2	3	4	5	Snowmobiling
1	2	3	4	5	Sunbathing	1	2	3	4	5	Other (specify) _____

2. In the past 12 months, did you participate in any of the following activities
 A. in Prince Albert National Park, C. in Canada but out of Saskatchewan and
 B. elsewhere in Saskatchewan, D. outside Canada.
 (please mark an X for all applicable boxes, you can have more than one X per activity)

A	B	C	D	ACTIVITY	A	B	C	D	ACTIVITY
				Camping					Fishing
				Hiking					Waterskiing/Tubing
				Picnicking					Boating
				Walking					Canoeing/Kayaking
				Photography					Sailing/Windsurfing
				Wildlife Viewing					Swimming
				Mountain Biking					Ice Fishing
				Hunting					Snowshoeing
				Horseback Riding					Cross Country Skiing
				Golfing					Downhill Skiing
				Tennis					Snowmobiling
				Sunbathing					Other (specify) _____

3. If you didn't participate in any of these activities in the past 12 months, why not?

<input type="checkbox"/>	too expensive	<input type="checkbox"/>	not able
<input type="checkbox"/>	not an outdoors person	<input type="checkbox"/>	bugs
<input type="checkbox"/>	too busy / no time	<input type="checkbox"/>	other (please comment) _____
<input type="checkbox"/>	previously had bad experiences		_____

4. About how many trips have you made to the Prince Albert National Park in the **past 5 years**? ___trips.

5. Please estimate the number of days spent in the past 12 months, in each of the following areas:

<input type="checkbox"/>	Prince Albert National Park	<input type="checkbox"/>	Big River Area
<input type="checkbox"/>	McPhee Lake	<input type="checkbox"/>	Meadow Lake
<input type="checkbox"/>	Emma / Christopher Lakes	<input type="checkbox"/>	Cypress Hills
<input type="checkbox"/>	Narrow Hills (Nipawin)	<input type="checkbox"/>	Moose Mountain
<input type="checkbox"/>	Candle Lake	<input type="checkbox"/>	Duck Mountain
<input type="checkbox"/>	Anglin Lake	<input type="checkbox"/>	Greenwater Lake
<input type="checkbox"/>	Lac La Ronge	<input type="checkbox"/>	Other (specify) _____

6. Would you like to spend more time at the Prince Albert National Park? YES ___ NO ___

(If **NO** go to Question 7 and if **YES** go to Question 8)

7. Why don't you want to spend more time in Prince Albert National Park?

<input type="checkbox"/>	too far	<input type="checkbox"/>	didn't know about the park
<input type="checkbox"/>	own or use a cottage/cabin elsewhere	<input type="checkbox"/>	too developed/ commercialized
<input type="checkbox"/>	too expensive	<input type="checkbox"/>	already spend enough time there
<input type="checkbox"/>	not enough time	<input type="checkbox"/>	snowmobiling prohibited
<input type="checkbox"/>	too congested	<input type="checkbox"/>	hunting prohibited
<input type="checkbox"/>	poor facilities	<input type="checkbox"/>	other parks/places are better (why?) _____

Other reasons (please comment): _____

8. In the space provided beside each feature of Prince Albert National Park below, please indicate the importance of each feature to you, on a scale of 1 to 5, where:

1=not at all important 2=not very important 3=somewhat important 4=important 5=very important

1	2	3	4	5	Scenery	1	2	3	4	5	Accommodation
1	2	3	4	5	Forest	1	2	3	4	5	Paddlewheeler
1	2	3	4	5	Lakes	1	2	3	4	5	Boat Dock
1	2	3	4	5	Beaches	1	2	3	4	5	Boat Launch
1	2	3	4	5	Grey Owl's cabin	1	2	3	4	5	Rental Services
1	2	3	4	5	Hiking Trails	1	2	3	4	5	Waskesiu townsite
1	2	3	4	5	Birds (Loons, Pelicans, etc.)	1	2	3	4	5	Areas outside Waskesiu townsite
1	2	3	4	5	Bison / Buffalo	1	2	3	4	5	Golf Course
1	2	3	4	5	Moose	1	2	3	4	5	Tennis Courts
1	2	3	4	5	Bear	1	2	3	4	5	Riding Stables
1	2	3	4	5	Other Wildlife	1	2	3	4	5	Restaurants
1	2	3	4	5	Fish	1	2	3	4	5	Bar/Liquor Store
1	2	3	4	5	Picnic Facilities	1	2	3	4	5	Grocery Store
1	2	3	4	5	Camping Facilities	1	2	3	4	5	Other (specify) _____
1	2	3	4	5	Trailer Park	1	2	3	4	5	Other (specify) _____

