Net Economic Values of Recreationists for Outdoor Experiences in the Fraser River Basin

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NET ECONOMIC VALUES OF RECREATIONISTS FOR OUTDOOR EXPERIENCES IN THE FRASER RIVER BASIN

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The sole responsibility for this report's contents lies with its author, Crane Management Consultants Ltd. Environment Canada reviewed this report and approved it for publication. This approval does not signifi that the contents reflect the views and policies of Environment Canada.

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EXECUTIVE SUMMARY

Introduction

The focus of this study is the net economic values of recreationists for outdoor experiences and preservation in the Fraser River Basin. It considers how to value non-traditional services which the water resource of in situ characteristics provides, alone or in combination with other resources. The traditional services, ie. direct use through withdrawal, are not included in this study. In a comprehensive study of the resource, they would be included.

Its results could be used for several purposes.

* increase public understanding of the value of these resources in comparison to better known economic activities
* become data in a benefit-cost analysis of a public policy decision, such as a land use planning process
* become baseline data for a study of change in value when there is a change in one or more characteristics of the resource

Net economic value is not a widely, or readily, understood concept. It is not the spending to undertake an activity such as outdoor recreation. Net economic value isolates the incremental contribution that a product or service makes to our economic well-being. Spending or the cost to undertake an activity highlights the flow of money between activities. If there are fewer sport fishing experiences available to us this year than last year, then we have experienced a drop in net economic value. If British Colombians spend less money this year than last year on sport fishing because of the fewer number of sport fishing experiences, this difference is spent on some other activity within our economy; there is no overall spending loss. The loss in net economic value comes from the fact that we place a value on the sport fishing experiences above and beyond what we spend on them.

In this study, the focus is on the net economic value that recreationists attach to their outdoor experiences. It does not attenpt to consider the total net economic value for all British Colombians penerated throud recreational activity in the Basin.

Use and Non-Use of Recreational Resources

Consumption and enjoyment of recreational resources occurs in two basic ways, use and non-use. Use is a familiar term which refers to on-site activities. They may involve consumption of the services of a resource for leisure, such as hunting snd fishing, or non-consumptive uses, such as wildlife viewing.

Non-use value is usually refered to as preservation or intrinsic value because it revolves around keeping a resource in a relativel y undisturbed state. Non-use is distinguished from use in that with non-use only the resource helps produce an activity, ie. no other resources are consumed such as gas and time to visit a recreation site. Perhaps the most widely understood preservation benefit is the intellectual or emotional enjoyment of knowing that a certain environmental amenity exists. People can come to know, and therefore value, natural resources without leaving home through books, films, and even personal conversations.

Methods of Estimating Economic Value of Recreational Resources

Since there are no competitive marketplaces for recreational services of environmental amenities, their net economic values must be estimated through indirect methods. The primary methods of estimating demand for and value of recreation use and intrinsic enjoyment of natural resources are the Travel Cost Method (TCM) and the Contingent Valuation Method (CVM). University researchers especially have applied them many times over the past twenty five years (Walsh et al 1990).

Valuation of these services is not widely practised because it is relatively more expensive to prepare estimates than to research well documented market prices and businesspersons and policy-makers have much more confidence in the accuracy of the latter than the former.

Travel Cost Method (KM) - The basic premise of the travel cost method is that per capita use of a recreation site will decrease as out-of-pocket and time costs of traveling to the site increase, other variables being constant. It is referred to as a revealed preference approach because the recreationist makes expenditures and time commitments to obtain the trip or

experience. TCM consists of deriving a demand curve by using the variable costs of travel and the value of time as proxies for price.

TCM only provides an indirect estimate of recreation use although many economists prefer it to the CVM because some of its input data, the out-of-pocket trip expenses, are based on market determined prices.

Contingent Valuation Method (CVM) -In a CVM study, individuals are directly asked for the amount that they are willing to pay (WTP) or willing to be paid (WTBP) for recreation services or preservation enjoyment of environmental amenities.

CVM constructs a hypothetical situation so its primary problems lie with response bias and misspecification of the situation, “ask a hypothetical question, get a hypothetical answer”.

There are several problems which must be addressed when using these methodologies. One fundamental factor which is often left out of recreation resource valuation studies is the impact of substitute sites. If substitutes are not taken into account, the estimates of consumer surplus will likely be inflated. Substitutes should be included in a demand model unless there are no reasonable substitutes, ie. a unique resource is the study focus.

The character of sites is such that there are substitutes available in all but a few instances. This does not imply that recreation in the Basin is of low value. The character of the region is such that there are many sites which are similar in terrain, habitat, etc. This means that there are many available substitutes. In relative terms, this will lower consumer surplus. How much would a recreationist be willing to pay when he or she can go ten miles down the road and carry out their favourite activity under virtually the same conditions and expenditures?

Net Economic Value Estimates

There have been a few isolated Canadian attempts at estimating net economic values that recreationists attach to their outdoor experiences. In B. C., the most prominent examples are a 1991 Ministry of Forests study which considered a wide range of recreational activities in Provincial forests and the preservation value of them and a significant series of B.C. Ministry of Environment studies on freshwater fishing, hunting and non-consumptive uses of wildlife in the 80s.

In the U. S., much more work has been undertaken on this subject. The U.S. Forest Service has developed standard unit day values for major recreation activities (but not preservation values) since the early 60s. The initial estimates were based on a park entrance fee survey. Since the mid 70s it has conducted periodic reviews (1975, 1980, 1985 and 1990) of studies using the CVM and TCM methods. They are regularly adjusted for changes in the Consumer Price Index. The 1990 study is a sophisticated meta-analysis of 287 net economic value estimates (156 TCM and 129 CVM) carried out between 1968 and 1988 (Walsh et al 1990). The values are used in various U.S. Forest Service Planning activities on the basis that they can be applied in all regions.

The following table shows, from top to bottom the freshwater fishing values obtained since the early 80s. The Walsh figure is from the U.S. meta-analysis. National Survey refer to the Canadian national fishing surveys which are carried out every five years. Reid Survey is a B.C. Ministry of Environment document. The'81, '85 and '90 surveys used the same CVM question but the results for B.C. residents widely differ. Obviously the timing of a survey influences the results. Economic emditions and consumer preferences change significantly over 5 year periods and they are reflected in the different consumer surplus values for the freshwater sport fishing experience.

Study	Daily Value (92Can$)
Walsh et al	$48.72
81 Reid Survey	$30.73

85 National Survey	$26.62
90 National Survey	$17.05
89-90 MOF Study	$15.82

The U.S. results are at the top end of the range, $66.33 for all hunting and $56.70 for waterfowl hunting. The MOF Recreation Opportunities Study (1991) listed a $31.13 per RAD value for hunting. For British Cohunbia. The Importance of Wildlife to Canadians study (1987) reported the mean daily use value for all hunting as $17.30 per participant in 1987 ($21 .221992 equivalent). The mean use value for hunting large mammals *was* $15.20 per participant ($18.64/92); for small mammals was $6.80 ($8.34/92); for waterfowl was $18.90 ($23.17/92), and for other birds was $10.0 ($12.26/92).

In 1985, the Value and Characteristics of Resident Hunting (Reid) report summarized the 1981 survey results. Daily hunting values were reported by species: for black bear, $17.90 ($30.34/92); for caribou, $27.70 ($46.95/92); for cougar, $34.20 ($57.97/92); for deer, $23.70 ($40.17/92); for elk, $30.50 ($51 .70/92); for grizzly bear, $42.60 ($72.20/92); for moose, $30.20 ($5 1.19/92); for mountain goat, $33.40 ($56.6 1/92); for mountain sheep, $46.60 ($78.98/92); for small game, $11.70 ($19.83/92), for upland birds, $13.10 ($22.20/92), and for waterfowl, $15.60 ($26.44/92). (No wolf category).

This report's text itemizes values for other recreation activities such as camping, hiking, etc.

Market Size or Activity

The essential components of a total net economic value calculation for recreation services are estimates of net economic value per person per day and estimates of total visitorship or participation, market size. For preservation services, the components are estimates of annual net economic value per person and the size of the group who enjoy these services.

Although visitorship is a seemingly simple concept, it is viewed and handled differently across the many organizations which have developed recreation and tourism data. The academic analysis of the economics of natural environments is heavily skewed to defining

and estimating non-market recreation per day values. Market size issues have remained a secondary concern.

The trip is generally considered the logical unit of analysis for recreation behaviour (Clawson and Knetsch 1971). This involves the total experience, not only an on-site visit, but also anticipation, travel and recollection. The consumer is viewed as demanding a trip or experience. The recreation trip or experience is produced by recreationists and by public and private owners and managers of resources (Bockstael and McConnell 1981). There is a two step process to provide the supply of trips, not just recreation sites and facilities, that the consumer demands. In the first step, public and private managers and owners make different kinds of opportunities available through development and regulation. In the second step, consumers combine the opportunities with their own knowledge, equipment, travel and technology to produce recreational trips or experiences. This production process gives the consumer an unusually significant influence in shaping the quality and amount of recreation Supply.

The common unit of activity is per day, defined as one person on-site for any part of a day (Walsh et al 1991).

There are three basic methods to estimate the “market”.

- license and permit data
- sample survey of referent society

*sample survey of site users

Some recreationists and tourists, such as sport fishermen and hunters, require an annual government issued license while others, such as campers, require a daily permit. Some providers of recreational opportunities are government licensed such as whitewater railing and guiding companies. The licensing and permit data provides reasonably inclusive figures on the total number of recreationists and tourists enagaged in an activity on a province-wide basis.

Another approach is to carry out a survey of the referent society. Respondents can be stratified to ensure a representative sample and the number of respondents can be selected to assure the desired error margin. The respondents are queried about their amount of participation in recreation activities over the past year. The percentage breakdowns can be applied against the referent society's total population. These surveys can be carried out in person, over the phone or through the mails but the last two are the only economical methods.

Another sampling approach is to count users and conduct in-person interviews on random days. This approach requires a single site or system of sites with a very limited number of access points. An example would be a swimming lake where there is a single access road and parking for users.

Most surveys try to yield a unit day figure. A noteable but ofkn sidestepped problem in recreation and tourism studies is the question of mulitple activities within a unit day. Surveys do not identifi activity by the actual number of hours directly engaged in it but by the dominant activity(ies) for the unit day. The U.S. Census defines recreation activity as primary use when it represents over 50 percent of total individual activity while at the site. This approach leads to undercounting of key, but secondary activities, such as sightseeing and wildlife viewing. The B.C. Ministry of Forests recreation study allowed for multiple recreation activities in a day, perhaps 3-4 Recreation Activity Days (IUD) might be counted within one calendar day. With this approach, the activity days from different activities can not be summed to arrive at a total for all activities.

Net Economic Value for Recreation and Preservation in the Fraser Basin

As previously mentioned annual net economic value for recreationists is a function of net economic value per activity day and the total number of annual activity days. In the following table, total net economic value estimates by activity in the Fraser Basin are presented. The values by activity are not additive into a grand total for all activities and the values for the activities can not be compared against each other. The figures are developed from several studies of different vintages so there maybe overlaps between activities which

results in double and even multiple counting of activity days. As well, there will be under-counting for some activities because non-residents are not included. If a grand total for all activities was required, a special study would have to be structured to accurately develop the estimate.

The freshwater fishing per day values and activity are taken from the the 1990 National Sport Fishing Survey. The hunting per day values are inflated from the 1983 MOE study and the hunting activity from the most recent annual MOE hunter survey. The per day values for the other activities are drawn from the 1991 U.S. Forest Service financed study by Walsh et al (4th column) and the 1991 B.C. Ministry of Forests study (3rd column). The issue of whether the U.S. data is applicable to the Basin is diminished by the size and diversity of it; the Basin has a wide variety of sites as does the Walsh study.

Activity	Activity Volume	BC Per Day Value ($)	Walsh Per Day Value ($)	BC Annual Value ($000)	Walsh Annual Value ($000)
Freshwater Fishing	by MOE region	varies by MOE region	$48.72	$38,932	$116,879
Big Game Hunting	by species	varies by species	$72.34	$20,868	$32,842
Rafting	60,000	$18.92	$40.35	$1,135	$2,421
Power Boating	7,367,522	$18.92	$40.84	$139,402	$300,889
Canoeing	2,368,132	$18.92	$40.35	$44,802	$95,554
Kayaking	263,126	$18.92	$40.35	$4,976	$10,617
Sailing	877,086	$18.92	$40.35	$16,593	$35,390
Swimming	11,592,153	$23.91	$29.59	$277,165	$343,012
Camping	2,000,000	$23.91	$31.02	$47,820	$62,040
Picnicking	9,037,000	$23.91	$27.57	$216,075	$249,150
Dayhiking	8,039,955	$24.95	$37.60	$200,598	$302,302
Backpacking	2,762,821	$24.95	$37.60	$68,937	$103,882

MOF asked a general preservation value question in its '89-90 survey. "What is the value that you personally would be willing to contribute voluntarily each year to protect and maintain the recreation resources of B.C.'S Provincial Forest lands for your own and future generations?" The per adult estimates derived from this question can be taken as a ballpark figure for the amount a British Columbian would be willing to pay to maintain recreational opportunities over a large portion of the province's natural resources. The amount of resources in Provincial Forest lands is not known, at even a highly general level, to respondents. Therefore, BCers would be responding from an intuitive sense of what they could afford given their interest in outdoor recreation. If Fraser River Basin was substituted for B.C.'S Provincial Forest lands, the responses would not likely be much different. Many respondents would consider special features of the Fraser Basin that they are familiar with just as they would likely do with Provincial Forest lands.

