

**ECONOMIC ASPECTS OF
RECREATION ACTIVITY
AT THE
PRINCE ALBERT NATIONAL PARK**

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A Report

Submitted To:

The Prince Albert Model Forest Association

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EXECUTIVE SUMMARY

Recreation is becoming an increasingly important activity for Saskatchewan people. Various types of recreation that combine nature appreciation and the use of forestland are increasing in popularity. The Prince Albert National Park (PANP), a large component of the Prince Albert Model Forest, is a popular Saskatchewan resident destination for such recreation activities. This study examines the use of the PANP for recreation by Saskatchewan residents. The major objectives of this study are: (1) to describe socio-economic characteristics of the PANP visitors; (2) to document various types of activities undertaken by these visitors while within the PANP; (3) to assess visitor satisfaction from the visit to the PANP; (4) to estimate visitors' trip expenditures and their economic incidence; and (5) to estimate an economic value to the recreation activity at the PANP.

The study is based on a survey of PANP visitors conducted by the University of Manitoba during 1991. Initially the sample included 890 visitors. However, in order to carry out the economic valuation of recreation, all incomplete data sets were eliminated. The result was a sample of 174 visitors, of which 86 were campers and 80 were commercial and non-commercial accommodation guests (8 visitors did both).

The analyses of visitor characteristics and trip expenditures of campers and accommodation guests suggested that accommodation guests spent substantially more in the park than the campers. The majority of the accommodation guests' in-park expenditures (78%) were spent on lodging and food. Both groups tended to spend similar amounts en route to and from the park. Campers earned less and visited the park more frequently than the accommodation guests. Visitors were very satisfied with the park's facilities and features. The town of

Waskesiu was one of the park's main attractions as the majority of non-driving time was spent there.

The economic value of recreation is estimated at \$35 per person per recreation day in 1991 dollars. This benefit accrues annually and, thus, over the life of the park would amount to be a significant factor. If the goal of the Prince Albert Model Forest is multiple use management of forest lands, such values of forest resources should not be excluded.

ACKNOWLEDGEMENTS

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Chapter 1

INTRODUCTION

Wilderness provides wildlife habitat, recreational opportunities (i.e., hunting, fishing, camping and hiking) and commercial opportunities (i.e., ecotourism, hunting expeditions/camps, campgrounds, trapping, specialty forest products), and enhances environmental values such as biodiversity. Parks located in Northern Saskatchewan provide a combination of these opportunities. One such site is the Prince Albert National Park (PANP), located some 100 km north of the city of Prince Albert. Location of this park is shown in Figure 1.1.

Wilderness in the Prince Albert National Park consists of forests and lakes. The term "forests" is used to describe forest ecosystems that include soils, water, animals, micro-organisms, other plants, and of course trees. The town of Waskesiu is the centre of commercial development within the park boundaries. The Prince Albert National Park, a major component of the Prince Albert Model Forest, is a popular Saskatchewan resident recreation area.

1.1 Need for the Study

Recreation is becoming an increasingly more significant use of wilderness areas. The park is almost like a public good since it has no defined market value and no assigned property value. The non-commercial economic activity here can therefore be classified as a "non-market good". Since there are both economic and noneconomic benefits associated with recreation in the park, the Prince Albert National Park has social, cultural, environmental and economic significance. The economic value of the park consists of two components, use and non-use value. Use value is derived from the

actual use of the natural resource, whereas the non-use values are created by the mere presence of the resource. Management of forests, as well as designing alternative land use patterns, must consider all commercial and non-market values of the resources. Society is more easily convinced of the commercial values, particularly during periods of high unemployment. The non-market values are not easily recognized since they are not that visible to members of society. However, it is important that optimal forest use and management also be based on a common metric - total economic value. In addition, forest lands have multiple uses. In order to prioritize one use over another, one must have some notion of the economic trade-off between various uses. Such trade-offs cannot be developed unless all values are identified and estimated.

1.2 Objectives and Scope of the Study

The primary objective of this study is to estimate the value of recreation in the Prince Albert National Park using a non-market methodology of economic valuation. Secondary objectives of this study are as follows.

- i) to describe the sample visitor characteristics, particularly in terms of socio-economic descriptors;
- ii) to document the nature of activities undertaken by sample visitors while at the park;
- iii) to assess satisfaction of visitors from park facilities; and
- iv) to estimate the level, and nature of trip expenditures by visitors, including their economic incidence.

This study utilizes sample data collected in 1991, for the Prince Albert National Park, by the University of Manitoba. The data set provided information on several user groups of which one, the general user group, is significant for this study. The general user group was defined as any visitor passing through one of two park entry/exit gates. This was the only group for which necessary economic information for the current study was collected. Other groups included in the University of Manitoba survey were excluded from this analysis.

1.3 Organization of the Study

The rest of this report is organized under five chapters. Chapter 2 is a literature review on multiple use and valuation techniques of non-market commodities; Chapter 3 discusses study methodology. Chapter 4 summarizes characteristics of park users and other relevant information. In Chapter 5, results of the analytical model are presented, while Chapter 6 summarizes the conclusions of the study.

Chapter 2

CONCEPTUAL BACKGROUND

Economic values of a natural resource are a subset of the general values held by society. The total value may include, beside economic values, social (cultural, educational, among others), and ecological (environmental) values. Total economic value of forests comprise use-related values and those not associated with use, usually referred to as non-use values. The total use-related values can be identified into two mayor types: one, for which the market offers a reasonable facsimile of society's preferences, and two, where the market does not operate since a particular good is not traded at all. The latter categories of goods are known as non-market goods. Use values of non-market experiences result from either consumptive uses of a resource (ie., fishing or hunting) or from nonconsumptive uses such as hiking, skiing or canoeing.

The benefits of non market experiences are difficult to determine, in contrast to the benefits of market experiences which provide data on frequent and priced transactions.¹ Knowledge of market and non-market values is essential for resource allocation. Suppose an allocation decision is to be made for an area: either to use an area, with no close substitutes, in a manner compatible with the preservation of its natural environment, or to produce commercial goods in this area. Since the market would not efficiently select between the two uses mainly due to the difficulty in determining

¹ Harvesting of timber is a prime example since wood is bought and sold in the market place.

non-use and use values of the non-market experiences, decision makers must consider them in the decision making process.²

2.1 Concept of Public and Private Goods

Various goods procured and enjoyed by a typical consumer could fall into one of three categories: private good, public good, and a quasi-public good. In the context of recreation experience, for example, procurement of goods away from home is a typical private good purchase. Price is an indicator of the value of private goods. Unlike public goods, private goods are bought and sold in the market place. Public goods (i.e. national security and air) do not have property rights assign to them nor do they have a market price. A quasi-private good has some characteristics of both public and private goods. Quasi-private goods are not traded in an organized market, however, consumers can purchase these goods. Park recreation, fishing licenses and hunting permits are examples of quasi-private goods. Price for these goods is rarely an indicator of value.

2.2 Concept of Value and Its Measurement

Valuation of an activity such as recreation has its foundation in our concern for human wellbeing. Economic values, thus, constitute a part of the total well-being of humans. These values have their basis in benefit estimates; a good has value if it produces some benefits. A popular measure of economic value is the concept of consumer surplus, which is the amount people are net willing-to-pay

² Krutilla (1957) and Weisbrod (1964) are largely responsible for early literature on non-use values. They focused almost exclusively on option and bequest values.

for the good, rather than going without it. The net willingness-to-pay is measured relative to a reference point, such as the current market price facing consumers.

The Contingent Valuation Method (CVM) and the Travel Cost Method (TCM) are two economic valuation techniques that attempt to measure benefits of public resources.

2.2.1 The Contingent Valuation Method

The Contingent Valuation Method (CVM) directly values use and/or non-use values of natural resources by estimating Hicksian demand. A hypothetical market is created and responses to this market are then elicited. Because individuals factor in their own perceptions in a hypothetical market, biases are difficult to avoid.³

2.2.2 The Travel Cost Method

The Travel Cost Method avoids the hypothetical problem of the CVM by measuring actual users' expenditures. This method only measures user benefits. The TCM indirectly measures use values of non-market experiences by determining actual expenses incurred by travelling to and from a recreation site, plus expenses incurred during the stay. The TCM was first proposed by Hotelling in 1947. In 1959, Clawson was the first to use and apply a TCM that he developed independent of Hotelling (van Kooten 1993). Since this time the Travel Cost Method has developed continually to determine accurate and unbiased values in a more efficient manner.