9. There are many reasons for valuing existing and potential wilderness areas. For each of the possible reasons below, please indicate the importance to you on a scale from 1 to 5 where:

1=not at all important 2=not very important 3=somewhat important 4=important 5=very important

1	2	3	4	5	a) Protecting rare and endangered species
1	2	3	4	5	b) Protecting wildlife habitat
1	2	3	4	5	c) Conserving natural areas for educational and scientific study
1	2	3	4	5	d) Providing scenic beauty
1	2	3	4	5	e) Protecting water quality
1	2	3	4	5	f) Protecting air quality
1	2	3	4	5	g) Providing income from tourist industry
1	2	3	4	5	h) Preserving unique plant and animal environments
1	2	3	4	5	i) Providing spiritual inspiration
1	2	3	4	5	j) Providing recreational opportunities (hiking, camping, fishing, hunting, wildlife viewing, etc.)
1	2	3	4	5	k) Knowing that in the future you have the option to go there if you choose
1	2	3	4	5	l) Knowing wilderness areas exist
1	2	3	4	5	m) Knowing that future generations will have wilderness areas

10. Currently some 5% (8,055,000 acres) of the Province is protected as wildlife and nature reserves, parks and historical sites. Are you satisfied with the current levels of protection? ___ **YES** ___ **NO**.
If **NO**, should ___ **MORE** or ___ **LESS** wilderness be protected?

Please keep in mind the next several questions are a hypothetical experiment intended to provide an economic measure of how strongly you value the protection of wilderness areas in Saskatchewan.

11. Assume that the only way to protect wilderness areas is for Saskatchewan households to support a special fund to be used exclusively for the purpose of protecting and managing wildlife and nature reserves, parks and historical sites in Saskatchewan. Please answer all three parts.

- (1) What is the maximum amount you would pay annually to ensure that current levels of protection (5% or 8,055,000 acres of Saskatchewan) prevail? \$ _____
- (2) What is the maximum amount you would pay annually to increase wilderness areas from 5% (8,055,000 acres) to 7.5% (12,083,000 acres) of Saskatchewan? \$ _____
- (3) What is the maximum amount you would pay annually to increase wilderness areas from 5% (8,055,000 acres) to 10% (16,111,000 acres) of Saskatchewan? \$ _____

Reasons: _____

12. If you answered zero to any of the above, was your answer zero because (only mark one):

- ___ a. you do not receive any benefits from the recreation opportunity or resource and therefore see no reason to pay?
- ___ b. you cannot afford it or your cost of living is already too high?
- ___ c. you feel that there is enough protection already?
- ___ d. other (please specify)

THANK YOU FOR YOUR PARTICIPATION

APPENDIX B
STATISTICAL ANALYSIS OF RECREATIONAL
ACTIVITY DIFFERENCES

Table B.1:
Results of Statistical Analysis of Difference in the Scores for Various Activities
at the PANP for Aboriginal and Saskatchewan Households

Activities	t-statistics	Statistically Different at	
		P=0.05	P=0.01
Walking	0.68	-	
Viewing Wildlife	1.07	-	
Camping	1.12	-	
Picnicking	1.06	-	
Swimming	0.61	-	
Fishing	-1.13	-	
Ice Fishing	1.83	-	
Boating	-1.19	-	
Hunting	1.99	*	
Snowmobiling	1.79	-	
Photography	-0.41	-	
Canoeing/Kayaking	-0.57	-	
Horseback Riding	1.53	-	
Hiking	-4.52		**
Sunbathing	-3.25		**
Snowshoeing	-0.36	-	
Mountain Biking	-2.96		**
Downhill Skiing	-4.30		**
Cross-Country Skiing	-7.56		**
Golfing	-7.84		**
Waterskiing/Tubing	-12.21		**
Tennis	-5.45		**
Sailing/Windsurfing	-10.22		**