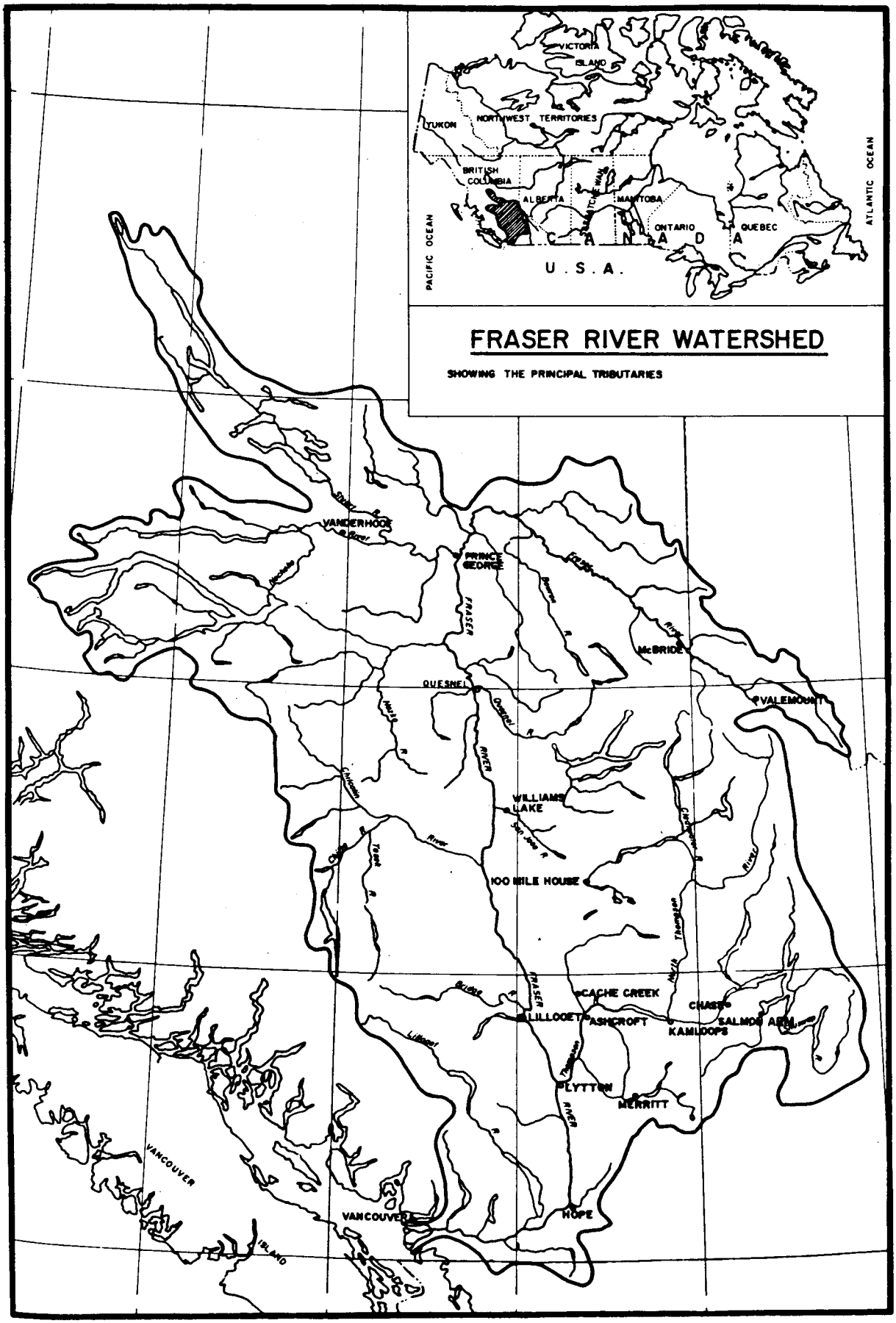
The provincial mean preservation annual value for Provincial Forest lands from the MOF study is $53.62. The total adult preservation value is reported as $114 million. Substituting Fraser River Basin for Provincial Forest lands would very likely result in a similar mean response.

Methodology for Estimating Fraser Basin Values

Previous studies have not focused on the Fraser Basin. They are either province-wide or use ministry administrative units which are not often co-terminous with Basin boundaries. The following methodology provides an estimate of the consumer surplus of resident recreationists (and "preservationists") for the Fraser Basin. As mentioned in the Introduction section, an estimate of total benefit for all British Colombians from outdoor recreation in the Fraser River Basin would require the capture of other benefits and costs in a wider net. In Appendix II, an abbreviated outline for such a study is presented.

The following are the recommendations for a Fraser River Basin study.

- Site - Basin boundaries as defined by Westwater Research
- Demand Estimation Method - Contingent Valuation Method
. Survey Method - Mail survey of sample of B.C. residents


VICTORIA ISLAND
YUKON
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
ONTARIO
QUEBEC
PACIFIC OCEAN
ATLANTIC OCEAN
U.S.A.
FRASER RIVER WATERSHED
SHOWING THE PRINCIPAL TRIBUTARIES
VANDERHOOF
PRINCE GEORGE
McBRIDE
QUESNEL
VALEMOUNT
WILLIAMS LAKE
100 MILE HOUSE
CACHE CREEK
LILLOOET
ASHCROFT
CHASE
KAMLOOPS
SALMON ARM
LYTTON
MERRITT
HOPE
VANCOUVER
VANCOUVER ISLAND

1.0 INTRODUCTION

The focus of this study is the net economic values of recreationists for outdoor experiences and preservation in the Fraser River Basin. It considers how to value non-traditional services which the water resource of in situ characteristics provides, alone or in combination with other resources. The traditional services, ie. direct use through withdrawal, are not included in this study. In a comprehensive study of the resource, they would be included.

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- become baseline data for a study of change in value when there is a change in one or more characteristics of the resource

The natural resources are considered in situ, so the study results provide an estimate of the foregone economic use value if the resource is completely lost, for example, extinction of a species or destruction of a natural habitat. If the resource was simply closed to use, some non-use value would remain.

It does not provide an estimate of the change in value if a characteristic of the resource(s) change(s). If for example, there is a reduction in stream flow or water quality, all recreation use value is not lost. An estimate would have to be made of how the demand function for the resource changes from the baseline because of the change(s) in site characteristics (Smith 1987). Marginal, not average, changes would be estimated.

Four concepts are referred to in the intial sentence and each requires some explanation.

1. net economic value
2. outdoor recreation
3. preservation
4. Fraser River Basin

Fraser River Basin

The region under study is the Fraser River Basin. A map of it appears on the opposite page. It does not have legislated borders as does apolitical jurisdiction; Westwater Research Institute (Westwater) has defined its borders from an ecological perspective, water shed boundaries. University of British Columbia affiliated Westwater has studied this river system for the past two decades and recently developed a GIS to organize data on its physical character, demography and economy. Although these boundaries are not officially recognized, they are widely accepted inside and outside of government. For example, DFO uses the Westwater boundaries for its planning units.

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Probably the key feature of the Westwater definition of the Fraser Basin is the inclusion of watersheds of several major tributary river systems. The Fraser's drainage catchrnent includes: the Nechako and Stuart sub-basins in the north; the West Road, Quesnel and Chilcotin sub-basins in the mid-region, the Thompson Rivers from the east; and, in the south, the Harrison-Lillooet sub-basins and the chilliwack Pitt, Coquitlam and Surnas Rivers.

The map shows that the Basin stretches from the Rocky Mountain Trench, along the B.C. - Alberta border to the Lower Mainland of south-west B.C. and horn Bulkley House in north-central B.C. to the Skagit River Valley, below the 49th parallel and the Canada - U.S. border. It drains one-quarter of the province but threequarters of the Basin's population is concentrated in its Lower Mainland region. Named after a European explorer, the Fraser Basin has been occupied for thousands of years by Aboriginal peoples. It is considered the greatest producer of salmoNds in the world (Dorcey 1991). In the mid 19th century, gold strikes on the Thompson tributary and at Barkerville initiated a change in settlement and economic activity in the Basin which persists today. The water resource of the Basin has assumed a fundamental role, providing a water highway for the forest industry, a major manufacturing input for the pulp and paper and mining industries, a habitat for the commercial and recreational fisheries and a water source for farms and ranches in the Fraser Valley, the Cariboo and the Chilcotin.

Outdoor Recreation

Outdoor recreation is another term which doesn't have an official definition. A U.S. Government task force defined the experience in very broad terms, "...outdoor recreation is a leisure moment outdoors, freely enjoyed.". This study adopts a more conventional activity-based approach. There are many recreational activities which can be undertaken in the outdoors. The focus in this study are the activities which need a river, lake or stream to be carried out. The major water resource-based recreational activities include the following,

- canoeing
- kayaking
- boating
- railing
- swimming
- sport fishing
- waterfowl hunting

Where to draw the line between water, land and snow-based activities or whether a line can be drawn because all three are effectively intertwined, is a debatable question. If the preceding are water-based activities then snow-based activities would be the following.

- downhill skiing
- cross-country skiing
- snowboarding
- snow-shoeing

The many land-based activities would include the following.

- hunting, other than waterfowl hunting
- wildlife observation
- day hiking
- backpacking
- walking
- photography
- camping
- biking
- driving for pleasure

Preservation

Natural resources can be enjoyed off-site, or through non-use if you will, as well as through on-site use, such as for outdoor recreation. The diverse, non-use benefits of natural resources are often collectively referred to as preservation benefits. Another term is intrinsic benefits. Perhaps the most widely understood preservation benefit is the intellectual or emotional enjoyment of knowing that a certain environmental amenity exists. People can come to know, and therefore value, natural resources without leaving home through books, films, and even personal conversations.

Net Economic Value

Net economic value is not a widely, or readily, understood concept. It is not the spending to undertake an activity such as outdoor recreation. Net economic value isolates the incremental contribution that a product or service makes to our economic well-being. Spending or the cost to undertake an activity highlights the flow of money between activities. If there are fewer sport fishing experiences available to us this year than last year, then we have experienced a drop in net economic value. If British Colurnbians spend less money this year than last year on sport fishing because of the fewer number of sport fishing experiences, this difference is spent on some other activity within our economy; there is no overall spending loss. The loss in net economic value comes from the fact that we place a value on the sport fishing experiences above and beyond what we spend on them.

In this study, the focus is on the net economic value that recreationists attach to their outdoor experiences. It does not attempt to consider the total net economic value for all British Columbians generated through recreational activity in the Basin. The net economic value term in this report applies to recreationists.

Where a study is undertaken to estimate total benefits, the following elements would have to be estimated.

- consumer surplus, the resident recreationists' net economic value (for recreation and preservation)
- producer surplus, the net economic return of supply industries such as guides, charters, equipment manufacturers
- net governmmt earnings from the activities of recreationists
- loss of producer surplus in alternative recreation industries and in conflicting resource industries (such as timber harvesting)

The first three items are benefits but the last item is a cost which would have to be subtracted out to arrive at a net benefit figure. This type of study would develop a net economic value for the whole referent society, not just recreationists.

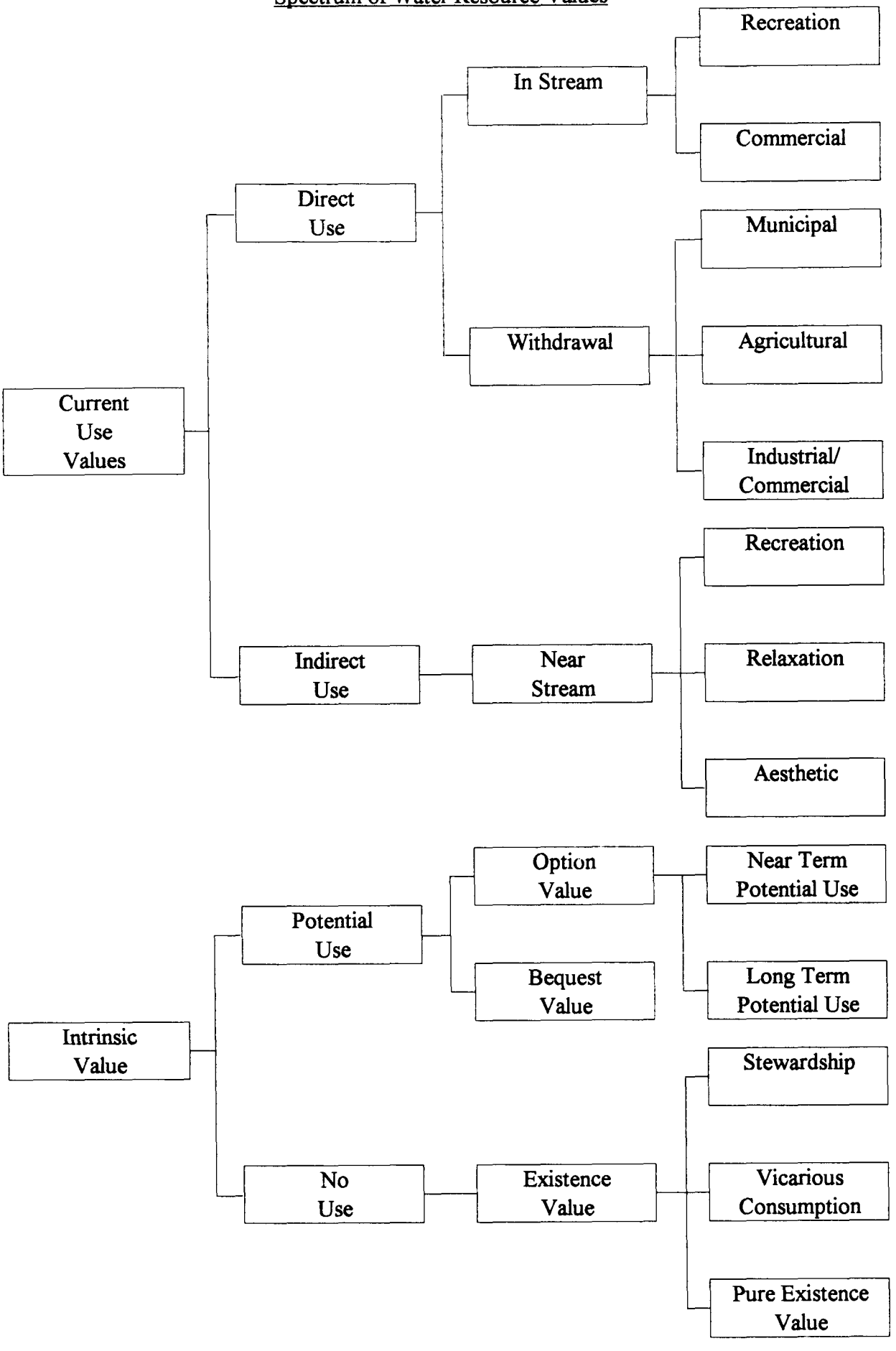
Many studies of net economic values from recreation focus on consumer surplus of use activities and imply through incorrect use of terminology that this part represents the total benefit. In many cases, it is likely the largest portion but remains as such when the benefit to society at large is considered.

Net economic value can readily be determined horn marketplace determined prices. Where there are no marketplaces for products or services, there are no official prices. For example, there is no marketplace for the several environmental amenities which are essential to providing a sport fishing experience. The government license fee is not a price because it is not set within a competitive marketplace it is intended to help off-set regulatory and stocking costs. If you ask anglers for the amount of money they would be willing to pay, the price, above and beyond their trip costs to enjoy sport fishing, they would quote a dollar figure. This is the net economic value they place on the services of the environmental amenities which go to makeup their sport fishing experience; economists refer to it as consumer surplus.

Report Structure

This study is divided into seven chapters. The Introduction highlights the study's focus. Since net economic value is most often considered as a fbnction of per day activity values and the annual number of days enjoying the activity, the following chapters have been organized to separate the two. Chapter two delves further into definitions of recreation and

Spectrum of Water Resource Values



preservation economic value and problems in estimating them. The next chapter reports on the recreation and preservation values researched to date in B. C., Alberta and the U.S. The fourth chapter explains the importance of participation in determining net economic value and discusses some estimation difficulties. Chapter five reports on estimates of recreation participation in B.C. and develops some estimates for the Fraser River Basin. The per day values and participation estimates are combined to show some net economic value estimates for the Fraser River Basin in chapter six. The final chapter brings together what has been learned from the work in B.C. and, especially in the U. S., to develop a framework for developing reliable net economic value estimates for water-based recreation and preservation in the Fraser River Basin.