³ For the present study, due to data limitations, the CVM could not be applied. This review is therefore brief. For a more detailed review of the Contingency Valuation Method see Loewen and Kulshreshtha (1995).

Using expenditures on fishing trips as an example, Bowes and Loomis (1980) show that an increase in travel costs can be considered equivalent to an increase in prices provided fishing trips are a non-essential commodity. This also suggests that travel costs can be combined with prices (i.e., entry fees or adventure fees) to form an overall price. Quantity is represented by the number of visits to the site or by the number of days spent recreating at the site. The uncompensated or Marshallian demand function, from which consumer surplus can be calculated, is derived from the use of distance travelled, expenses incurred by those consumers using the resource of concern along with user characteristics such as income, education, and site characteristics and substitutes (van Kooten 1993).

There are two main types of TCM: the Zonal TCM and the Individual TCM. In the Zonal TCM, a statistical relationship is sought between aggregate trips from a zone and the cost of travelling from a zone to the site. The zones are origin generated, whereby recreationists are grouped into zones around the site. Per capita visits from each origin is then regressed on the independent explanatory variables (Luzar, Hotvedt and Gan 1992). The Individual TCM derives a demand function by approximating the statistical correlation between an individual's quantity of visits and travel distance/expenses and other independent explanatory variables (Bergstrom and Cordell 1991, Luzar, Hotvedt and Gan 1992).

Bergstrom and Cordell (1991) identify advantages and disadvantages for both the Zonal TCM and the Individual TCM. The Zonal TCM demands less data and adjusts for both probability and frequency of participation using ordinary least squares approach to estimate a single equation. The Individual TCM only considers the frequency of participation; however, individual variation in demand behaviour is retained, because, unlike the Zonal TCM, the individual observations are not aggregated into zones. The Zonal TCM loses within zone demand variation because of the

aggregation of the recreationists. The Zonal TCM can be effective for recreation demand analysis on the broad population level. The Individual TCM is more effective for demand behaviour because the relationship between individual consumer characteristics and recreation demand is represented.

Adamowicz (1992) suggests three variations of the Travel Cost Method: the basic TCM, the Discrete Choice Model, and the hedonic TCM. The Discrete Choice Model is useful for alterations in site characteristics or quantities. The hedonic Travel Cost Method attempts to measure quality effects. The hedonic TCM is similar to the hedonic price method, but property values are replaced by travel costs (Johansson 1987). Using a numerical scale, a value to each relevant site characteristic can be determined. Basically, shadow prices (implicit values) of each site characteristic can be produced by regressing cost incurred by the recreationist against each attribute. According to Brown and Mendelsohn (1984), the basic TCM is able to measure the value of the Colorado River; however, the hedonic TCM can value the River's scenic quality, congestion, fish density and/or water quality. Although time consuming, the basic TCM can also account for quality changes. If the demand equation is estimated with and without a proposed modification in site quality, the calculated difference would be equal to the net benefit of the change. However, limitations are quite evident when using the basic TCM to measure quality changes.

The basic TCM uses travel costs as a proxy for the price of a recreational site visit. The estimated TCM demand equation is more extensive than merely relating price and quantity. Income, education and site characteristics may also have profound influence on demand. The Travel Cost Method works best when (1) the choice of site is fixed but visit length changes, (2) there are large travelling distances to the site, and (3) people stay shorter or longer times due to quality changes (van

Kooten 1993). The basic individual TCM will be sufficient for the current purpose of developing recreational demand functions so that consumer surpluses can be calculated.

Travel costs do not measure values recreationists derive from an opportunity, but rather the willingness of consumers to pay for access to an opportunity (Rosenthal, Loomis and Peterson 1984). The net economic value of an existing site can be determined, but should be considered a lower bound to the actual or true value. There are five major uses of the Travel Cost Method:

- i) to determine net economic value of existing sites,
- ii) to determine net economic value of modifying a site,
- iii) to determine net economic losses from loss of or damage to a site,
- iv) to predict recreationists' behaviour, and
- v) to forecast changes in the use of a recreation site resulting from charging or changing fees.

This study provides an application of the TCM to estimate net economic value of recreation experience at the Prince Albert National Park.

The TCM makes explicit assumptions about individuals' behaviours and perceptions. Actual expenditures are measured, whereas the Contingent Valuation Method depends on individuals to factor in their own perceptions in a hypothetical market.

Chapter 3

SURVEY OF PARK VISITORS

The major purpose of this chapter is to provide a brief description of the data collection used which served the basis for the results of this report. It must be noted that the data used here were collected earlier by another agency, and simply introduced/included here to estimate a value to the recreation activity.

3.1. Source of Data

Information used for this report was collected originally by the University of Manitoba (see Fox *et al.* 1992). At the outset, it should be noted that the emphasis of the survey in the Manitoba report was on the evaluation of the Prince Albert National Park's performance, not on the non-market valuation. Five different park users were surveyed, namely, general users, backcountry users, campground users, seasonal residents and lake users. For the purposes of this study data from the general users only were used. Details on expenditures, however, were collected only for general users. The general user group consisted of campers (tent, trailer and backcountry campers), accommodation guests (motel/hotel goers, cottage renters and cottage borrowers), day visitors and miscellaneous visitors.

During the University of Manitoba survey, vehicles were stopped at the two park entrance gates and names and addresses were collected. This procedure occurred on randomly selected days. Surveys were then mailed out to the collected addresses. Data were statistically analyzed using SPSS (Norusis 1988) and SHAZAM (White *et al.* 1990).

3.2 Response Rates

The sample size used in the Travel Cost analysis was smaller than the original number of responses. Originally, a total of 1,589 names and addresses were collected, of which 982 individuals returned surveys containing useable data, as reported in the 1991 Visitor Survey (Fox *et al.* 1992). These responses were screened for useability. To be classified as useable for the current study, observations had to meet the following criteria:

- i) The primary purpose of visiting the park was for recreation;
- ii) The park was the main trip destination;
- iii) The visitor was a backcountry camper, tent or trailer camper, hotel/motel guest, cottage renter, cottage borrower or any combination;
- iv) The respondent stayed in the park at least one night,
- v) No responses were outliers (e.g., expenditures too high or too low); and,
- vi) No significant responses were missing.

The end result was a sample size of 174 recreationalists (Table 3.1). Respondents indicating that they only visited for the day were assumed to be local residents and were excluded because they have small travel distances and costs, conditions under which the Travel Cost Method does not work well. Also, difficulty was encountered in determining whether or not a respondent was a day visitor. A summary of the type of visitor comprising the sample used for Travel Cost analysis is provided in Table 3.2.

According to the figures presented in Table 3.2, half of the respondents visited the PANP for camping, almost another quarter used the commercial facilities, and the rest were cottage renters or borrowers. Back country camping type of visitors represented only a very small proportion of the total.

**Table 3.1:
Response Rates**

Particulars	Number
Surveys Mailed	1,589
Returns Containing Useable Data	982
Useable Returns for this Study	174

**Table 3.2:
Type of Visitor in Travel Cost Analysis**

Visitor Type	% of Total Respondents
Campers (Trailer or Tent)	47.7
Hotel/Motel Guests	21.3
Cottage Renters	20.7
Cottage Borrowers	4.0
Campers (Backcountry)	1.7
Combination	4.6
Total	100.0

Chapter 4

CHARACTERISTICS OF GENERAL PARK USERS

The major purpose of this Chapter is to present the salient features of visitors to the PANP included in the estimation of the value of recreation. The Chapter is divided into 3 Sections. The visitor characterization is presented in Section 4.1, which is followed by the nature of visitor activities in Section 4.2, and by visitor satisfaction in Section 4.3. The last Section contains visitor expenditures for the two categories of visitors.