APPENDIX C
PARTICIPATION IN VARIOUS LOCATIONS FOR RECREATION
ACTIVITIES BY SASKATCHEWAN HOUSEHOLDS

**Table C.1:
 Percent* of Respondents Participating at specified Location in 1993/94**

Activity	PANP	Sask. (incl. PANP)	Canada (Out of Sask.)	Outside Canada	None
Hiking	30	81	34	13	14
Picnicking	21	67	16	5	30
Viewing Wildlife	22	61	26	8	33
Camping	13	60	20	4	35
Swimming	17	61	15	6	35
Photography	15	45	27	12	36
Boating	13	62	7	2	37
Fishing	11	60	8	2	37
Hiking	17	47	19	8	46
Sunbathing	16	52	11	7	48
Golfing	13	49	12	7	50
Water Skiing/Tubing	6	31	1	1	70
Ice Fishing	1	30	1	0	70
Snowmobiling	0	25	1	1	75
Cross-Country Skiing	4	22	1	1	78
Mountain Biking	4	20	3	2	78
Hunting	0	22	0	0	78
Downhill Skiing	0	15	10	1	81
Canoeing/Kayaking	3	19	2	1	81
Tennis	1	11	2	2	89
Horseback Riding	2	10	2	1	90
Sailing/Windsurfing	1	8	1	1	91
Snowshoeing	0	2	0	0	95

* Numbers would not add up to 100 on account of multiple locations used by some respondents.

APPENDIX D

STATISTICAL ANALYSIS OF PARK FEATURES AND ACTIVITIES

Table D.1:
Results of Statistical Analysis of Difference in the Scores for Various Features
of the PANP for Aboriginal and Saskatchewan Households

Features	t-stat	Statistically Different at	
		P=0.05	P=0.01
Scenery	0.88	-	
Lakes	0.19	-	
Forest	0.21	-	
Grocery Store	3.47	-	**
Other Wildlife	1.86	-	
Moose	1.96	*	
Fish	1.69	-	
Birds	0.25	-	
Picnic Facilities	0.12	-	
Camping Facilities	-0.06	-	
Bear	1.06	-	
Beaches	-0.42	-	
Bison	0.26	-	
Outside Town	-1.04	-	
Restaurants	0.11	-	
Waskesiu Town	-0.72	-	
Hiking Trails	-1.17	-	
Trailer Park	-0.88	-	
Riding Stable	1.25	-	
Accommodations	-2.92	*	
Boat Dock	-1.72	-	
Grey Owl's Cabin	-1.18	-	
Rental Service	-1.70	-	
Boat Launch	-2.46	*	
Golf Course	-3.79		**
Paddlewheeler	-4.83		**
Tennis Courts	-2.72	*	
Bar and Liquor Store	-5.76		**

* Not significantly different.

APPENDIX E
DETERRENTS TO INCREASED PARK USE
BY SASKATCHEWAN HOUSEHOLDS

Table E.1:
Reasons for not Wanting to Visit the Park More, Saskatchewan Residents^a

Reason	Mean^b	St. Dev
own or use cabin elsewhere	43%	0.50
too expensive	36%	0.48
too developed/ commercialized	27%	0.45
too far	25%	0.43
too congested	23%	0.42
not enough time	17%	0.38
other parks are better	12%	0.32
snowmobiling prohibited	10%	0.30
hunting prohibited	7%	0.25
already spend enough time there	4%	0.19
didn't know about the park	3%	0.17
poor facilities	2%	0.14

^a Responses do not add up to 100% because respondents were able to choose more than one reason.

^b Based on 104 observations.

APPENDIX F
STATISTICAL ANALYSIS OF REASONS
FOR PRESERVATION OF WILDERNESS IN SASKATCHEWAN

**Table F.1:
 Results of Statistical Analysis of Difference in the Scores
 for Various Preservation Reasons by Aboriginal and Saskatchewan Households**

Reason	t-statistics	Statistically Different at	
		P=0.05	P=0.01
Water Quality	7.45		**
Future Generations	8.07		**
Knowing Wilderness Exists	5.13		**
Rare/Endangered Species	6.41		**
Air Quality	3.93		**
Wildlife Habitat	3.58		**
Scenic Beauty	5.95		**
Spiritual Inspiration	11.89		**
Unique Environments	1.53	-	
Option to Visit in Future	1.36	-	
Recreational Opportunities	-0.65	-	
Educational and Scientific Study	-0.93	-	
Revenue from Tourism	-1.51	-	