2.0 OVERVIEW OF ECONOMIC VALUES

2.1 Water Resource Economic Values

The chart on the opposite page shows the wide range of economic use and enjoyment that persons can derive from water. Most people would place an economic value on direct use through withdrawal. Common examples are municipal water withdrawal for water supply, agricultural withdrawal for irrigation and withdrawal for industrial/commercial use manufacturing processes and energy production. In-stream direct use supports various recreation experiences such as sport fishing, waterfowl hunting, boating, swimming, rafting, etc. It also supports commercial fishing and tourism enterprises which cater to non-residents who consume recreational experiences.

The indirect use economic values come from the contribution of the water resource, along with several other resources, to support an enjoyable experience, such as picnicking, hiking, wildlife viewing, and sightseeing. Most people would have difficulty in placing a value on the services of water for these activities. The main reason being that there is no market for these services where they are sold and purchased.

Methodologies for assessing the economic values that people derive from water are well established. A body of economic principles and analytical procedures has evolved over the past thirty years which can be used to provide reasonably good estimates of private benefits and costs. However, traditionally, analyses have failed to include consideration of in-stream direct use and preservation values. By omitting them from a calculation, they are implicitly assigned a value of zero. Sometimes an economic value is estimated for a recreation experience based on water resources if a traditional use, such as power generation, directly clashes with it. Estimates of preservation value of a resource to non-users are rare. The lack of an estimate for the value of an item is not necessarily a problem. For example, when benefits and costs of a new dam are being weighed, the costs need only be estimated until they supercede the benefits to dismiss the project on economic grounds (Krutilla and Fisher

1985). It may not be necessary to come up with estimates of foregone recreation use or preservation values.

Looking at the chart of the preceding page, the net economic values from the water resource which will be researched in this study are the following.

- In Stream, Direct Use for Recreation
- Near Stream, Indirect Use for Recreation, Relaxation and Aethestics
- All Preservation Values

The values exempted from this study are the commercial uses, for example, hydro power generation and irrigation. They are not less important but are more familiar and better documented.

As mentioned in the Introduction, consumption and enjoyment of recreational resources occurs in two basic ways, use and non-use. Use is a familiar term which refers to on-site activities. They may involve consumption of the services of a resource for leisure, such as hunting and fishing, or non-consumptive uses, such as wildlife viewing.

The concept of non-use is a relatively recent innovation in natural resource economics and although widely accepted, there is continuing debate about its technical details (Rosenthal and Nelson 1992; Kopp 1992). Non-use value is usually referred to as preservation or intrinsic value because it revolves around keeping a resource in a relativel y undisturbed state. Non-use is distinguished from use in that with non-use only the resource helps produce an activity, ie. no other resources are consumed such as gas and time to visit a recreation site.

Non-use or preservation value is said to have four components.

Existence value - a person may simply enjoy knowing a resource is left in its natural state
Option Value - a person may hold some expectation, howewir slim of consuming or enjoying a resource in the future
Quasi-Option Value - a person may hold some expectation that new information may come forward at a later date which would influence a decision about use of a resource today

Bequest Value - a person might want want to see a resource made available to others today or in the future

2.2 Net Economic Value of Recreationists

The differences between economic and financial values for natural resources is often confusing to non-economists. Consumer and producer surplus must be measured to arrive at economic value. Where there is perfect competition and small changes in resource quantity, economic and financial values are almost synonymous. Competition does not rise to the marketplace ideal when the consequences of resource use and therefore value are not accounted for in the marketplace. The market for water resources has three basic weaknesses which drive a wedge between financial and economic value. Water is a non-rival resource, ie. it can be used by two or more individuals without one person's consumption diminishing the amount available to others. Another issue is non-exclusivity, ie. a situation where excluding additional users is practical y infeasible. The third market weakness is inter-dependence, ie. the external effects of resource consumption between users are not accounted for in the marketplace. The classic example is water pollution.

Economists rely on market prices to determine the economic value of commodities, including water and its associated natural resources such as fish. When the aforementioned problems are evident, market prices may not exist and if they do exist, they will not reflect the benefits and costs associated with resource consumption and enjoyment.

The concept of consumer surplus is oflen received skeptically because it represents money which has not been paid to a business or government agency. It is the value associated with a recreation resource after all the costs of use have been paid. It is not equivalent to a price in the sense that one pays a certain price for a loaf of bread. It neither represents the cost of providing the recreation opportunity nor the intersection of supply and demand fhnctions. Consumer surplus could be equivlent to a price if a government agency was able to establish an individualized access fee for a resource it absolutely controlled. It would be the difference between the maximum amount that an individual would pay, rather than forgo the activity, and all the costs, including fees that the person does pay. It is illustrated in the

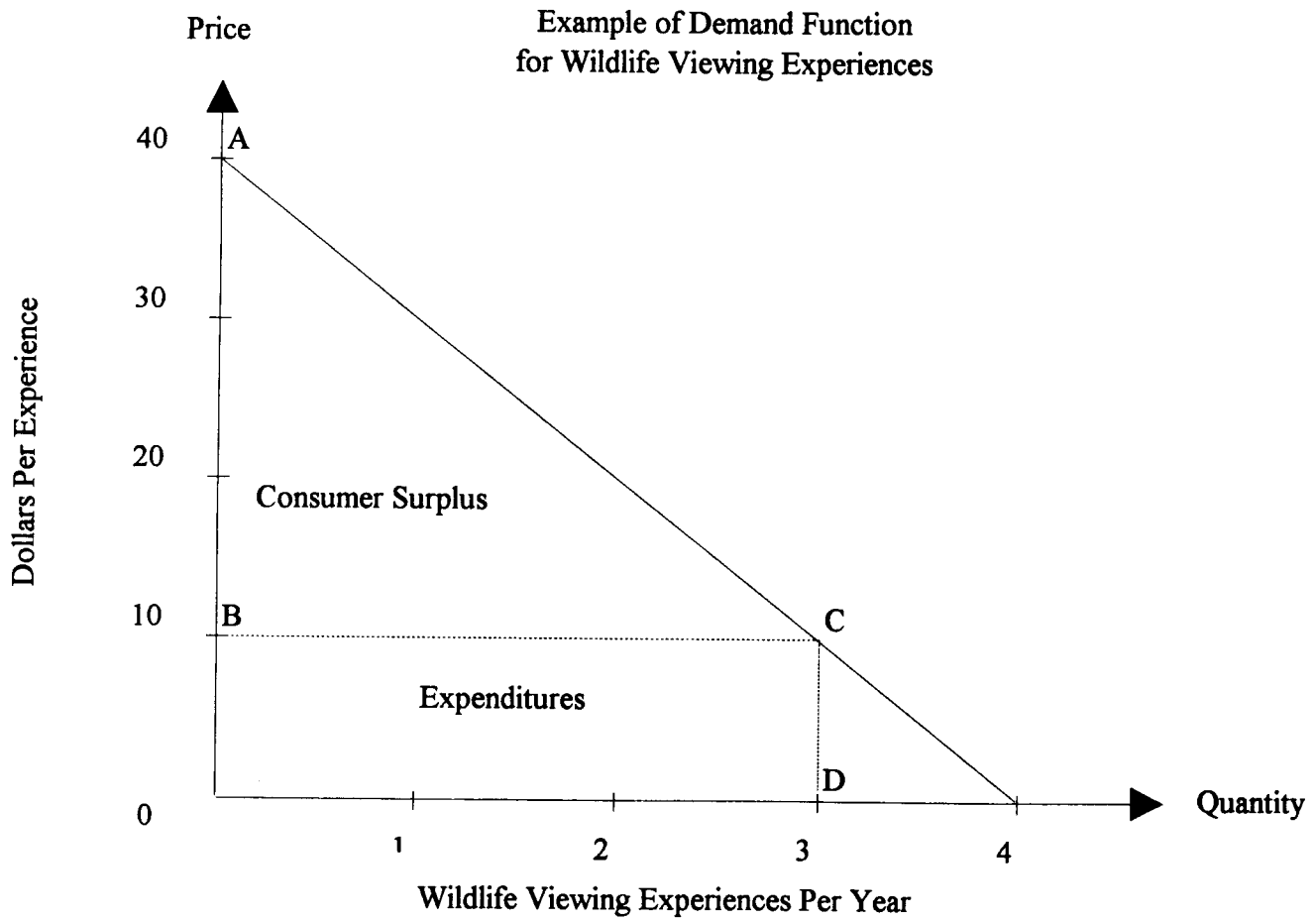

Price
Example of Demand Function
for Wildlife Viewing Experiences
40
30
20
10
0
A
B
C
D
Consumer Surplus
Expenditures
Dollars Per Experience
Quantity
1
2
3
4
Wildlife Viewing Experiences Per Year

figure on the opposite page which shows the amount of trips a fictious person might take at different prices. At a $10 per trip price, a person will take 3 trips. For 1 trip, this person would pay $30, for 2 trips the projected per trip price would be $20. If the price is $10, a person derives a benefit from not having to pay $30 for the first trip and from not having to pay $20 for the second trip. Consumer surplus represents the benefits to the consumer, profit if you will, from the workings of an efficient marketplace.

Even where there is no price, consumers enjoy a surplus of benefits because they would be willing to pay a certain amount to consume or enjoy the services of the resource(s). In the case of recreational use or non-use of natural resources the absence of prices is the norm.

Sometimes entrance or permit fees are seen as market prices but they are rarely accurate representations of economic value. These prices are almost never set within a competitive market framework. They increase government financial receipts and decrease individual financial resources, money moves from one pocket to another, they do not change net economic value that individuals or B.C. society attach to the resource(s).

Often spending or economic activity studies are carried out but they do not convey information about economic value. They can be used for weighing relative job creation capability or for tracking spending through economic sectors. Expenditures or costs are not accurate representations of economic value because they are benefits foregone. If more money is spent, there is less net benefit. And costs of engaging in an activity can easily exceed revenues. If an activity is actually eliminated, the consumer surplus maybe lost but not so the expenditures. The money which would have been spent on the lost activity will simply be spent on another item.

2.3 Estimating Net Economic Value

Since there are no competitive marketplaces for recreational services of environmental amenities, their net economic values must be estimated through indirect methods. The primary methods of estimating demand for and value of recreation use and intrinsic enjoyment of natural resources are the Travel Cost Method (TCM) and the Contingent

Valuation Method (CVM). University researchers especially have applied them many times over the past twenty five years (Walsh et al 1990).

Valuation of these services is not widely practised because it is relatively more expensive to prepare estimates than to research well documented market prices and businesspersons and policy-makers have much more confidence in the accuracy of the latter than the former. This study presents the limited amount of information on the recreation and preservation services of these resources in B.C. Another reason for the small amount of B.C. or Canadian data on this subject is that there is a lack of institutional requirements to derive these non-market values. On the other hand in the U. S., there are some institutional factors, such as trade disputes, legal liability claims and Presidential Orders requiring certain types of analyses, pushing this subject horn the academic realm into the commercial world (Smith forthcoming).

In addition to TCM and CVM, the Hedonic Price Method has been used, largely to quantifi the relationship between air pollution and property values. It is an indirect method because it focuses on the marginal rate of substitution for pollution in property value. It is not a widely practised method because of its theoretical limitations and there must be an observable relationship between private property value and the environmental resource.

Travel Cost Method (’KM) - The basic premise of the travel cost method is that per capita use of a recreation site will decrease as out-of-pocket and time costs of traveling to the site increase, other variables being constant. It is referred to as a revealed preference approach because the recreationist makes expenditures and time commitments to obtain the trip or experience. TCM consists of deriving a demand curve by using the variable costs of travel and the value of time as proxies for price.

TCM only provides an indirect estimate of recreation use although many economists prefer it to the CVM because some of its input data, the out-of-pocket trip expenses, are based on market determined prices.

Contingent Valuation Method (CVM) -In a CVM study, individuals are directly asked for the amount that they are willing to pay (WTP) or willing to be paid (WTBP) for recreation services or preservation enjoyment of environmental amenities.

CVM constructs a hypothetical situation so its primary problems lie with response bias and misspecification of the situation, “ask a hypothetical question, get a hypothetical answer”.

2.4 Estimation Problems

Substitutability

An important factor which is often left out of recreation resource valuation studies is the impact of substitute sites. If substitutes are not taken into account, the estimates of consumer surplus will likely be inflated. Substitutes should be included in a demand model unless there are no reasonable substitutes, ie. a unique resource is the study focus.

The character of sites is such that there are substitutes available in all but a few instances. This does not imply that recreation in the Basin is of low value. The character of the region is such that there are many sites which are similar in terrain, habitat, etc. This means that there are many available substitutes. In relative terms, this will lower consumer surplus. How much would a recreationist be willing to pay when he or she can go ten miles down the road and carry out their favourite activity under virtually the same conditions and expenditures?

Use of Average Values

Whether CVM or TCM methods are used in a regional study, the assumption is usuilly made that all observations from all sites within a region are fkom a single site. This allows the summing of values from different areas. On the down side, it ignores differences between sites and the substitutability of one site for another. As the defined region becomes larger and more diverse, the problems of this approach increase. There are more substitution possibilities with a larger region and the average value becomes less representative because the observations are from sites of greater diversity.

Impact of "Market" Size

The first line of attack in estimating the value of the recreation resource is to project the value of its services on a per person per day basis. The next step is to define its "market", the annual number of receation users and the annual number of preservation non-users. Academic research tends to focus on the per day values and their accuracy. However, accurately estimating market size or activity is of similar importance when trying to arrive at annual net economic value figure. A mispecification of market size of 50 percent has the same impact as a similar error in the per day value.

Defining the market of recreation users is a readily understandable proposition, although non-resident visitors are regularly excluded becuase of the difficulty in estimating their use. Defining and estimating the market size of preservation non-users tend to be "muddied" problems, in comparison. The market issues are dicussed in chapters four and five.

Willingness to Pay Versus Willingness To Be Paid

Whether recreationists are willing to expend large amounts of money or not to enjoy an activity is irrelevant. The correct measure of value is consumer surplus - willingness to pay or be paid above actual costs and fees. A CVM study can use either question whereas a TCM study is premised on WTP.

In theory, a sample of reereationists should respond with the same value to both questions, WTP or WTBP (Freeman 1979). One of the most severe criticisms of the estimation of net economic value for recreational resources is that there is a significant divergence between WTBP and WTP responses in studies where both questions are attempted. The WTBP values are almost always higher. Some academics have sharply questioned the value of CVM studies because of this finding (Knetsch 1988). Others have said that the differences can be explained and the estimation results are valid (Cummings et al 1986).