4.1 Visitor Characterization

As noted earlier in this report, a total of 174 visitors were used for carrying out further analysis. Of these, 86 were campers, and 80 used commercial accommodations, including eight that did both.

Generally, overnight park visitors stayed nearly 4.5 nights on average. Park visitors typically travelled in groups of four. The average respondent earned an annual personal income of \$33,500 and had about two years of post secondary education. In the past 2.5 years (1989-1991), these respondents typically have made nearly 3 trips (spending a total of 10 days) to the Prince Albert National Park.

There are some significant differences between two major park user groups, namely, campers and accommodation guests. Compared to commercial accommodation guests, the campers earned \$9,000 a year less, and in the past 2.5 years tended to have visited the park more. Group size, nights spent in the park and level of education were similar for both groups. Table 4.1 provides a summary of some general visitor characteristics.

**Table 4.1:
 Visitor Characteristics for Sample Visitors^a**

	TOTAL ^b (174)	Campers (86)	Accommodation Guests (80)	Combination (8)
Expenses ^c	\$37.05	\$23.35	\$53.71	17.78
Group Size	3.90	3.87	3.75	5.63
Nights Stayed	4.37	4.37	4.03	7.88
Income	\$33,500	\$29,100	\$37,900	\$37,500
Education	13-15 years	13-15 years	13-15 years	13-15 years
Days Past ^d	9.78	11.45	7.91	10.56
Trips Past ^e	2.70	3.26	2.11	2.38

^a Number of observations are in parentheses.

^b Totals include only overnight guests. The total sample size includes individuals who camped, stayed in accommodations and those who did both.

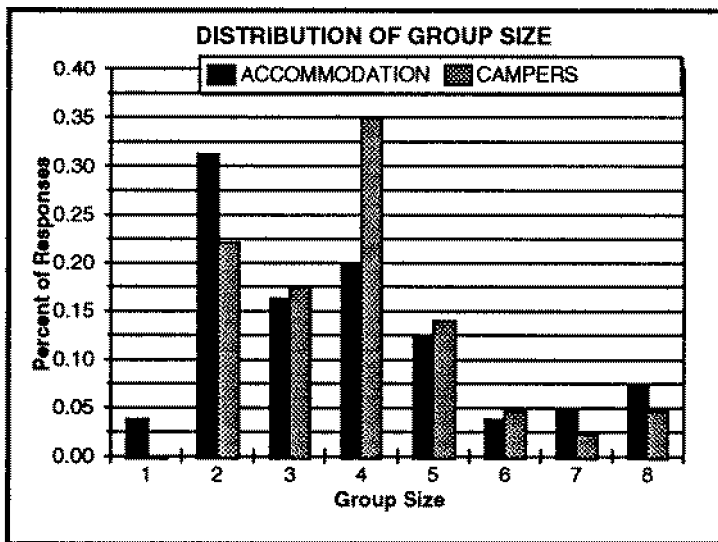
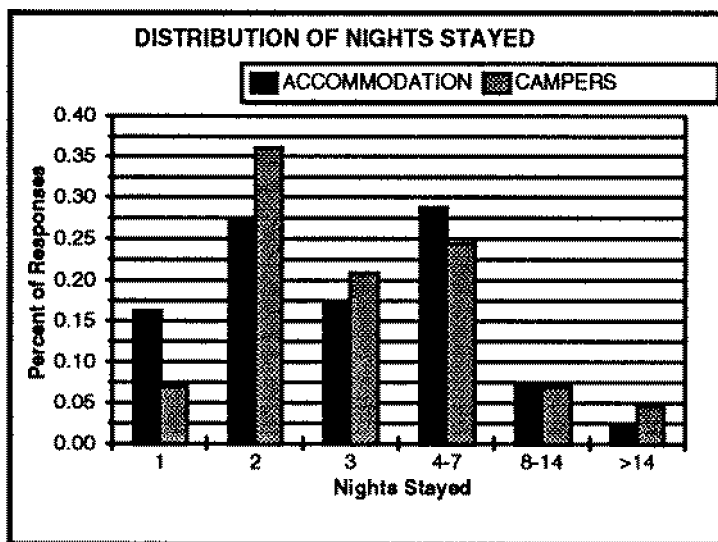
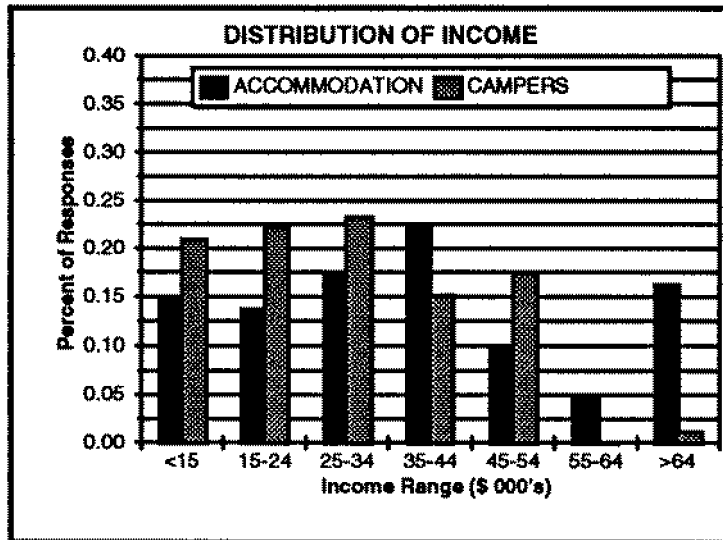
^c Expenses are calculated as per night per person.

^d Days Past equals the estimated number of days spent in the park in the past 2.5 years. Days past is derived from past trips where a 1 day visit equals 1 day, a 2 to 7 day visit equals 4.5 days and a greater than one week visit equals 10 days.

^e Trips Past equals the number of trips taken to the park in the past 2.5 years.

Figure 4.1 displays the frequency distribution of income, group size and nights stayed for each of the two groups. Over 20% of the accommodation guests and only 1% of the campers earned income over \$55,000 per year. A third of the accommodation guests visited the park in groups of 2, while over a third of the campers travelled in groups of 4. The majority of visitors spent more than one night in the park.

Figure 4.1: Frequency Distribution of Income, Nights Stayed & Group Size for Visitors to the PANP



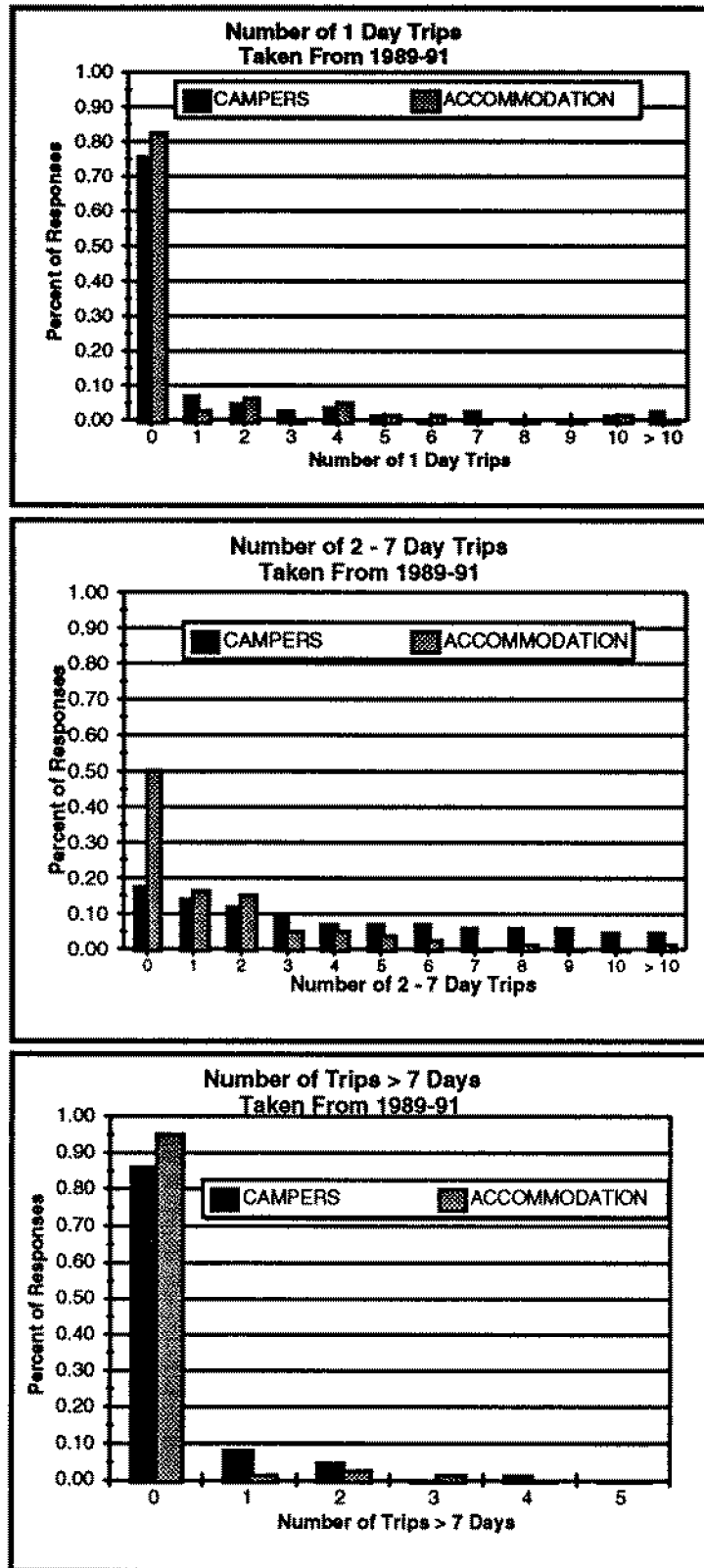
In the past 2.5 years (1989-1991) overnight visitors have typically made visits to the PANP for a duration of 2 to 7 days. Few visitors have made trips to the park lasting longer than a week, while even fewer visitors have made day trips in the same time frame. Figure 4.2 summarizes, for both groups, the frequency distribution of trip length for visits made from 1989 to 1991.

Accommodation guests allocated about 95% of their time between Waskesiu Lake and the town. The majority of time for both groups was spent in town (see Figure 4.3). Campers on average spent the highest portion of their time (10%) away from the town and Waskesiu Lake. The amount of time spent in town was quite surprising considering the vast accessible wilderness the park has to offer in terms of its natural beauty and peacefulness away from civilization. Campers and accommodation guests spent, respectively, 48% and 29% of their non-driving time outside the town.

4.2 Park Utilization

Some of the more popular activities common to both groups were pleasure driving, day hiking, picnicking, wildlife viewing, swimming, restaurant dining and retail shopping. Participation rates between campers and accommodation guests differed substantially for various activities. Campers had greater participation in picnicking and swimming, whereas accommodation guests had greater participation in golfing, motor boating, restaurant dining and retail shopping. Similar participation rates, above 20%, were evident between campers and accommodation guests for day hiking, wildlife viewing, nature study, photography, pleasure driving and fishing. Participation rates for numerous activities are summarized in Table 4.2.

Figure 4.2. Frequency Distribution of Past PANP Visits (1989-1991) by Various Types of Visitors



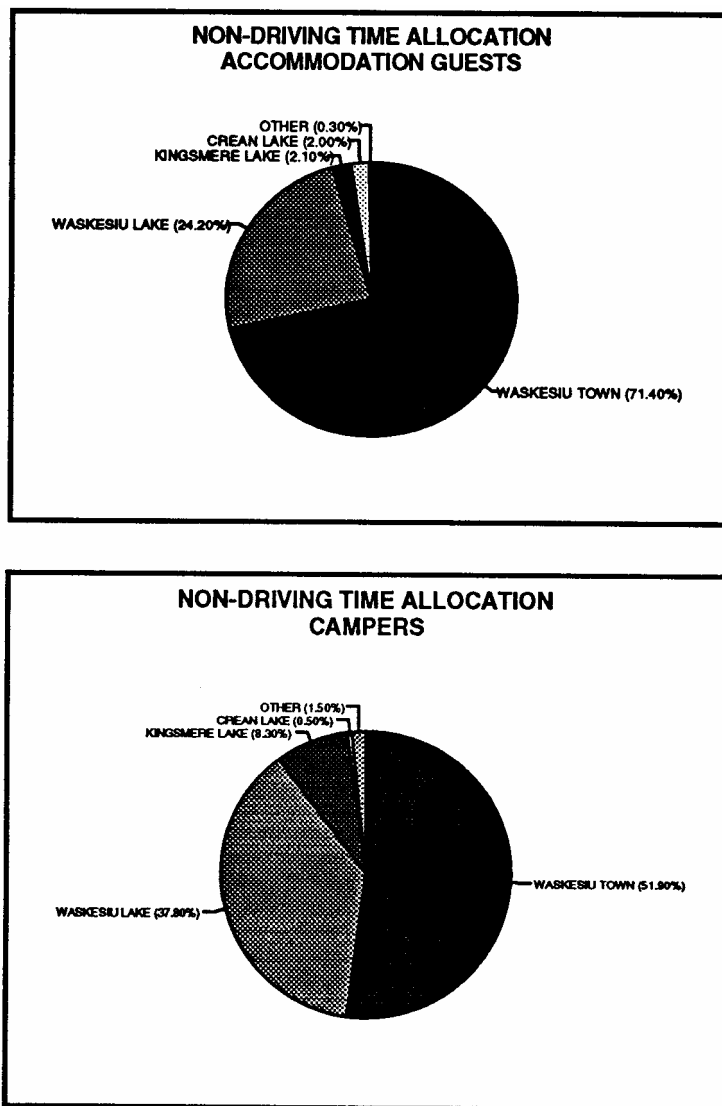


Figure 4.3: Non-Driving Time Allocation for Campers and Accommodation Guests at the PANP

**Table 4.2:
 Participation Rates in Specified Activities by PANP Visitors**

Activity	Campers^a (86) %	Accommodation^a (80) %
Day Hiking	42	48.5
Backpacking	6	4
Picnicking	51	39
Wildlife Viewing	47.5	54
Nature Study	28	28.5
Photography	23.5	23
Trail Biking	4.5	12
Road Biking	22	17.5
Pleasure Driving	52.5	59.5
Art	6	5.5
Horseback Riding	4.5	13.5
Golfing	20	44.5
Tennis	13	16
Lawn Bowling	6	7
Fishing	23.5	19
Swimming	74.5	58
Scuba/Snorkiing	3.5	4
Canoeing	14	4
Sailing	1	1.5
Windsurfing	0	2.5
Kayaking	1	0
Motor Boating	17.5	24.5
Waterskiing	11.5	11
Restaurant Dining	45.5	67.5
Retail Shopping	49	65
Paddle Wheeler	8	12

^a Number of observations are in parentheses.

Campers tended to participate in 7 activities during their trip and accommodation guests averaged 6.5 activities per trip.

4.3 Visitor Satisfaction

Prince Albert National Park visitors felt that the park was being managed more than satisfactorily. Park and town congestion, particularly on weekends, seemed to be a slight problem to campers and day visitors, as were also beach litter, consumption of alcohol, and inconsiderate people. Visitor attitudes are quantified in Table 4.3.

Generally campers and accommodation guests appeared to be satisfied with park features and facilities. Table 4.4 presents satisfaction levels for various park features and facilities. It is interesting to note how similar the levels of satisfaction were between the two groups. Mean responses for accommodation guests and campers ranged from either satisfied or dissatisfied with insects to more than satisfied with golf facilities and beaches.

Use rates of the beaches, restrooms, parking lots, signs and information were high across visitor types. Over 40% of the overnight visitors were involved with a guided nature program. Table 4.4 also displays use rates of specified features.

The grocery store and restaurants were used by over 80% of both the campers and accommodation guests (see Table 4.5). The use rates of souvenir shops were about 10% a greater for accommodation guests, while use rates of the gas service were 10% greater for campers. Table 4.5 summarizes the use rates for selected park services.