Response Bias

CVM surveys elicit behaviourial intentions. The researchers can incorrectly specify the question on several dimensions. The reliability of CVM estimates is dependent on "...the degree to which the valuation situation is plausible and meaningful to the respondent in the way intended by the researcher." (Mitchell and Carson 1989). Respondents may:

- answer strategically, to influence a policy decision;
- have faulty recall about the recreation experience they are being asked to attach a value to;
- have some problems understanding some dimensions of the question.

A critical point is that respondents be familiar with the recreation resources which are the survey's subject. This knowledge can be directly acquired through use or indirectly through the media and reading.

Time of Sampling

Depending on when sampling is done in a particular area, seasonal recreationists may be missed. This problem is prevalent when several types of recreation activity are being studied.

Residents Versus Non-Residents

In a study of economic value, the referent society must be defined and it is usually done so as the society having a direct economic interest, perhaps through public ownership, in the studied resources or services. The net economic value conrnbutions of non-residents and residents of the referent society are substantively different and therefore differently calculated.

The contribution of non-residents is often left out of net economic value studies because of the difficulty in gathering data about their recreation activity. In a situation where a site or system of sites mainly attracts local or regional visitors, this deficiency is not a significant shortcoming. Because of the expense of estimating net economic values, the studied sites or

regions are usually patronized by large numbers of tourists. If only the values of residents are included, there will be a severe understatement of net economic value.

Regional Averages Versus Site Specific Values

Many studies are site specific and even when a study covers a region, respondents answer based on their experience of sites within the region. A regional study gives an average value for the sample of respondents. It is not a value for an average site in the region. When the results are extrapolated to a larger population, there must be a direct correlation between the sample and the population. If a site or region receives most of its visitors from outside the province, a sample of users will not yield an accurate site value for the B.C. population. Values are dependent on the sample of users (McCollurn et al 1990).

Means, Medians and Quatiles

The reported per day values are usually means but they can be medians or quartrile values. There is no firm rule to select a statistic to indicate the representative value for the sample.

Site Versus Region Values

Although CVM can be used to attach values to both a site and a region, having many sites, the valuation questions must be precise. A recent study has shown that respondents will assign site values within a region which will sum to a significantly larger value than the value given to the region as a whole (Diamond et al 1992). Respondents can view the services of the region differently than the services of the site.

Multi-Destination trips

In TCM studies, treatment of multiple destination trips is a problem. O&n, trips are made to several sites. When a single site study is undertaken, the trip value has to be divided up so that the value for the site under study is given. If the full cost of the trip is included there will be an overstatement of the value for the single site. If multiple destination trips are removed fkom a sample, there maybe a bias against travelers from further afield. Since trips of several days usually involve more than one destination, TCM is an insufficient

technique for them. It would be an unwieldy procedure to use the TCM for a region of many sites, such as the Fraser Basin.

It also doesn't work well for sites in urban areas because the estimation of a good demand fimction requires substantial variation in the distance that recreationists travel.

Equation Specification

Although the basic approach of the TCM is widely accepted, academic researchers continue to refine its econometric approaches. Variations on statistical models, linear, log-linear, or semi-log, and estimators, ordinary least squares, generalized least squares, or maximum likelihood-tobit, have been found to significantly affect benefit estimates (Smith and Kaoru 1988).

Net Economic Value to Recreationists Versus Net Economic Value to Sock@

Sometimes, perhaps through an incorrect use of terminology, a study will imply or state that the consumer surplus of resident recreationists represents the total benefit from the services of environmental amenities. It only indicates the net benefit to recreationists. The total benefit or net economic value to the referent society requires the estimation of the following.

- consumer surplus, the resident recreationists' net economic value (for recreation and preservation)
. producer surplus, the net economic return of supply industries such as guides, charters, equipment manufacturers
. net government earnings from the activities of recreationists
. loss of producer surplus in alternative recreation industries and in conflicting resource industries (such as timber harvesting)

Units of Value

Surveys usually require trip recreation activities to be repotied on a per day basis. The usual experience is that recreation trips include several activities, for example, sport fishing and nature viewing, camping and hunting, etc. Values can be interpreted in three ways for multiple activity trips.

1. The value of the primary recreation activity
2. The value of the recreation experience having a primary activity, such as sport fishing
3. The value of the recreation experience having a bundle of attributes

The resource is not having a value attached to it. The services that the resource(s) provide are being valued. The first option has been the prevalent way of reporting the value results. Other activities are assumed as being secondary and the full value is attributed to the primary one. In a TCM or CVM study, the researcher will ask the respondent to select a primary activity. In effect, other activities are not ignored in the valuation but they are not reported. The effect is to under-report some activities. especially the more passive ones, and over-report other activities.

The choice of primary activity is made on the basis that if the primary activity were not available, the trip would not have been made. And that if the primary activity were available but tother activities were not, the trip would have been made.

The difference between options no. 1 and no. 2 is that the latter acknowledges the general recreation or leisure intent of the trip and highlights its main activity. Option no. 1 ignores the other activities to the advantage of one.

In modem tourism marketing, the tourist is found to value the experience which is derived from enjoyment of several natural resources and tourism products. The quality of these resources and products determine the value of the experience and the attractiveness of the site. It maybe more consistent with individual choice to value a complex but distinguishable bundle of attributes which comprise a recreation experience. For example, in the National Sport Fishing surveys, anglers are asked to rate the importance of different attributes of their trip, scenery quality, fish catch probability, species, etc. Scenery ranked highest in the 1985 survey.

3.0 REVIEW OF NET ECONOMIC VALUE ESTIMATES

3.1 Summary of Reports

In this section, studies which reference net economic values for the services of B.C. recreational resources are summarized. Those considered most useful for future analytical work in the Fraser River Basin have been analyzed in greater depth.

Various Activities

Study: Outdoor Recreation Survey 1989/90
Author: B.C. Ministry of Forests, Recreation Branch (1991),

Summary of Survey Methodology

Scope of sample	Sample Representation	Response Rate
B.C. residents only - adults over 19 - random sampling - households with phones	stratified with good sampling for all regions mail survey	5,325 respondents 61% of total sample

Methodological Features:

The survey was designed to avoid several biases. There is less recall bias (as a diary is provided), less seasonal bias (with quarterly sampling), and no male/female bias (takes the respondent with the latest birthday). An age bias is acknowledged aggregate values for the population cannot be computed.

The data is reported by forest administrative regions which do not correspond to Fraser Basin regions. This is a common problem the Federal and B.C. departments use different administrative regions which hinders comparisons between studies and prevents developing data on a Fraser Basin basis.

This study asked respondents to report activities which occurred in "B.C.'S Provincial Forest lands". This request may have generated some confusion and from an analysis perspective, limits the source of activities to forested, rural areas.

Only the activity and values of B.C. residents is covered in this study so there is an understatement of the actual activity and value attributable to Provincial forest lands.

The survey design and report of findings are suitably straightforward for the general public. The report is for the most part descriptive, not interpretive: it does not explain the variability of values and usage among regions or within activity groupings.

Summary of Data Characteristics

Data Categories	Data Aggregation	Limitations
Expenditures and CVM (net use) - two CVM questions	six forest regions - activity groupings - access categories	activity values are not additive data ***can*** not be further dis-aggregate

The recreational activity groups are: nature study, boating, motoring, (all) fishing, camping and swimming, hiking/skiing, (all) hunting, and other. There is considerable breakdown within some groups. It is noted that the activity values cannot be added to get total value across activities (total experience), due to a definition of IUDs (recreation activity days) that

allows for double-counting between activities. Some of the activity groups include components which are, in some respects, polarized (for example, hiking and skiing which sre divergent in terms of associated costs and issues of accessibility).

The two CVM questions are posed in a very straightforward manner, without simulating a market situation. There is one intended to measure WTP for net use value and one for WTP for non-use values. The questions are characterized as follows:

1). A discrete choice for WTP to measure use value over the last three months. Provides dollar interval choices (O, 25,50, 100,200,300, etc.), asking: "..the amount your costs would have had to increase before you no longer (would) have participated...".

2. An open-ended response for preservation value "What is the total amount you... would be willing to contribute voluntarily each year to protect and maintain the recreation resources of B.C.'S Provincial Forest lands for your own and future generations?"

Study: Wilderness Survey Project (in design for 1993)
Author: B.C. Ministry of Forests, Economics and Trade Branch

This study will examine the use and values associated with B.C.'S protected and unprotected wilderness areas. It will focus on the full trip experience. A CVM willingness-to-pay question will be used to obtain net economic values, and a dichotomous choice question will test the threshold of preservation values. The sample will be stratified and the results aggregated by the forest regions.

Sport Fishihg in B.C

Study: The Determinants of Value for a Recreational Fishing Day Estimates from a Contingent Valuation Survey.
Author: Trudy Cameron and Michelle James, Fisheries and Oceans Canada (1987)

Summary of Survey Methodology

Scope of Sample	Sample Representation	Response Rate
Residents and non-residents -fishermen only -fishing from craft only	in-person interviews at four coastal locations	***4,161*** respondents

This study reflects a very sophisticated theoretical and empirical approach taken to determine the demand for recreational fishing days. As a case study, it explores the use of dichotomous choice surveying tactics and net direct benefit measurements (both WTP and WTBP) to gauge the effect of policy changes for sport fishing and comparisons of benefits associated with sportfishing and commercial fishing.

The scope of the study was narrow, allowing for an intensive interviewing strategy. With in-person, on-site interviews, reliability was increased through fill participation and more immediate recall; there coul~ however, have been more strategic bias. The approach was tailored to the decision-making fhunework and consequently, the transferability of results to other applications is limited.

This study provides an excellent methodological example. The authors reconcile their approach with underlying economic theory and apply state-of-the-art econometric techniques. There is an explicit discussion of the variables under study and rigorous sequential testing of hypotheses using several functional forms. Unlike mail surveys, the authors collected data such that they could compare the fitted WTBP (compensated demand) against WTP for the same individual.

Summary of Data Characteristics

data Categories	data Agregation	Limitations
Explored CVM; compared WTBP and WTP.	by offshore vicinity location by type of residency	not representative of all coastal fishing efforts
Looked at net economic benefits over expenditures on a day's fishing trip.		cannot be used to determine option or existence values

The two CVM questions were crafted to simulate realistic market decisions:

1) a WTP question: Respondents asked to indicate through a dichotomous choice (referendum style) question if they choose to accept or reject a threshold amount. The question posed was: "if the cost of your fishing trip had been higher today, would you still have gone fishing – No or Yes'?"

2) a WTBP question: Again, the dichotomous choice testing format waa used with randomly selected dollar amounts to reduce starting point or dollar interval biases associated with a more open-ended approach. The question posed was: "suppose you were offered $ _ dollars to give up fishing (until the end of next month), would you still have gone fishing -- No or Yes?"

Both questions do not make the respondent directly consider the availability of substitutes.

Their study was limited geographically to four off-shore areas. Using the coast off Victoria as a base fishing experience (assigned value O), fishermen were willing to pay $41.38 ($57.31/92) more in comparison for fishing off Port Albemi, $18.78 ($26.00/92) for fishing off Campbell River, and $25.35 ($35. 11/92) for fishing near Sechelt. Given the site-specific and motorized craft basis of this study - as well as the reported surge in salmon stocks in 1984 (Mylchreest, DFO) - the transferability of these estimates to fish stocks from the Fraser River remains at issue.

Studies: Economic Values and Impacts of Freshwater Sport Fishing in British Columbia and British Columbia Freshwater Results of the 1985 National Survey of Sport Fishing

Author: Michael Stone, B.C. Ministry of Environment (1988)

Summary of Survey Methodology

Scope of Sample	Sample Representation	Response Rate
A random mail survey (2.4Yo) of annual freshwater licence holders - resident and non-residents	sample stratified for nine B.C. Environment administrative regions survey conducted every five years.	for residents, nearly 60°/0 (5,200)

In “Results”, Stone highlights the well-conceived survey design. There are two tailored questionnaires (one for resident% one for non-residents), a stratified sample for good representation among regions, and sequenced contacts to guarantee a high response rate and improved reliability.

Summary of Data Characteristics

Data Categories	Data Aggregation	Limitations
Expenditures, total value, economic impact and net benefit (WTP additional expenses).	by nine regions by residents, non-resident Canadians and aliens	focus on one activity in isolation

The National Survey of Sport Fishing in Canada is conducted every five years as a cooperative effort between the federal and provincial governments. The survey provides a consistent format for longitudinal and cross-sectional study, although the previous studies (1975 and 1980) did not include a CVM question.

Stone concludes that the contingent valuation method can provide an unbiased estimate of net direct benefit when used "with a well designed survey instrument".

The CVM question deals with a willingness-to-pay additional expenditures rather than additional taxes or admission (i.e., higher licence fees), such that strategic bias is reduced. The question is phrased "at what additional cost would you have decided not to fish?"

Study: The Value and Characteristics of Freshwater Angling in British Columbia

Author: Roger Reid B.C. Ministry of Environment (1986).

Summary of Survey Methodology

Scope of Sample	Sample Representation	Resnonse Rate
A sample of anglers	selective sample for eight BC Environment regions	3,817 completed licensed (41% response) for residents 3,469 completed (37% response) for non-residents

The results of this 1981 study as conducted by the Ministry of Environment can be compared against those of the 1980 National Fishing Survey. Reid offers a very comprehensive comparison, reconciling the two somewhat different outcomes.

Reid's report offers a very useful discussion of the survey biases most commonly encountered. Strategies for reducing biases are recommended

1. to reduce recall bias, survey anglers as soon afler the season as possibly
2. to reduce response bias, conduct several mailings;
3. to counteract hypothetical bias, design WTP questions which are realistic; and
4. to reduce strategic bias, ensure your WTP question is well designed.

Summary of Data Characteristics

Data Categories	Data Aggregation	Limitations
activity, expenditure, catch/harvest Total and net economic values	eight Ministry of Environment regions	not representative of the general population (male bias) focus on use values and studies activity in isolation

Two CVM questions were included. The first willingness-to-pay (more for expenditures) question was almost identical to that later used in the 1985 National Sports Fishing Survey. It asked: “at what additional daily cost would you have decided not to fish?” Again, the same interval sequence of dollar options was provided that could introduce bias.

The second question tried to estimate demand in reverse. It sought to collect the hypothetical number of days an angler would choose to fish under an alternative fee structure. It posed the question: “how many days do you think you would have fished if the daily entry charge had been _ (responses required for each of $1,$5,$10, and $20).

Study: The Value of Commercial and Sports Fisheries in B.C.
Author: The Fisheries Council of B.C. (1991).

This report critiques past values estimates and recommends that sports and commercial fishing be compared in terms of the value for the marginal fish. (A similar approach was taken by Marvin Shaffer and Associates, (1987)).