**Table 4.3:
 Potential Park Problems Identified by PANP Visitors, by Type**

Item	Average Score ^a	
	Campers (79-85) ^b	Accommodation (68-72) ^b
Town Congestion	1.60	1.30
Too Many People on Weekdays	1.29	1.16
Too Many People on Weekends	2.08	1.56
Too Many Boats	1.36	1.20
Too Much Law Enforcement	1.25	1.09
Not Enough Law Enforcement	1.41	1.04
Unfriendly Commercial Personnel	1.27	1.13
Unfriendly Park Service	1.21	1.07
Inconsiderate People	1.75	1.24
Dirty Facilities	1.36	1.22
Litter on Beaches	1.72	1.57
Drinking	1.69	1.25
Vandalism	1.33	1.25

^a A scale of 1 (not a problem) to 5 (very serious problem) is used.

^b Number of observations are in parentheses. A range is reported because the number of valid observations varied depending on the item.

Table 4.4:
Park Feature/Facility Satisfaction and Use Rate^a

Features and Facilities	Satisfaction Level ^b		Use Rates (%)	
	Camp	Accom	Camp	Accom
Beaches	4.4	4.2	85.5	77.5
Boat Ramps	3.9	3.9	33.5	40.5
Restroom	4.0	3.9	91.5	85
Rental Boats	3.7	3.8	28.5	28.5
Parking lots	4.1	3.9	89	84
Showers	4.0	3.8	77	37.5
Golf Facilities	4.6	4.3	33.5	58
Tennis Facilities	3.9	3.9	28.5	26.5
Tent Sites	3.8	n/a	68.5	n/a
Signs and Information	4.0	3.9	99	97.5
Playgrounds	3.9	4.0	43.5	49.5
Info Centre	3.9	4.1	69	64
Nature Centre	4.1	4.1	58	65
Dumping Stations	4.0	3.4	32.5	16.5
Laundry Facilities	3.6	3.9	30	28.5
Picnic Table & Grills	4.1	4.0	85.5	62.5
Marinas	3.9	3.6	34	35
Change Rooms on Beach	3.9	3.9	56	36.5
Courtesy of Attendants	4.0	4.1	93	74.5
Garbage Facilities	4.1	3.9	93	73.5
Bug/Insects	2.9	3.0	n/a	n/a
Goat Weather	3.7	4.1	n/a	n/a
Guided Nature Programs	4.1	3.8	43	41.5

^a Valid observations varied from 79-84 for campers, 72-76 for accommodation guests and 17-20 for day visitors.

^b A scale of 1 (very dissatisfied) to 5 (very satisfied) is used.

n/a not applicable.

**Table 4.5:
Use Rates of Services by PANP Visitors**

Service	Campers (%)	Accommodation Guests (%)
Grocery Store	85	88
Restaurants	72	82
Souvenir Shops	47	58
Gas	49	39
Lounge/Bar	12	28
Laundry	15	14

4.4 Visitor Expenditures

Accommodation guests typically spent over double the amount spent by campers on their PANP visit. Accommodation guest spending inside the park was near triple that of campers, however, en-route expenditures by both groups were quite similar. Table 4.6 presents a summary of trip expenditures.

Considering total trip expenditures on a per person per night stay basis, over 50% of the campers spent less than \$20, while another 35% spent between \$20 and \$40. About 85% of the accommodation guests spent more than \$20. When in-park expenditures were isolated, 80% of campers and 23% of accommodation guests incurred under \$20 for the trip. For the majority of visitors en-route expenditures were under \$40 per person per trip for both groups. Figure 4.4 illustrates the frequency distribution of total expenses and in-park expenses per person per night stayed and en-route expenditures per person per trip for campers and accommodation guests.

Of total expenditures, accommodation guests spent 84% in the park, while campers spent 63% in the park. Not surprisingly, slightly over half of the accommodation guests' in-park

**Table 4.6:
 Visitor Expenditures^a**

	Campers (86)	Accommodation Guests (80)	Overall Average (174)
Total Expenses^a			
/person/night	\$23.35	\$53.71	\$37.05
/person/trip	\$77.07	\$171.85	\$122.80
/group/trip	\$274.26	\$581.42	\$434.85
<i>-In Park/group</i>	63%	83%	76.5%
<i>-En-Route/group</i>	37%	17%	23.5%
In-Park Expenses			
/person/night	\$12.72	\$41.66	\$26.05
/person/trip	\$47.12	\$140.08	\$92.17
/group/trip	\$172.20	\$482.94	\$332.74
En-route Expenses			
/person/trip	\$29.95	\$31.77	\$30.63
/group/trip	\$102.06	\$98.48	\$102.11

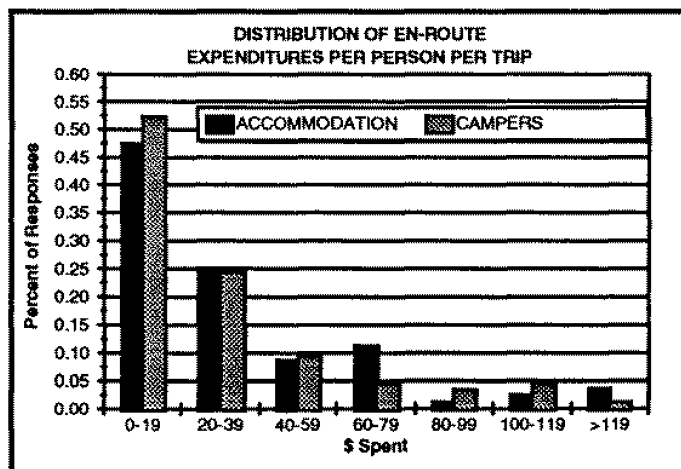
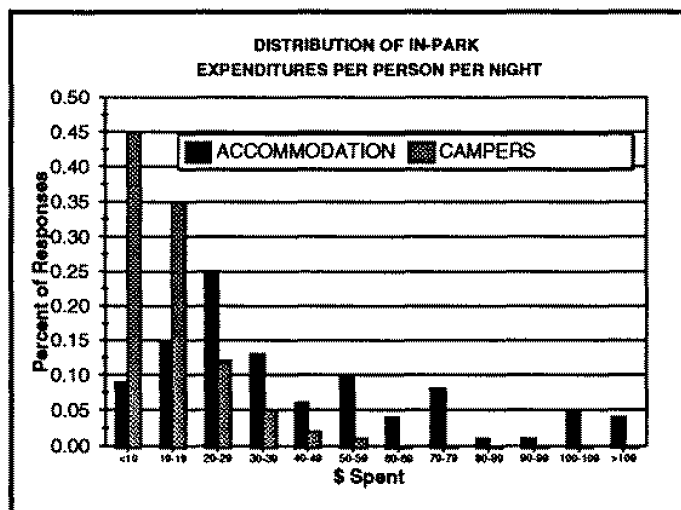
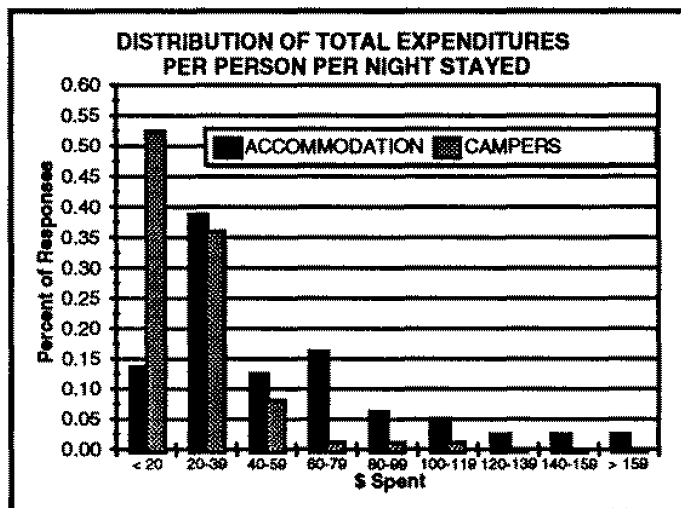
^a Total expenses are expenses incurred travelling to and from the park as well as expenses incurred while in the park.

expenditures was spent on lodging and a quarter on food. Approximately 14% was spent on entertainment. In comparison, 31% of the campers' in-park expenditures was incurred for food, 27% for entertainment, 21% for lodging and 12% for transportation. Figures 4.5, 4.6, 4.7 and 4.8 display a breakdown of group expenditures.

Campers spent more than accommodation guests on in-park transportation, although for every other in - park expenditure the accommodation guests on average spent substantially more than the campers. En-route expenditures (to and from the park) for the overnight visitors were near \$100.⁴

⁴ For more information on expenditures see Lafontaine and Perron (1993).

Figure 4.4: Frequency Distribution of Total, In-Park and En-Route Expenditures for PANP Visitors by Type of Visitor



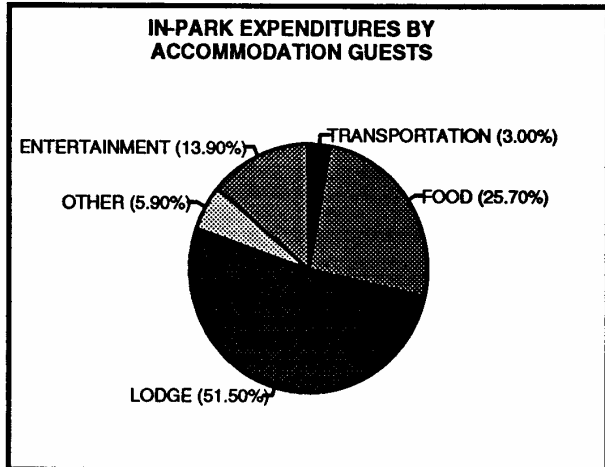


Figure 4.5: Accommodation Guest In-Park Expenditure Breakdown (\$41.66/person/night stayed)

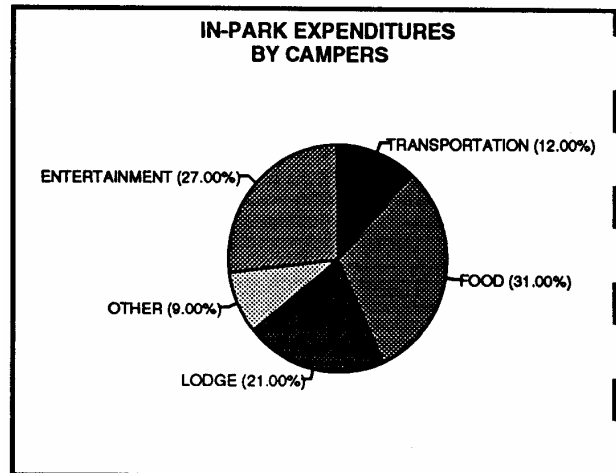


Figure 4.6: Camper In-Park Expenditure Breakdown (\$12.72/person/night stayed)

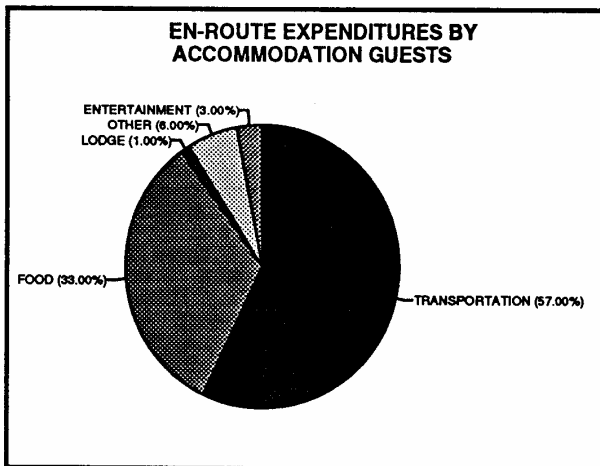


Figure 4.7: Accommodation Guest En-Route Expenditure Breakdown (\$31.77/person/trip)

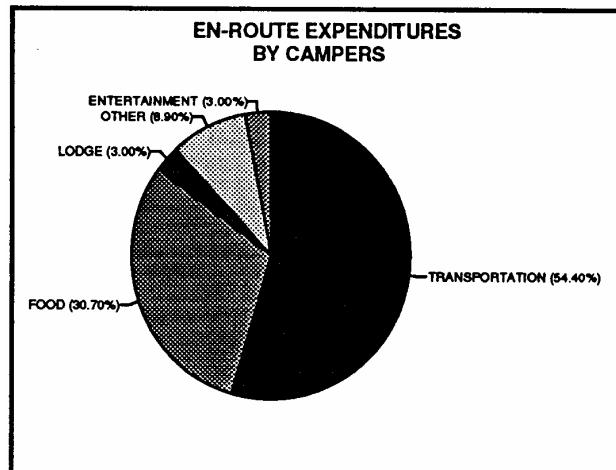


Figure 4.8: Camper En-Route Expenditure Breakdown (\$29.95/person/trip)

Chapter 5

ECONOMIC VALUE OF RECREATION

In this chapter, a travel cost model is estimated for recreation in the Prince Albert National Park. An estimate of economic consumer surplus is provided for recreation in the park. Consumer surplus is a measure of the area under the demand curve above price. Basically, consumer surplus estimates the amount that consumers are willing to pay that is not already captured by the market place.

5.1 Considerations Involved in the Estimation of Travel Cost Models

5.1.1 Functional Form

The choice of functional form to be used in a TCM is a somewhat arbitrary process, as theory provides little guidance in this area (Kealy and Bishop 1986). The linear, semilog, log-log, and quadratic models have been used in past non-market valuation studies (Luxar, Hotvedt and Gan 1992). Adamowicz, Fletcher and Graham-Tomasi (1989) suggest that "if two forms are relatively similar regarding overall fit (judged via t- and F-statistics), but one has a smaller variance of the associated welfare measure, that form should be selected" (p.420).

5.1.2 Methods of Estimation

The most recent literature advocates the use of maximum likelihood estimation (MLE) rather than ordinary least squares (OLS) to determine use values. These two methods are the only relevant choices for on-site surveys (Smith 1988). It is suggested that OLS estimation leads

to biased coefficient estimates when truncated and/or censored data are encountered. Truncated data are common to on-site surveys since only information for users is obtained. Information on nonparticipants is not available through these types of surveys (Smith 1988). Censored data occur when the dependent variable, the number of trips taken or days spent visiting, can only take on non-negative values. The OLS (normally distributed error term) implies that the dependent variable can range from $+\infty$ to $-\infty$. Without information on both non-users and users for recreation data, it is recommended by Fletcher, Adamowicz and Graham-Tomasi (1990) to use maximum likelihood estimation. However, Balkan and Kahn (1988) found that there was little difference in estimated consumer surpluses between the two methods. When quality changes of recreational activities were valued, OLS and MLE gave significantly different results. Another study by Kealy and Bishop (1985) found that OLS produced a consumer surplus 3.5 times larger than that based on MLE. Maximum likelihood estimation requires an assumption to be made regarding the distribution of the errors.

5.1.3 Sources of Biases in Travel Cost Models

In the TCM, time costs, multi-destination trips and substitute difficulties may occur. Failure to include cost of travel time can result in the underestimation of site value (Gunton 1991). Recreationists include travel time and on-site time in the decision for recreational consumption as there is an associated opportunity cost. Clearly, the value of time is at most equal to the recreationist's wage rate, and at minimum, equal to zero. Cesario (1976) suggests that time costs should be between a quarter to a half of wage rates based on recreational travel time; as well, he indicates that the shadow price of travel time will likely be much lower than

the wage rate. However, there is no convincing evidence that households consider work travel time and recreational travel time as equivalent commodities (Johansson 1987). Thus, there is a great deal of uncertainty when including time.

It is evident that including time will increase the estimated value of the recreational site, but it is not clear whether including or excluding time results in a model that is closer to the true behavioral model (Fletcher, Adamowicz and Graham-Tomasi 1990). Information on the types of travel time (which will likely result in different opportunity costs of time) is necessary before time is included in the model. For instance, an individual vacationing on a paid holiday or a weekend will likely perceive the value of time differently from an individual taking unpaid time off work. The difficulty with including time value is the level of subjectivity involved in determining its value.