Study: An Analysis of the Economic Efficiency Implications of Alternative Chinook Allocations in the Gulf of Georgia
Author: Marvin Shafter & Associates (1987).

This report was prepared for Fisheries and Oceans Canada. Its focus was to compare the value of sports fishing and commercial fishing efforts. It derived estimates of a value per fish on the margin. The analysis relied on existing data sources, such as the Creel Survey results and the CVM estimates obtained by Cameron and James (1987).

This report provides a detailed methodology and clearly specifies the relationship being modelled. Willingness-to-pay is estimated as a function of activity days, success rate, and other factors.

Study: An Analysis of the Economic Benefits of Recreational and Commercial Fisheries (Report on Methodology)
Author: Marvin Shaffer & Associates (1986).

Written for Fisheries and Oceans Canada this report provides an excellent discussion of the methodology used to determine economic efficiency and impacts associated with the salmon fishery. Economic efficiency is defined as the value of output generated by the activity less production costs. Economic impacts are intended to capture both direct and indirect effects.

Study: The Travel Cost Method: Potential Use in Evaluating the B.C. Tidal Sport Fishery
Author: Frances Wooley, DFO (1985)

This paper provides a theoretical overview of the travel cost method and its strengths and shortcomings with respect to measuring economic values for the tidal sports fishery. It confirms the general observation that the travel cost method is most appropriate for site-specific studies.

Study: Freshwater Sport Fishing in British Columbia 1985
Author: B.C. Ministry of Environment and the Department of Fisheries and Oceans Canada.

This information bulletin highlights the results of the 1985 National Survey of Sport Fishing. Data on angler profile, fishing effort, harvest, motivations, expenditures and net economic value were collected. The survey was administered by the provincial governments as part of a nationally co-ordinated effort. For more detail on the methodology and findings, see under the Stone (1988) reports in the Summary of Survey Methodology and Data Characteristics.

Some preliminary results of the 1990 National Survey were released to the consultants. However, there are no materials available as yet on the 1990 survey methodology or regional results. It was confirmed, however, that the format of the WTP question was the same as that for the 1985 survey. The full results are to be released in April, 1993.

Study: Sport Fishing in British Columbia Tidal Waters, 1985
Author: Department of Fisheries and Oceans Canada.

In 1986, Fisheries and Oceans Canada surveyed the opinions of B.C. tidal sport fishermen. A broad sample was drawn from the 332,888 adults (over 16) who purchased B.C. angling licences. The survey covered both residents and non-residents, yet there was still an excellent response rate of 72Y0, with 2,407 completed returns. Information was obtained about angler

profile, fishing effort, harvest, motivations, expenditures, and the net direct economic value (wP).

A contingent valuation question was included to measure how much anglers valued their fishing experience over and above costs incurred. It asked "at what additional daily cost would you have decided not to fish", offering dollar choices set out in intervals from $1.00 to $100.00, and beyond. (The report provides only the total willingness to pay ($48.6 million), but the daily net direct benefit of $14.81 can be computed from the reported 3,280,621 tidal angler-days).

Study: An Introduction to the Economics of Recreational Fisheries Management
Author: Department of Fisheries & Oceans Canada (1983).

This paper was written to explain in simple terms how economic concepts are used to value fishery resources. It outlines how an economic model maybe used for decision-making purposes. As the report suggests, estimated economic values can assist in determining access and regulation, a reasonable allocation among competing users, the overall (net) benefits of stock enhancements or program changes, and the impact of environmental chsnges.

studies: Recreational and Preservation Values Association with the Salmon of the Fraser River (1974), and Updated Estimates for Recreation and Preservation Values Associated with the Salmon and Steelhead of the Fraser River (1978).
Author: Philip A. Meyer, Environment Canada.

Two surveys were conducted in sequence. Meyer worked to improve his methodology and reduce the unreliability observed in the results of the first survey (conducted in 197 1). His general approach did not, however, change; in 1972, he again tried to measure economic value by asking respondents to gauge their willingness-to-pay indirectly as taxpayers. To improve the reasonableness of answers, respondents were first asked to review actual municipal expenditures, before recommending an annual allocation (on a per household

basis) that they thought would be appropriate for maintaining and preserving recreational opportunities offered by the Fraser River.

Meyer concluded that the 1972 results were more consistent than the 1971 results nevertheless, the results of both surveys are listed below as the activity groupings changed somewhat. The “willingness-to-pay” responses were often extreme: even with subsamples limited for “reasonableness”, the means were far higher than the medians, suggesting that the median values could be more representative (less skewed). The values derived from this study should not be directly compared to more current values.

Philip Meyer wrote another report in 1976 on Perceptions on Recreation and Sport Fisheries in the ChilliwackWedder River, and co-authored another, Local Perceptions Concerning Recreation on the Coquitlarn River in 1977. The former provides WTP results; the latter does not.

Study: The Value of Fresh Water Sport Fishing in British Columbia
Author: Pearse Bowden Economic Consultants Ltd. (1971)

The B.C. Fish and Wildlife Branch commissioned this study. Of the sample of 4,793 resident anglers who had held a licence during 1969, only 1,250 completed the survey, the response rate was somewhat low (38.9°/0) despite their follow-up procedures. Data was also collected and reported on steelhead fishing as a separate activity.

The respondents were asked to gauge their approval of selected management programs and their willingness-to-pay for such programs. In several respects, the results of this study should be used with caution. There are pronounced biases: anon-respondent bias (as acknowledged but dispelled on the basis of a behavioral assumption), a strategic bias (given the question asks the respondent’s willingness-to-pay an additional fee), a hypothetical bias (as the survey did not attempt to simulate a realistic market situation), and a contextual bias (as the respondent may disapprove of the program options offered but might otherwise be willing to contribute an incremental amount for other programs).

Study: The Value of Non-Resident Sport Fishing in British Columbia
Author: Pearse Bowden Economic Consultants Ltd. (1971)

A mail survey was sent to non-resident anglers who had purchased a Iicence in 1969. Of the non-steelhead licence holders surveyed, 3,320 completed their returns for a response rate of 39V0. A survey was also sent to a comprehensive sample of 370 commercial fishing enterprises, such as lodges, camps, and resorts, who proved cooperative by returning 83°/0.

The focus was on annual expenditures (for determining total value) and average expenses per day to indicate a willingness-to-pay. Again, caution is advised in the comparison of these measures to more recent studies.

Study: The Value of the Kootenay Lake Sport Fishery
Author: Peter Pearse and Michael Laub (1969).

The authors studied the resident and non-resident use and values related to fishing on the Kootenay Lake in 1967. There were then 4,441 anglers fishing the lake, the majority of which were non-resident (2,53 1 or 570/0). In the interviews, the anglers were asked about their maximum willingness-to-pay for an annual licence to fish the lake. For non-residents, three different methods were used to estimate the demand schedule: willingness-to-pay for individual licences, willingness-to-pay for household licences and an indirect travel cost approach (for household WTP). For residents, the authors commented on the limited evidence supporting the underlying assumptions made and the lack of reliability. The report focussed on the optimal licence fee as that which generated maximum licence sales revenue. Given this orientation, it is likely the responses were subject to a strategic bias.

Study: Evaluation of Sport Fisheries: An Experiment in Methods
Author: R.A. Spargo (1971), for the Department of the Environment, Ottawa.

This report used two sites (Margaree River and Crecy Lake) and three methods (expenditure, personal evaluation and Hotelling's) to examine values associated with sport fishing. The results of this study should be used with caution. Although the "personal evaluation" method

used did reveal the willingness of an individual to pay over and above the day's fishing costs, even the author observed an unacceptably low response rate to the WTP question and declared the results were the "product of extreme values".

Study: Recreational Fishing Evaluation
Author: W.R.D. Sewell and J. Rostron, for the Department of Fisheries and Forestry, 1970.

Although outdated, this report was sophisticated in its approach to examining recreational salt water fishing. Numerous valuation options are considered and the authors present a justification for a preferred model based on the behavioral aspects of choice. Two questionnaires were used: one for a lengthy interview, the other to be filled out by the respondent. The sample used was small by today's standards: 116 people were interviewed and only the first 100 returns were considered (thus biasing the results to the most keen fishermen). A multivariate analysis of the demand for salt water fishing was performed, with the explanatory variables considered for statistical significance.

Hunting in B.C

Study: The Value and Characteristics of Resident Hunting and The Value and Characteristics of Non-Resident Hunting
Author: Roger Reid, B.C. Ministry of Environment, Wildlife Branch (1985).

These studies reflect a consistent methodological fhmework with the results presented in a similar format. Each reports the activity levels, expenditures, total values (as interpreted through inputioutput analysis), and a net economic value (willingness-to-pay) by species. As hunters may be involved in hunting more than one species at a time, the values per species cannot simply be aggregated to yield an overall value for hunting. However, the values presented for species hunting in each of the eight regional administrative regions are complemented by provincial averages. These weighted averages counteract the variability of values among the regions and provide more reasonable estimates to apply to the Fraser River Basin. Overall, the presentation of findings is more descriptive than analytical.

Summary of Survey Methodology

Scope of sample	Sample Representation	Response Rate
A sample of species license holders	stratified sample to represent eight administrative regions	resident: 11,890 (45% response) non-resident: 1,870 (49% response)

Summary of Data Characteristics

Data Categories	Data Aggregation	Limitations
activity, harvest, success, expenditures	by species by eight adrninist-rative regions	use value only considered hunter-days and values are not additive.

One CVM question was posed. It asked the respondent to identi~ the threshold levels of increased daily hunting costs... (where) you would have chosen not to hunt (in B.C. in 198 l)?". This maximum WTP was collected on a per species basis.

The survey data collected was compared against the findings of preceding studies. The expenditure estimates obtained were compared against those identified in the Canadian

Wildlife Service's Importance of Wildlife to Canadians study, noting little difference except with respect to the pricing of equipment. The author noted a previous study of resident hunting in 1972 (Pearse and Bowden), but suggested that a comparison of the values would not be valid given the latter was limited and its results outdated.

The data is reported by BC Environment administrative region so it cannot be aggregated into a Fraser Basin region.

Study: Big Game Hunting in the East Kootenay
Author: Peter Pearse and Gary Bowden (1966)

The methodology and results of this report are now outdated. The authors focussed on travel costs incurred to hunt, reporting use values in terms of average annual and daily expenditures by hunters. Values were reported for each of the following categories of hunters: local hunters, other B.C. hunters, non-resident hunters, and all hunters. The expenditure model has since then been proven unreliable for estimating net use values.

Non-Consumptive Use of Wildlife in B.C

Study: Report on the British Columbia Survey on Non-Hunting and Other Wildlife Activities for 1983.
Authors: R. Reid M. Stone, and F. Rothman, B.C. Ministry of Environment, Wildlife Branch.

This report provides a good theoretical base for examining activity, expenditures, and indirect and direct economic values associated with non-hunting wildlife activities in B.C. in 1983. Both a willingness-to-pay for nonconsumptive use and for non-use (preservation) were recorded. The former asked "how much would you have been willing to increase your annual expenditures before deciding not to have participated in your indirect non-hunting activities during 1983?"; the latter asked "what is the total amount you would be willing to voluntarily contribute annually to preserve the current populations and types of wildlife in British Columbia?".

Two questionnaires were used. The “green” questionnaire addressed attitudes and opinions about wildlife. The "brown” questionnaire collected information about participation and economic values. Both forms were mailed to 11,946 residents with a response rate of 46% (for 5,495 returns). The sample was stratified and the results tabulated based on the eight administrative boundaries.

Opportunity Cost Studies

Study: Preserving old growth timber stands to preserve deer and elk habitat on North Vancouver Island
Author: Jointly by B.C. Ministry of Environment and Ministry of Forestry, (1983).

This study included the computed present value (PV) of old growth timber stands. It considered the costs of foregone timber revenue, $16.00/sq metre in 1982 ($24.46 09/92 equivalenthq metre) incurred when protecting old growth habitat for deer and elk on North Vancouver Island. A discount rate of 10% was used.

Study: Response to the Ministry of EnvironmenMvlinistry of Forests Reports
Author: MacMillan Bloedel, (1983)

This report responded to the values advanced by the Ministry. At issue was the discount rate used to value forest resources for future generations. MacMillan Bloedel advocated that cost and benefits should be computed from activities in one year only.

Study: Impact Analysis of the cost of establishing deer and elk reserves on TFL37 and 39
Author: B.C. Ministry of Forests, Strategic Studies Branch, (1983).

This report examined the impact of wood harvest lost to provide reserves for deer and elk.

It estimated the opportunity costs of not harvesting timber valued at $ 120/sq metre in 1982 ($183/sq metreJ92) in order to establish deer and elk reserves. No discount rate was used.

MacMillan Bloedel suggested that the opportunity costs associated with protecting the TFL37 and 39 sections were greater. They recommended using ($25.43/sq metre, 1982 ($38.88 sq metre/92) instead.

Study: B.C. - West Coast Trail
Author: E. Pope, (1986).

The author examined the trade-off between wilderness use and mixed logging wilderness uses. She applied a 8% discount rate and examines market benefits and costs.

This report used standard recreation values from the U.S. Water Resources Council:

> $45.44 daily use value for hiking in wilderness used as calculated WTBP compensation. (She multiplied 3.3 times the recommended value of $13.77 WTP daily ($17.62 09/92 equivalent)).
>
> $16.96 daily use value for "dispersed recreation" with multiple use, as calculated WTA compensation. (She multiplied 3.3 times the recommended value of $5.14 WTP ($6.57/92)).

Study: B.C. - The Stein Valley
Author: G. Bowden, 1986

This study examined two alternatives: wilderness preservation or mixed use. It provides estimates of foregone timber benefits.

Opportunity costs incurred in foregone revenues would vary according to the timber quality: ranging from $45/sq metre (low), to $5 l/sq metre (mid) to $57/cubic metre (high) for revenue, ($58, $65, and $73, respectively, in 09/92 dollars).

Site Specific Studies in B. C

Study: Stein River Watershed Resource Evaluation
Author: Tom Gunton, SFU Resource Management, (1985)

Using on-site survey data and U.S. Government estimates of per day values, values were computed for recreation activities including: hunting, fishing, day-hiking, and backpacking or guided tours. A 10 percent discount rate was used to consider the future benefit streams.

Study: B.C. North Vancouver Island (on range maintenance for deer and elk)
Author: Jointly by B.C. Ministry of Environment and Ministry of Forests, (1983)

The focus is on direct hunting benefits only. No attempt is made to measure indirect or non-consumptive use benefits. Reference is made to the Pearse-Bowden report on deer and elk range maintenance and McDaniel's 1980 report on elk.

Study: Tatshenshini-Alsek Region Wilderness Study (Northern B.C./Yukon/Alaska border)
Author: J.S. Peepre and Associates, (1992).