Substitute sites can create another problem, namely, site value overestimation, if they are not properly represented in the model (Seller 1985). Rosenthal (1987) found that Travel Cost models yield higher per person consumer surplus estimates when substitute prices were omitted. If substitutes exist and are not considered, missing variable bias will exist (Seller 1985). One way around this problem is to develop a regional study that will estimate benefits for a group of sites or to include a substitute variable in the demand equation.

Multidestination trips produce the expected difficulty of efficiently allocating expenses. Removing these observations from the analysis is the easiest way to resolve the problem, as long as the number of multidestination observations are small.

5.2 Study Methodology

A travel cost model was used to estimate recreational demand and ultimately consumer surplus. The quadratic functional form was applied in this study, as it statistically fit the data best judged via F-statistics, t-statistics, correct variable signs and residuals squared. Results for other models are presented in Appendix A. As noted earlier time and substitutes can influence results; however, unfortunately, due to the data constraints this study was unable to account for time and substitute sites. To avoid difficulties with multideestination sites, observations were excluded from analysis if the PANP was not the main trip destination.

Maximum likelihood estimation and ordinary least squares have been used to determine use values. Since both methods are imperfect, ordinary least squares is used in this study because of its simplicity. Residual plot examination was performed for recreation in the PANP and the errors visually characterized a normal distribution, supporting the use of OLS. More details are provided in Appendix B.

5.3 Estimates of Recreation Demand

5.3.1 Specification of the Travel Cost Model

The dependent variable used in the Travel Cost model was the number of nights spent on the reported visit. The length of visit was regressed on price and several socioeconomic variables - income, age, education, experience and household size. Several functional forms were examined and the quadratic functional form was the chosen form for Travel Cost analysis. This form typically fit the data best according to t-statistics, F-statistics, R^2 and correct variable signs. While "price" variable was included in the regression first, the other variables were included in

a stepwise fashion (Norusis 1988, p. 56). In this model the length of visit (Y) is a function of price (P), price squared (P²) and several socioeconomic variables (S) as depicted in the following two equations:

$$Y_i = f(P_i, P_i^2, S_i) \quad (5.1) \text{ or}$$

$$Y_i = a + b_1 P_i + b_2 P_i^2 + \sum_{j=1}^k c_j S_{ji} \quad (5.1a)$$

5.3.2 Estimation of Consumer Surplus

A frequently used measure of economic value for a consumer good is consumer surplus. This measure reflects the benefits derived by consumers through using a given consumer good. Consumer surplus is defined as the area beneath a consumer's demand curve but above the actual price paid. In Figure 5.1, demand for recreation is shown by the curve DD' - which takes into account the effect of substitute sites. The demand curve D₁D₁' excludes the substitute sites, and therefore, would lie to the right of the earlier demand curve. Let the cost of the recreation experience be ob - actual price paid. The consumer surplus is the shaded area in Figure 5.1, demarcated by abc. The consumer surplus using a demand curve excluding substitute sites would be higher than area "abc" since it would include area "S" - the area between the demand curves D₁D₁' and DD' but above the price line.

To calculate consumer surplus for the Prince Albert National Park overnight visitors, the following equation was used:

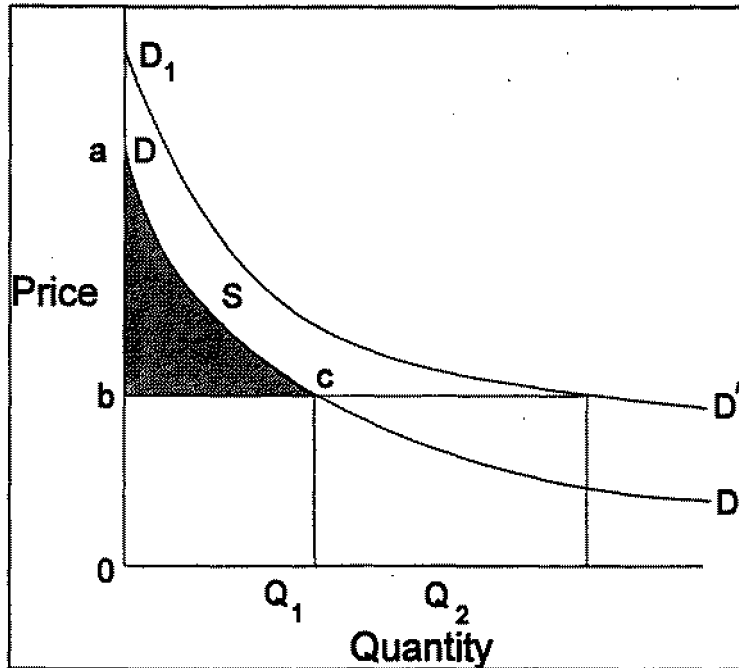


Figure 5.1: Concept of Consumer Surplus for Recreation Demand

$$CS = Q + b_1 (c) + 2 b_2 P (c) + b_2 (c)^2 \quad (5.2)$$

where, Q represents the mean actual number of nights spent in the PANP, b_1 and b_2 are the coefficients in equation (5.1a); P is the mean estimated cost of the trip and c is the additional cost. Only the coefficients on the two price variables are considered in the calculation, other variables are collapsed. Following procedures explained by Ziemer, Musser and Hill (1980), consumer surplus was calculated by increasing "c" to the point where the dependent variable, number of nights, becomes zero, and calculating the area under the demand curve. If the statistical demand curve reaches a minimum before touching the additional cost axis, the dependent variable will begin to increase. This response is not logical and thus if the minimum point was reached before the dependent variable reached zero the dependent variable would be set at zero (Gum and Martin 1975).

5.3.3 Results for the Estimated Model

Travel Cost model of visitors to the PANP was estimated for the combined sample of 174 visitors. The factors affecting this cost included price, experience, income and age as significant variables, as shown in Table 5.1. The coefficients on age, income and experience were positive. Experience was measured by the number of days spent in the Prince Albert National Park in the past 2.5 years, as most visitors were repeat visitors. The greater the experience, the more nights the respondent stayed on the most recent trip. Also, the older the respondent, the longer was the length of stay in the park. Price was measured as expenses incurred in and en route to the park on a per person per night basis. Price had the expected influence on the length of stay; as the price increased the stay shortened. The independent variables explain nearly half of the variation in the dependent variable.

As can be expected when using the quadratic functional form, the two price variables have a high degree of correlation between them. Multicollinearity was examined for all other variables using pairwise and auxiliary regressions and was not found to be a problem. Heteroscedasticity⁴ was apparent in a residual plot from the initial OLS and was confirmed by the Goldfeld-Quandt procedure. Correction for heteroscedasticity was accomplished by weighted least squares using the SHAZAM software (see White *et al.* 1990). Results are presented in Appendix C. However, since results were not substantially different, consumer surplus estimates were made using results in Table 5.1.

⁴ Heteroscedasticity is an econometric problem usually present in cross-sectional data sets. The error terms display a tendency of varying with change in an independent variable. For example, visitors with higher income would have a larger variance in their expenditures than those with lower incomes. Such tendencies in data would lead to this type of problem.

**Table 5.1:
 Regression Results with Nights Stayed as the Dependent Variable^a**

Variable/ Particulars	Regression Coefficient and (t-value)
Price ^b	-0.101 (-3.77)
Price Squared	0.00048 (2.66)
Experience ^c	0.072 (3.07)
Age	0.071 (2.42)
Constant	3.545 (2.93)
F-statistic	9.66
R ² Adjusted	0.17
Sample Size	174
Consumer Surplus ^d	\$35/day

^a t-statistics are in parentheses.

^b Price is a per person per night price calculated by summing up travel expenses with expenses incurred in the park divided by the group size and the number of nights spent in the park.

^c Experience is measured by the number of days the respondent visited the park in the past 2.5 years.

^d Consumer surplus is calculated by determining the area under the demand curve above price using Equation (5.2).

5.3.4 Estimated Value of Consumer Surplus

The calculated consumer surplus for the overnight park visitors was approximately \$35 per person per recreation day. This is in 1991 dollars. This value is comparable to that presented by other studies. Wilderness related recreation values ranged from \$16 for fishing in Pennsylvania to \$90 for hiking /backpacking in Washington and Oregon (Shafer *et al* 1993). Consumer surplus values for recreation in southern Alberta was estimated to be \$4-15 per day (Wilman and Perras 1987). Consumer surplus estimates (from 1970-1980) for some American states ranged from \$3-11 per recreation day for picnicking, \$6-14 per recreation day for camping, \$10-18 day for wilderness and \$10-16 per day for hiking (Sorg and Loomis 1984).

Chapter 6

SUMMARY AND CONCLUSIONS

Visitors to the Prince Albert National Park during 1991 were analyzed in this report. The major objective of the study was to estimate the economic value of recreation activity at the park. The travel cost method of non-market valuation was used in this study. Study of visitor characteristics and satisfaction with the park was a secondary objective of this study. Two groups of visitors were analyzed: campers and accommodation guests.

Generally, Prince Albert National Park visitors were more than satisfied with the park's facilities and features. The town of Waskesiu does have a significant role as the majority of nondriving time is spent there; hence, it is an obvious park attraction and an asset. Of the two groups considered in this report, accommodation guests spent substantially more than the campers. The majority of accommodation guest expenditures (78%) was on lodging and food. En-route expenses for the two overnight visitor groups were similar.

Consumer surplus for recreation in the Prince Albert National Park was calculated using a travel cost model. The two price variables - cost of the trip and its squared form - were strongly significant and had a theoretically consistent relationship with the dependent variable, length of visit. The calculated consumer surplus was \$35 per day.

Multiple use management of forests in Saskatchewan is at an elementary stage. Markets alone are inadequate to make efficient allocation choices when dealing with non-market and market uses of public resources. The common goal of multiple use management of public forestland should be to maximize the public benefit. One such benefit of increasing importance

is recreation. It is hoped the information presented here would be of some use to policy makers engaged in forest land use management.

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APPENDIX A

RESULTS FOR ALTERNATIVE FUNCTIONAL FORMS

FOR THE TRAVEL COST MODEL

**Table A.1:
 Linear Regression Results with Nights Stayed as the Dependent Variable**

Variable	Regression Coefficient and (t-value)
Price ^a	-0.023 (-2.10)
Experience ^b	0.081 (3.41)
Income	0.342 (1.90)
Group Size	0.370 (1.79)
Constant	1.863 (1.58)
F-statistic	8.70
R ² and (R ² Adjusted) ^c	0.17 (0.15)
Sample Size	174

^a Price is on a per person per night basis. It was calculated by summing up travel expenses with expenses incurred in the park divided by the group size and the number of nights spent in the park.

^b Experience is measured by the number of days the respondent visited the park in the past 2.5 years.

^c R² measures the proportion of variation in the dependent variable explained by the set of independent variable. The R² adjusted is a similar measure but after loss in degrees of freedom is taken into account.

Table A.2:
Semi-Log Regression Results with the Log of Nights Stayed as the Dependent Variable

Variable	Regression Coefficient and (t-value)
Price ^a	-0.004 (-2.41)
Experience ^b	0.007 (1.81)
Group Size	0.076 (2.22)
Constant	0.963 (5.10)
F-statistic	9.04
R ² and (R ² Adjusted)	0.135 (0.12)
Sample Size	174

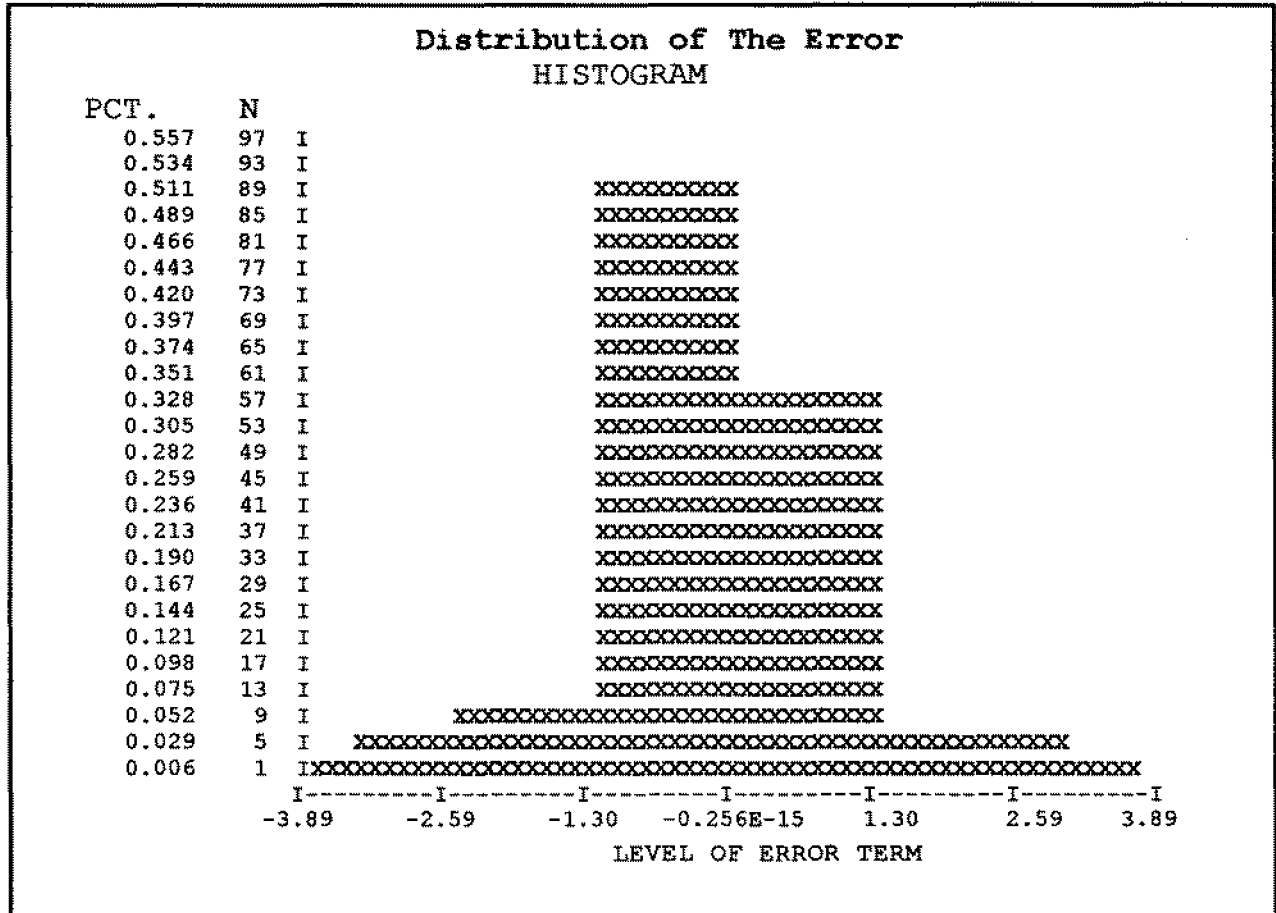
^a Price is on a per person per night basis. It was calculated by summing up travel expenses with expenses incurred in the park divided by the group size and the number of nights spent in the park,

^b Experience is measured by the number of days the respondent visited the park in the past 2.5 years.

APPENDIX B

DISTRIBUTION OF ERROR TERMS

FOR THE TRAVEL COST MODEL



APPENDIX C

TRAVEL COST MODEL WITH QUADRATIC

FUNCTIONAL FORM CORRECTED

FOR HETEROSCEDASTICITY

**Table C.1:
 Regression Results with Nights Stayed as the Dependent Variable**

Variable	Regression Coefficient and (t-values)
Price ^a	-0.230 (-1.67)
Price Squared	0.0011 (1.61)
Experience ^b	0.128 (4.79)
Age	0.149 (3.87)
Constant	0.589 (0.70)
F-statistic R ² and (R ² Adjusted)	40.65 0.49 (0.48)
Sample Size	174

^a Price is on a per person per night basis. It was calculated by summing up travel expenses with expenses incurred in the park divided by the group size and the number of nights spent in the park.

^b Experience is measured by the number of days the respondent visited the park in the past 2.5 years.