This study used the 1985 Alsek River user survey da~ based on responses from commercial rafting and guide-outfitting sources. There are no new economic values generated in this study.

3.2 Table of B.C. and Alberta Value Estimates

The following section summarizes the per day net economic values from the B.C. and Alberta recreation studies. The reported values have been inflated to September 1992 dollars for ease of comparison.

Preservation Value:

1989/90 B.C. Outdoors Survey (CVM)	preservation value of all forest recreation resources	$54.80 annually (range $38.57 Kamloops to $54,89 Vancouver)

Fishing:

1989/90 B.C. Outdoors Survey (CVM)	use value	$15.82 per RA.D (range $12.46 Kamloops to $19.42 Cariboo)
	preservation value for fishing opportunities	$21.76 annually (range $18.82 Vncouver to $37.27 Cariboo)

Tidal Fishing:

National Sport Fishing (1990) (CVM)	use value of which:	$31.02 daily
	use value residents	$29.94 daily
	use value non-	

	resident Cdns.	$38.73 daily
	use value aliens	$34.13 daily
Cameron & James (DFO), 1984 (CVM)	use value guided	$32.78 daily
	use value non-resident, Cdns.	$22.77 daily
	use value non-resident aliens	$20.10 daily

Freshwater Fishing:

National Sport Fishing (1990) (CVM)	overall use value	$17.04 daily (range $22.40 Peace to $15.34 Thompson-Nicola)
	use value, non-resident Canadians	$20.34 daily
	use value, aliens	$24.09 daily
National Sport Fishing, 1985 (Stone, 1988) (CVM)	use value, resident	$26.62 daily
	use value, all non-residents	$31.22 daily
	of which: use value, non-resident Canadians	$27.13 daily
	use value, aliens	$35.45 daily
Reid (1986)	use value, residents	$30.73 daily

(CVM)	use value, all non-residents	$47.70 daily
	of which:	
	use value, non-residents Canadians	$42.35 ddy
	use value, aliens	$53.82 daily
Meyer (1975) (CVM)	use value on Vedder Riven	
	- steelhead	$78 daily
	- coho	$58 daily
	- trout	$46 (kdy
Bryan (1974) (CVM)	use value on the Coquitlam River	$32 daily
1972 Survey Meyer (1978) (indirectly, CVM)	use value, residents:	
	- Lower Fraser (assume 3.0 MIX)	$479 mean annual $115 median annual ($38 daily')
	- Upper Fraser (assume 4.84 RADs)	$1,107 meanannual $306 median annual ($63 daily)

[1] Assuming Recreational Activity Days (RADs) at 1990/91 levels for the region under study, applied against the median (not the mean).

	use value of salmon & steelhead to residents:	
	- Lower Fraser	$697 mean annual
	(assume 3.0 RADs)	$211 median annual ($70 daily)
	- Upper Fraser	$1,207 mean annual
	(assume 4.84 RADs)	$506 median annual ($132 daily)
	preservation value of salmon & steelhead	
	- Lower Fraser	$192 annually
	- Upper Fraser	$1,303 annually
Pearse-Bowden (1971) (CVM)	use value (in B. C.)	
	- all fishing	$30.34 daily
	- for steelhead esp.	$11.98-35.11 daily
Pearse & Laub (1969) (CVM)	use values	
	- residents,	unreliable
	- non-residents	$51.06 daily CVM $125.32 daily TCM

Hunting:

1989/90 B.C. Outdoors Survey (CVM)	use value	$31.13 per RAD (range $18.15 Cariboo to $41.90 Kamloops)
	preservation	$8.99 annually

	value for hunting opportunity	(Range $4.51 Vancouver to $50.82 Cariboo)	
Importance of Wildlife (1987) (CVM)	use value all hunting of which:	$21.22 daily	
	- large mammals	$18.64 daily	
	- small mammals	$8.34 daily	
	- waterfowl	$23.17 daily	
	- other birds	$12.26 ddy	
Reid (1985) (CVM)	use values by species:	values per day resident	non-resident
	- black bear	$30.34	$206.78
	- caribou	$46.95	$289.83
	- cougar	$57.97	$383.05
	- deer	$40.17	$186.44
	- elk	$51.70	$240.68
	- b l a c k b e a r	$72.20	$232.20
	- moose	$51.19	$171.18
	- mountain goat	$56.61	$323.73
	- mountain sheep	$78.98	$367.80
	- small game	$19.83	- - -
	- upland birds	$22.20	- - -
	- waterfowl	$26.44	- - -
	- wolf	- - -	$264.41
Pearse & Bowden (1966) (CVM/extra	use value for big game hunting, by residency		

	- local residents	$599.12 annually	
	- other residents	$481.35 annually	
	- non-resident	$4,608.64 annually	
Philips et al.	hunting in Alberta		
(1989)	- big game	$229.06 annually	
(CVM)	- grizzly bear	$169.63 annually	
Adamowicz (1983)	hunting in	value per day	
(CVM)	Alberta	resident	non-resident
	- mountain sheep	$123.63	$417.85
	- moose	$122.05	$158.27
	- grizzly bear	$119.46	$197.75
	- mountain goat	$115.32	---
	- elk	$106.78	$104.24
	- black bear	$90.17	$62.85
Phillips, DePape	hunting in	value per day	
and Ewanyk (1977)	Alberta	resident	non-resident
(CVM)			
	- all game	$89.55	$130.61
	- big game	$85.08	$148.09
	- bird game	$58.19	$104.21
Prather	hunting in Alberta		
(1974)	- residents,	CVM: $44.59 daily	
(CVM and TCM)		TCM: $25.94 daily	

Miller	hunting in Alberta	
(1971)	- residents	$41.97 daily
(CVM)	- non-residents	$80.55 daily
Pattison	moose hunting in	
(1970)	Alberta	
(CVM)	- all hunters	$24.33 ddy
	- residents	$18.44 daily
	- non-residents	$53.54 daily
Pearse & Bowden	B.C. big game hunting	
(1966)	by residency:	
(CVM7expenses)		
	- local residents	$599.12 annually
	- other residents	$481.35 annually
	- non-resident	$4,608.64 annually

Motoring:

1989/90 B.C.	use value	22.41 per RAD
Outdoors Survey		(range 9.32 Cariboo
(CVM)		to 26.85 Vancouver)
	preservation	$10.33 annually
	value for motoring	(range $6.22 Ka.mloops
	opportunity	to $12.16 Prince
		George)

Boating:

1989/90 B.C. Outdoors Survey (CVM)	use value	$18.92 per RAD (range $15.56 Kamloops 0.36 Prince George)
	preservation value for boating opportunity	$2.81 annually $8.23 Cariboo to $23.29 Prince Rupert)
Meyer (1978) (indirectly CVM)	use value (as recommended municipal expenditures per household in 1972)	
	- Upper Fraser	$1,107 annually ($192 median)
	- Lower Fraser	$207 annually ($57 median)

Camping/Swimming:

1989/90 B.C. Outdoors Survey (CVM)	use value	$23.91 per RAD (range $27.95 Vancouver to $15.90 Kamloops)

Swimming Only:

Meyer (1978) (indirectly, CVM)	use value as recommended municipal expenditures per	

	household in 1972	
	- Upper Fraser	$1,080 annually ($192 median)
	- Lower Fraser	$192 annually ($38 median)
Hiking/skiing:		
1989/90 B.C. Outdoors Survey (CVM)	use value	$24.95 per RAD (range $15.76 Cariboo to $26.00 Vancouver)
	preservation value for hiking/skiing opportunity	$27.53 annually (range $16.54 KilldOOpS to $38.46 Prince George)
Hiking, Picknicking and Viewing:		
Meyer (1978) (indirectly CVM)	use value (as recommended municipal expenditures per household in 1972)	
	- Upper Fraser	$2,011 annually ($307 median)
	- Lower Fraser	$360 annually ($1 15 median)

Wildlife Viewing or Nature Study:

1989/90 B.C. Outdoors Survey (CVM)	use value	$6.09 per RAD (range $2.47 Cariboo to $7.16 Vancouver)
	preservation value for nature study opportunity	$40.07 annually (range $20.67 Kamloops to $45.82 Prince George)
Importance of Wildlife (1987) (CVM)	nonconsumptive use value of wildlife	$9.68 daily
Non-Hunting and Other Wildlife (Stone et al, (1986) (CVM)	use values (watching wildlife)	$18.34 daily (range $16.17 on VSllCOUVer Island to $26.43 Omineca-Peace)
	preservation value	$75.97 annually (range $77.99 on Vancouver Island to $113.67 for Omineca-Peace)

3.3 Table of U.S. Value Estimates

The U.S. Forest Service has developed standard unit day values for major recreation activities (but not preservation values) since the early 60s. The initial estimates were based on a park entrance fee survey. Since the mid 70s it has conducted periodic reviews (1975, 1980, 1985 and 1990) of studies using the CVM and TCM methods. They are regularly adjusted for changes in the Consumer Price Index. The 1990 study is a sophisticated meta-analysis of 287 net economic value estimates (156 TCM and 129 CVM) carried out between 1968 and 1988 (Walsh et al 1990). The values are used in various U.S. Forest Service Planning activities on the basis that they can be applied in all regions.

The isssue of how to evaluate alternatives in the face of budgets which can not find new value estimates has generated academic interest in the U.S. on how to make better use of on-the-shelf research (Smith Forthcoming). The U.S. Forest Service sponsored research represents the most comprehensive attempt to review reported values and adjust them for several variables.

- inflation
- omission of travel time in TCM studies
- omission of out-of-state users
- omission of cross-price term for substitution in TCM studies
- application of individual observation in TCM studies

There have not been enough studies of some activities to produce statistically significant explanations of the differences between value observations to adjust them. The U.S. data has been converted to $CDN and inflated to September, 1992 levels.

Activity	Mean	Median (Range)
All Activities	$54.01	$42.99 ($6.22-$349.46)

Activity	Mean	Median (Range)
Camping, picnicking & swimming group:	$32.04	$28.32 ($1 1.22-$74.28)
Camping	$31.02	$30.10 ($13.14-$55.51)
Picnicking	$27.57	$20.40 ($1 1.22-$74.28)
Swimming	$36.55	$29.59 ($11.22-$68.32)
Mechanical travel & viewing group:	$40.44	$34.11 ($13.16-$109.22)
Sightseeing and offroad driving	$32.28	$31.37 ($16.44-$50.66)
Boating (motorized)	$50.21	$40.84 ($13.16-$109.22)
Hiking, horse riding & water travel group:	$66.41	$39.33 ($16.32-$291.72)
Hiking	$46.27	$37.60 ($24.99-$88.79)
Boating, non-motorized	$77.45	$40.35 ($16.32-$291.72)
Winter Sports Group	$45.34	$38.80 ($17.93-$106.10)
Resorts, cabins & camps	$19.86	-- ($6.22-$31.71)
Hunting Group:	$66.33	$55.49 ($26.38-$226.56)

Activity	Mean	Medium (Range)
Big game hunting	$72.34	$60.25 ($31.52-$226.56)
Small game hunting	$49.03	$43.72 ($29.78-$82.79)
Waterfowl hunting	$56.70	$40.20 ($26.38-$163.68)
Fishing Group:	$62.45	$47.08 ($12.93-$349.46)
Cold water fishing	$48.72	$45.33 ($16.02-$187.93)
Anadromous fishing	$85.93	$73.57 ($26.81-$202.47)
Salt water fishing	$115.33	$84.88 ($29.74-$349.46)
Nonconsumptive fish & wildlife	$35.32	$32.60 ($8.38-$60.55)
Other recreation activities	$29.94	$25.55 ($10.83-$69.03)
Wilderness	$39.11	$30.64 ($13.87-$169.06)

3.4 Comparison of Values

Tidal Fishing

The U.S. estimates for anadromous fishing, mean and median values of $85.93 and $73.57, respective y, are much higher than the recent B.C. estimates.

The results of the National Sport Fishing Survey (1990), released in draft, provide the basis to compute the overall net economic value of tidal fishing in British Columbia for both residents and non-residents. The 1990 value for tidal fishing in 1990 was $28.97 ($31.02 09/92 equivalent). A further breakdown includes: a mean daily use value of $27.96 ($29.94/92) for residents; $36.17 ($38.73/92) for non-residents; and $31.87 ($34.13/92) for non-Canadian, non-residents.

Freshwater Sport Fishing

Again the U.S. results indicate the high end of the range, $48.72. The results of the National Sport Fishing Survey (1990) by residency has a mean daily use value of $15.93 in 1990 ($17.05 09/92 equivalent) for B.C. residents; $19.01 ($20.34 9/92) for non-resident Canadians; and $22.51 ($24.09 9/92) for non-Canadian, non-residents. The 1989-90 MOF study had an estimate of $15.82 for B.C. residents.

In Stone's (1988) 1985 National Survey of Sport Fishing, the average daily value for resident angling across the province was reported to be $20.80 ($26.62/92), ranging fkom a low of $17.90 ($22.90/92) on Vancouver Island to a high of $28.10 ($35.96/92) in the Peace region. In 1985, the average daily value for all non-residents in B.C. was $24.40 ($31.22/92); of these, the non-resident Canadians revealed values of $21.20 ($27.13/92), while the non-resident aliens valued their freshwater fishing day at $27.70 ($35.45/92).

Reid's (1986) Value and Characteristics of Freshwater Angling also reported the net economic values of a fishing day for residents versus non-residents. In 1981, the average daily net economic value for residents was $20.10 ($30.73/92), with values ranging from a low of $14.80 ($22.63/92) for the Lower Mainland region to a high of $23.30 ($35.62/92) for the Cariboo.

The following table shows, from top to bottom the values obtained since the early 80s. The '81, '85 and '90 surveys used the same CVM question but the results for B.C. residents widely differ. Obviously the timing of a survey influences the results. Economic conditions and consumer preferences change significantly over 5 year periods and they are reflected in the different consumer surplus values for the freshwater sport fishing experience.

Study	Daily Value (92CN$)
Walsh et al	$48.72
81 Reid Survey	$30.73
85 National Survey	$26.62
90 National Survev	$17.05
89-90 MOF Study	$15.82

Hunting

Once again the U.S. results are at the top end of the range, $66.33 for all hunting and $56.70 for waterfowl hunting.

The MOF Recreation Opportunities Study (1991) listeda$31. 13 per RAD value for hunting. For British Columbia The Importance of Wildlife to Canadians study (1987) reported the mean daily use value for all hunting as $17.30 per participant in 1987 ($21.22 1992 equivalent). The mean use value for hunting large mammals was $15.20 per participant ($18.64/92); for small mammals was $6.80 ($8.34/92); for waterfowl was $18.90 ($23.17/92), and for other birds was $10.0 ($12.26/92).

In 1985, the Value and Characteristics of Resident Hunting (Reid) report summanzed the 1981 survey results. Daily hunting values were reported by species: for black bear, $17.90 ($30.34/92); for caribow $27.70 ($46.95/92); for cougar, $34.20 ($57.97/92); for deer, $23.70 ($40.17/92); for elk $30.50 ($51.70/92); for grizzly bear, $42.60 ($72.20/92); for moose, $30.20 ($51.19/92); for mountain goat, $33.40 ($56.61/92); for mountain sheep,

$46.60 ($78.98/92); for small game, $11.70 ($19.83/92), for upland birds, $13.10 ($22.20/92), and for waterfowl, $15.60 ($26.44/92). (No wolf category).

The following table displays a comparison of the most recent values for all hunting and waterfowl hunting.

Study	All Hunting Daily Value (92Can$)	Waterfowl Daily Value (92Can$)
Walsh et al	$66.33	$56.70
87 National Survey	$21.22	$23.17
85 Reid Report	(deer)$40.17	$26.44
89-90 MOF Study	$31.13	---

Boating

In the U.S. meta-analysis, motorized and non-motorized boating had mean values of $50.21 and $77.45, respectively. In both cases, the median value was much lower, $40.84 and $40.35, which indicates that there were some unusually large estimates skewing the average. At the other end of the spectrum, the MOF study showed a value of $18.92 for boating.

Swimming

In the U.S. meta-analysis, swimming had a mean value of $36.55. The MOF Study aggregated camping and swimming results togetheq the reported value is $23.91.

Hiking

In the U.S. meta-analysis, hiking had a mean value of $46.27 and a median value of $37.60. The MOF Study aggregated hiking and skiing results together the reported value is $24.95.

Wildlife Viewing or Nature Study

In British Columbia, The Importance of Wildlife to Canadians study (1987) reported the mean use value for all non-consumptive trips as $9.68 per participant. The MOF study

showed a value of $6.09. In the Survey of Non-Hunting and other Wildlife Activities, Stone et al (1986) reported 1983 mean daily use values of $18.34 for those watching wildlife in British Columbia. The values varied by region the lowest value was$16. 17 for Vancouver Island, while the highest was the Omineca-Peace at $26.43. Once again, the U.S. study stood at the other end of the spectrum, a mean value of $35.32.

4.0 RECREATION ACTIVITY

4.1 Definitions

The essential components of a total net economic value calculation for recreation services are estimates of net economic value per person per day and estimates of total visitorship or participation, market size. For preservation services, the components are estimates of annual net economic value per person and the size of the group who enjoy these services.

In Section 3.0, individual net economic value was discussed. This Section delves into the other half of estimating net economic value, estimating visitorship and the size of the preservation enjoyment group.

Although visitorship is a seemingly simple concept, it is viewed and handled differently across the many organizations which have developed recreation and tourism data. The academic analysis of the economics of natural environments is heavily skewed to defining and estimating non-market recreation per day values. Market size issues have remained a secondary concern.

The trip is generally considered the logical unit of analysis for recreation behaviour (Clawson and Knetsch 1971). This involves the total experience, not only an on-site visit, but also anticipation, travel and recollection. The consumer is viewed as demanding a trip or experience. The recreation trip or experience is produced by recreationists and by public and private owners and managers of resources (Bockstael and McConnell 1981). There is a two step process to provide the supply of trips, not just recreation sites and facilities, that the consumer demands. In the first step, public and private managers and owners make different kinds of opportunities available through development and regulation. In the second step, consumers combine the opportunities with their own knowledge, equipment, travel and technology to produce recreational trips or experiences. This production process gives the consumer an unusuall y significant influence in shaping the quality and amount of recreation supply.

The common unit of activity is per day, defined as one person on-site for any part of a day (Walsh et al 1991).

Recreationists and tourists identify with a trip or visit unit of time which has a personal reference. The amount of time per trip or visit will vary between individuals.

The respondent unit is often an individual but it can be a group, where one person answers on behalf of the traveling unit. A related issue is that survey respondents are selected directly by the interviewer or indirectly by asking qualification questions at the outset of a mail survey. This step is taken to obtain a stratified sample but often with recreation surveys, a sample of only the adult population. For example, there is often an age question to eliminate persons under eighteen years old from responding.

Some surveys will make assumptions about the size of the group and divide responses where necessary, to provide an individual estimate. The B.C. Tourism surveys use this approach.

The activity data falls into two broad economic sectors, tourism and recreation. The terms have different meanings for different organizations. Municipal parks and recreation consider recreation as physical activity for leisure undertaken in the local area by residents. The Outdoor Recreation Council of B.C. leans to an activity based definition too but includes non-residents as recreationists when others might refer to them as tourists and is not so concerned with the time dimension. B.C. Ministry of Tourism distinguishes between day-trippers, overnighters and tourists and divides them by resident and non-resident. Although many more studies of net economic value have been undertaken in the U.S. than in Cana~ American researchers have by and large ignored or overlooked the contribution of non-residents, especially foreigners. They usually see the consumers of these environmental resource experiences as recreationists. Canadian researchers usuall y try to capture non-resident values.

The potential market for enjoyment of non-use benefits of environmental resources should be the referent society. It is usually delimited in practical terms by the resources available to carry out a CVM survey.

A good study will try to capture all of the consumers and then it becomes a matter of dividing them into descriptive categories for analytical purposes. For the puposes of analysis, it is essential that residents of the referent society are separated from non-residents. In a welfare economics study, the referent society is usually taken as the nation, be it Canada or the U.S. Often a state or province will comprise the referent society. There are theoretical problems when the smaller jurisdiction is listed as the referent society but policy-making practicalities often dictate the necessity of adopting B.C. or Alberta etc. as the source of residents.

4.2 Estimating Activity

There are three basic methods to estimate the "market".

- license and permit data
- sample survey of referent society
- sample ***survey*** of site users

License and Permit Data

Some recreationists and tourists, such as sport fishermen and hunters, require an annual government issued license while others, such as campers, require a daily permit. Some providers of recreational opportunities are government licensed such as whitewater rafting and guiding companies. The licensing and permit data provides reasonably inclusive figures on the total number of recreationists and tourists enagageci in an activity on a province-wide basis. By surveying license holders, an average annual number of activity days can be estimated. With the annual average days estimate and the license data a total days estimate can be developed for the province.

Licensing data has the advantage of including non-residents. Fraser Basin regional activity can be estimated by overlaying regional factors from a study with regional activity data. Licensing and permit data does not include all of the preservation group as many may not be active recreationists.

Random Sample Survey of Referent Society

Another approach is to carry out a survey of the referent society. Respondents can be stratified to ensure a representative sample and the number of respondents can be selected to assure the desired error margin. The respondents are queried about their amount of participation in recreation activities over the past year. The percentage breakdowns can be applied against the referent society's total population.

These surveys can be carried out in person, over the phone or through the mails but the last two are the only economical methods.

A phone interview does not lend itself well to asking questions about activities undertaken within a region without well-defined boundaries because the respondent may not be familiar enough with the subject area's geography. Where an ill-defined region is under study, a mail survey has the advantage of lending itself well to maps but a phone survey can incorporate a map if it is sent to the respondent in advance of the call.

Non-residents can be randomly sampled at entry and exit points, ie. border crossings, to the referent society. An in-person questionnaire can be administered there or they can be asked take it away and mail it in. The other random alternative, sampling the at-large non-resident population, is likely to be prohibitively expensive.

The phone survey is best for controlling sample stratification and size.

Sample Survey of Site Users

Another sampling approach is to count users and conduct in-person interviews on random days. This approach requires a single site or system of sites with a very limited number of access points. An example would be a swimming lake where there is a single access road and parking for wers.

4.3 Estimation Problems

Most surveys try to yield a unit day figure. A noteable but often sidestepped problem in recreation and tourism studies is the question of mulitple activities within a unit day. Surveys do not identify activity by the actual number of hours directly engaged in it but by the dominant activity(ies) for the unit day. The U.S. Census defines recreation activity as primary use when it represents over ***50*** percent of total individual activity while at the site. This approach leads to undercounting of key, but secondary activities, such as sightseeing and wildlife viewing. As previously mentioned the B.C. Ministry of Forests recreation study allowed for multiple recreation activities in a day, perhaps 3-4 Recreation Activity Days (RAD) might be counted within one calendar day. With this approach, the activity days from different activities can not be summed to arrive at a total for all activities. Another route is to characterize the day as being given over to recreation without distinguishing between the types of activities. This approach provides no information about particular activities.

Where more than one activity is undertaken in a unit day, the so-called lesser experiences are not counted. This is not a problem fkom the perspective of arriving at a total figure for a site because respondents are answering questions based on their visit. They consider it as a total recreation or tourism experience, which involves more than one activity. It is a results interpretation problem where lesser activities are overlooked at the expense of primary activities.

The problem comes to the fore because there are only conventional practises rather than definitions about the categories for recreational activities/experiences. If the focus is activity, problems arise because, often, several activities are undertaken in the process of consuming an experience. By focusing on the activity rather than the experience, the latter is shortchanged and data based on the former may mislead planners and policy-makers. For example, hiking may or may not be directed at having a wildlife viewing experience. The lack of standard definitions makes it difficult to compare studies, other than for hunting and sportfishing, and, sometimes to interpret the implications of their value estimates.

A related problem is the definition of activity. This issue may appear to be straightforward but it is not. Tourism or recreation are marketed as experiences which include many dimensions. For example, charter operators do not sell sport fishing on the basic activity of fishing but on the total experience; a primary dimension is the wildlife and scenic viewing experience, another dimension is being on the water, and in some instances there is a heritage experience. This concept of experience pushes forward the idea that value is a function of services from all site resources and less of one resource. When considering one resource, it is easier to assume homogeniety of the resource over a geographic system than if a site offers several unique resources which combine to offer a recreation or tourism experience.

This experience concept is strongly backed up by consumer and operator surveys and is the basis for tourism marketing today. The activity nomenclature misdirects the focus to one resource away from the idea that several resources help produce the consumed item, the recreational experience. The problem does not rest with economic theory but the application of it. For example, there are many studies which consider the implications of water quality changes to the recreational value of sport fishing. They consider how the value of sport fishing would go up or down with improvements or harm to water quality. They correctly focus on the one resource whose value is changing. The problem arises when a value is attached to an experience which is dependent on the services of several environmental amenities but is attributed to the services of one resource only.

5.0 REVIEW OF B.C. RECREATION ACTIVITY ESTIMATES

5.1 Report Summaries

There are several studies which provide recreation activity volume data for the province of B.C. but there is no study which focuses on the Fraser River or the Fraser River Basin. It is possible to capture activity volume data for the Fraser Basin from the original data of some of the B.C.-wide studies.

Wilderness Preservation

Study: Wilderness Survey Project (in design phase)
Date: 1992 plan, proposed for Spring 1993
Author: Economics and Trade Branch, B.C. Ministry of Forests

In a mail survey, the following data will be collected from a large sample of users of protected and unprotected wilderness areas.

- recreational use
- user expenditures
- use activity and non-use preservation net economic values

It will be stratified by B.C. Ministry of Forests administrative region. A CVM willingness-to-pay question will likely be used to detemine net economic value and a dichotomous choice format will be used for preservation value questions.

Comment: The survey methodology will be the same as that applied in the Outdoor Recreation Study, described below.

Outdoor Recreation

Study: Outdoor Recreation Survey 1989/90: How British Colombians Use and Value their Public Forest Lands for Recreation
Date: 1991
Author: B.C. Ministry of Forests, Recreation Branch.

Description: This study was the first to look into the fidl range of recreational activities in B.C.'S provincial forests, 85 percent of the province's land base. Diary cards were mailed to 10,286 randomly selected B.C. households in four phases corresponding with the seasons. They were used to track recreation activity and spending over the following three months. At the end of this period, a questionnaire was sent to this stratified sample of the adult population. A follow-up procedure was used to maximize response. There were 5,325 completed returns, 61 percent of the sample. The data was reported by activity group and ROS class [2] It shows expenditures, use value (total and mean net (CVM)), and preservation value (total and mean net (CVM)). The sample was stratified by the six B.C. Ministry of Forests administrative regjons. The study differentiates between recreation user days (RUDS) and recreation activity days RADS). The latter is all or part of a calendar day on which a particular recreation activity took place. The former are all or part of a calendar day spent participating in any form of recreation.

Comment: Because it is a mail survey, users can be located by area code of residence but activity sites are only identified by the forest region in which they occurred. The forest regions are not co-terrninous with the Fraser Basin. Therefore, data from a few forest regions can not be aggregated to make a Fraser River Basin region.

[2] The recreation activity groupings were nature study, boating, motoring, fishing (all types), camping/swimming, hiking/skiing, hunting (all types) and other. The Recreational Opportunity Speetrum (ROS) Class denoted accessibility: primitive, semi-primitive, roaded or rural.

Respondents are directed to only report activities on Provincial Forest Lands so the project does not include urban or semi-urbsn areas. Water based activities in or near population centres, even small communities like Lillooet will not be included.

The sample includes B.C. residents only, so the values of other Canadians or foreign tourists are not taken into account.

The reported results were expanded by assigning a result to the non-respondents, 50 percent of the respondents' mean. This was an arbritary decision.

The study takes an activity based rather than an experience based approach. All activities are reported; there were an average of 2.4 activities (reported as 2.4 RADs) during a recreation user day (reported as 1 RUD). The RADs from different activities are not additive because of double counting problems.

Study: Recent Trends in Outdoor Recreation Participation By British Colombians
Date: 1991
Author: B.C. Ministry of Environment, Lands and Parks

Description: This report identifies recreation participation levels by British Colombians across fourteen recreation activities. It provides trend data from 1983, 1989 and 1991 phone surveys. The latest was part of an omnibus phone survey conducted with 508 BCers in May, 1991.

Comment: Although it only provides data on the proportion of the population who have engaged at least once in the previous year in a recreational activity, it does show changes in level of interest within the population towards a recreation activity. For example, the number of people who went overnight backpacking declined from21 percent in 1983 to 17 percent in 1991. If respondents had been asked the number of days in the past year that they had participated in an activity, a gross estimate of provincial total activity days could have been made.

Study: Demand For Outdoor Recreation in the Lower Mainland
Author: Outdoor Recreation Council of B.C. for G. V.R.D.
Date: 1991

Description: This study brought together survey results, park use statistics and other data developed over the past decade on outdoor recreation activity in the Lower Mainland. Several of the reported studies are covered herein. The municipal sponsored studies focus on determining the percentage of residents who participate at least once in an activity or attend a local site(s) over the previous year and do not have volume data. GVRD park use volume data is reported.

SportFishing

Study: British Columbia Freshwater Results of the 1985 National Survey of Sport Fishing
Date: 1985
Author: Michael Stone, MOE

Description: A mail survey was distributed to 2.4 percent of (8,668) of the freshwater licence holders (360,139), with close to a 60 percent response rate. Different questionnaires were sent to residents and non-residents. Activity data, catch and harvest data was broken down by the nine MOE regions and Canadian versus alien non-residents.

Comments: The national fishing surveys are undertaken every five years by the provincial ministries responsible for inland fisheries. Some results of the 1990 data has been made available to the authors of this study but the full study is not yet available. The MOE administrative regions are not co-terminous with the Fraser Basin so data for a Fraser Basin region can not be directly aggregated. A Fraser Basin region can be developed if activity patterns from the 1980 survey are assumed to hold for the 1990 results. The 1980 results are reported by MOE Management Unit, a sub-administrative region, and they can be aggregated into a Fraser Basin region.

MOE's Fisheries Branch issues annual licenses and has annual data on the number of license holders by MOE administrative region. The Branch does not annually survey license holders as does the Wildlife Branch. Annual license data by region of residence is of limited assistance for this study.

Study: The Determinants of Value for a Recreational Fishing Day: Estimates from a Contingent Valuation Survey.
Date: 1987
Author: Trudy Cameron and Michelle James, DFO

Description: An in-person interview survey of 4,161 anglers, undertaken at Port Alberni, Campbell River, Sechelt and Victoria provided data on tidal water fishing activity, catch, residence, and CVM (two variations). Design used a "closed-end" (dichotomous choice - reject or accept) CVM question format, with amounts varied for respondents.

Comment: The study has an excellent theoretical framework and sophisticated econometric treatment. The sample of activity was drawn horn non-Fraser Basin sites.

Study: The Value and Characteristics of Freshwater Angling in British Columbia
Date: 1986
Author: Roger Reid B.C. Ministry of Environment, Fisheries Branch

Description: This study was conducted separately from the 1985 national sport fishing survey. It collected data on activity, expenditure, catch and harvest data, with total and net (CVM) economic values. It includes breakdowns by origin: B.C. residents, non-residents (other Canadians, U.S. or foreign elsewhere), with data stratified by MOE management regions. It is based on a mail survey distributed to 450,000 licensed freshwater anglers, and enjoyed a 77 percent response rate.

Comments: The 1990 national sport fishing survey provides fresher data. MOE conducts the national sport fishing survey in B.C.

Wildlife Hunting and Viewing

Study: The Value and Characteristics of Resident Hunting and The Value and Characteristics of Non-Resident Hunting
Date: 1985
Author: Roger Reid, B.C. Ministry of Environment,Wildlife Branch

Description: Results of the 1981 British Columbia Resident Hunter Provincial Survey are presented in this study. A comprehensive questionnaire was mailed to resident holders of species licences, with 11,890 of the 28,116 holders responding, a 45 percent response rate and to non-resident license holders, 3,836 with 1,870 responding, a 49 percent response rate. Data on activity days, expenditures, total values (input/output), and CVM by species is reported by eight MOE administrative regions.

Comment: The study has a high level of detail and includes a waterfowl category. Although there is an annual Hunter Sample Survey, this study provides more information on hunting activity. Its main drawback is that the data is over a decade old.

Study: Hunter Sample Survey
Date: Annual
Author: B.C. Ministry of Environment, Wildlife Branch

Description: Number of hunters and annual amount of hunter days is reported by species and MOE Management Unit. The Management Unit is a smaller administrative area than the MOE Region and is usually based on watersheds. The data is developed from a mail survey of all license holders.

Comment: Data for a Fraser Basin region can be aggregated from the Management unit data. It is not readily accessible because it is stored on an IBM mainframe. The hunter activity data is reported by species so it can not be aggregated because of double counting

where hunters are stalking more than one species on the same trip. Hunter days are reported for big game species but not game birds and waterfowl.

Study: Wildlife Viewing in British Columbia
Date: 1988
Author: Ethos Consulting, Land Sense Ltd. and Youds Planning Consultants, Canada - B.C. Economic Development Agreement

Description: This study identified the 51 choice wildlife viewing sites in B.C. and provides characteristics by location, wildlife, viewing season, access, programs, management responsibility and environmental sensitivity. The data source was the professional judgement of the authors.

Comment: It does not provide activity data but it is a detailed source on key characteristics of B.C.'S best wildlife viewing sites.

Study: Report on the British Columbia Survey on Non-Hunting and Other Wildlife Activities for 1983
Date: 1986
Author: R. Reid, M. Stone, and F. Rothman, B.C. Ministry of Environment, Wildlife Branch.

Description: This study was carried out on a very significant scale. Two distinct questionnaires were used a "green" one for attitudes and opinions about wildlife and the "brown" one on participation, and economic values. Both forms were mailed to 11,946 B.C. residents, with a response rate of 46 percent (5,495 returns). Data included activity, indirect and direct economic values, CVM (willingness-to-pay to preserve and willingness-to-pay to participate) and total value. Reporting was done by eight MOE administrative regions.

Comments: This study is an important counterpart to the hunting and fishing surveys because these activities have long been documented whereas non-consumptive enjoyment of

wildlife has not received much attention. Because the data is reported by MOE administrative region, it can not be accurately applied to the Fraser Basin.

Studies: The Importance of Wildlife to Canadians in 1987:
Trends in participation in wildlife-related activities 1981-2006 (1992) and
The Importance of Wildlife to Canadians in 1987: Highlights of a National Survey (1989)
Date: 1989 and 1992
Author: Canadian Wildlife Service, Environment Canada.
(prepared by Federal Provincial Task Force)

Description: This study is a time-series analysis, projecting consumptive and non-consumptive hunting trends trends to 2006. The data was sourced from 1981 and 1987 National Surveys on the Importance of Wildlife to Canadians. A mail survey of 78,429 targeted nation-wide was undertaken in 1987, 55,173 replied a response rate of 70.3 percent. Trends projected for participation, multiple activity use, organization involvement, public support, and hunting.

Comment: The data is broken down by province so some raw assumptions are necessary to separate Fraser Basin activity.

Tourism

Study: Resident Travel in British Columbia
Date: 1991
Author: Marktrend Research and The Tourism Research Group, B.C. Ministry of Development, Trade and Tourism

Description: Tourism British Columbia separately studies travel behaviour of resident and non-residents. This study focused on B.C. residents who travelle~ at least over-night, for any purpose; 23 percent of travel by residents was for business purposes. A wide range of

data was collected: propensity to travel; frequency of travel; destination; purpose; mode; travel expenditures; and activities.

Between March 1989 and February 1990, 14,825 phone interviews of adult BCers were conducted to collect basic travel pattern data and to identifi a large sample who would be given a detailed travel diary to complete. 7,884 persons agreed to complete a travel diary, 1,500 complete diaries were returned and 1,046 covered B.C. trips. Originally the data was supposed to be dis-aggregated by Tourism B.C. administrative regions but the lower than hoped for return rate did not provide large enough samples to produce detailed regional information.

Comment: This study does not provide useable data for the purposes of the Fraser Basin study. It does not use a definition of activity day and simply refers to the proportion of respondents who participated in a listed activity during their trip. We do not know the number of days of participation and there is no uniform time unit, such as a quarter or a year, over which the respondents' report. There is also the aforementioned lack of regional dis-aggregation.

Study: Visitors '89- A Travel Survey of Visitors to British Columbia.
Date: 1990
Author: B.C. Ministry of Tourism and Provincial Secretary.

Description: This major study provides data on visitors to B. C., tourists and businesspersons. Topics covered include origin, trip purpose, length of stay, region visited, party size, expenditures and activities. The data is broken down by nine Ministry of Tourism administrative regions and comparisons are made to the results of the Visitors '87 and Visitors '79 studies. 13,357 out-of-province visitors were contacted and screened as they entered B. C.; Trip diaries were distributed to 8,775 tourists and 1,085 excursionists and 4,401 diaries were completed, a 45 percent return rate. The diaries were used to obtain trip characteristic data and follow-up phone interviews of a sample. All types of trip purposes were included: 11 percent of respondents visited on business; 33 percent on personal matters;

27 percent for a conventional tourist visit 8 percent for a wilderness trip; 3 percent on a city tour and 12 percent for a resort or cruise vacation.

Comment: Although the Visitor series is a sophisticated survey of non-residents who come to B.C. for leisure, personal affairs and travel, its data is not useable for the purposes of the Fraser Basin study. The diaries ask for activity information by location but this data is aggregated by tourism region and a group of these regions are not co-terminous with Fraser Basin boundaries. The activity data is reported as participation by a percentage of respondents. A fixed reporting period of 3 months is used but the sample covers a full year of four periods.

Study: Visitors '89 Insert.
Date: 1990
Author: B.C. Ministry of Forests

Description: This is an inset to the 15,000 diaries which were distributed as part of the B.C. Ministry of Tourism's non-resident Visitor study. It was intended to elicit use and expenditures by non-residents in B.C.'S forests. A map was provided to respondents so they could identify the region of their activity.

Comment: This initiative shows that it is possible to "piggyback" on BC Tourism's regular study of non-resident tourism to collect data on a Fraser Basin region.

Study: Touriscope Cat no. 87-504
Author: statistics Canada
Date: 1989

Description: Every two years, Statistics Canada surveys domestic tourism activity. Data on origin, destination, mode, distance, demographic, activity, duration, and accommodation type is developed. The results are reported by tourism regions which correspond to the administrative regions used by the provincial ministries responsible for tourism.

Comment: The activity is reported by the total number of participants and includes double counting of days. The tourism regions are not co-terminous with a Fraser Basin region.

Study: Adventure Travel in British Columbia
Date: 1988
Author: Outdoor Recreation Council of B.C.

Description: This study is based on a mail survey of a sample of B.C. adventure travel operators. The authors defined adventure travel as tourists who expect to experience varying degrees of risk and excitement and to be personally tested or stretched in some way in an unusual, exotic remote or wilderness setting. The list of adventure travel possibilities in B.C. includes backpacking, mountaineering, nature observation, sailing cruises, bicycle touring, canoeing, kayaking, cross-country-skiiing, horseback trail riding, river-rafting, heli-skiing and scuba diving.

The questionnaire was mailed to 396 adventure tour operators and 97 responses were received. Fishing and hunting operators were excluded from the survey. Data collected included expenditure, stay and customer demographics, revenue, employment and customer day activity.

Comment: This study has a good breakdown by adventure travel activity but it lacks a regional breakdown, activity through operators is actually greater than shown and much adventure travel participation takes place without operator involvement, eg. the kayaker who heads off for a day trip or a week-end with a few fiends.

Study: Coastal Tourism Resource Inventory, Phase 1: Mapping Methodology.
Date: 1991
Author: AlU4 Consulting Group et al, B.C. Ministry of Touri~ Sustainable Development Branch.

Comment: This was the first of several tourism BC Tourism GIS projects and established the methodology for eventually creating a tourism GIS for the entire province. Many different layers of data are collected in this mapping project but not activity data. It was cited as being needed but will not be included until a survey of tourism operators is undertaken. There is a focus on tourism services delivered businesses. The activity data from operators will under-estimate the total volume of tourist and recreationist activity.

BC Tourism's GIS does establish the capability of areas and sites to host tourism activities, The Canada Land Inventory identifies recreation capability too but this GIS project uses more information and provides a finer level of detail and rankings on capability, physical features and types of appropriate activities by site.

Whitewater Rafting

The Parks Division of B.C. Environment issues annual operating permits to commercial river rafting companies. Unfortunately, for the purposes of this study, the ministry does not collect operating data from them.

The MOF'S Outdoor Recreation Survey collected and reported rafting activity from its respondents, by region. Since the railing occurs predominantly in the Fraser Basin, the reported activity for the MOF Regions which overlap the Fraser Basin can be taken as its railing activity.

Boating

Study: Household Facilities and Equipment Cat no. 64-202
Date: annual
Author: statistics Canada

Description: Statistics Canada maintains few recreation or leisure statistics. This series shows an estimate of the number of recreational boat owners by vessel type by province. A fi.uther geographical breakdown is not available.

Comment: There does not appear to an available B.C. or Canadian study on boating activity by vessel type, ie. the annual number of days enagaged in boating. The U.S. Forest Service developed a projection of outdoor recreation activity in support of its long range planning, which includes some annual boating activity estimates. They can be combined with the Statistics Canada ownership to produce a gross estimate of provincial boating activity. The assumption would likely be made that two adults were involved per activity day.

Under the Federal Small Vessel Registration Act, any vessel powered with a ten horsepower motor and up must be registered with Revenue Canada. This requirement excludes many pleasure boats such as sailboats, canoes, kayaks, etc. so it is not a comprehensive database on boat ownership.

Camping

Study: Park Data Handbook
Date: annual
Author: BC Parks

Description: This annual publication provides data on park characteristics and visitorship at campgrounds and day-use sites operated by BC Parks.

Comment: There are approximately 141 provincial parks and day use sites within the Fraser Basin. Based on the visitorship estimates for these facilities, an estimate for the Fraser Basin region can be developed. There no national parks in the Basin. Tourism BC has data on the characteristics and location of privately operated campgrounds but there are no estimates for their visitorship. According to a 1986 BC Parks publication, Camping in B. C.: Recent Trends, camping capacity was believed to be split evenly between the public and private sector.

5.2 Estimates of Water Based Recreation Activity in the Fraser Basin

Sport ***Fishing***

B.C. Ministry of Environment reports its fishing data by administrative region and B.C. totals. Its nine management regions are divided into management units which roughly correspond to watershed boundaries. Six management regions overlap Basin boundaries. Recent fishing data has not been reported by management units. The 1980 sport fishing survey data was collected and published by management unit, in addition to the management region reporting. The earlier data can be aggregated, management unit by management unit, into a Fraser Basin super region. Unfortunately, the 1985 and 1990 data was collected and reported by management region only. If an assumption is made that sport fishing activity patterns were similar in 1980 and 1990, an estimate of activity within the Basin can be drawn from the 1990 Sport Fishing Survey. This estimate is developed by applying the percentage of fishing effort (angler days) by management unit which occurred within the Basin against the 1990 data. The following table shows the overlap of angling effort between MOE management region and the Fraser River Basin for the 1980 sport fishing survey (Dorcey et al 1991).

MOE Management Region	% of angling in Basin
Lower Mainland	80
Thompson - Nieola	100
Okanagan	21
Cariboo	90
Skeena	36
Omineca	75

The Fraser River Basin hosts approximately one-half of the total days spent sport fishing in the freshwaters of B.C. The Thompson-Nicola region, which lies completely within the Basin, accounts for fblly one-fifth of freshwater sport fishing. The following table provides

the total number of angling days for each MOE management region and the number which occurred in the Basin. The figures were developed from the 1990 sport fishing survey.

MOE Management Region	Total Angling Days	Fraser Basin Angling Days	% of Basin Total
Lower Mainland	777,439	621,951	26
Thompson-Nicola	835,661	835,661	35
Okanagan	505,178	106,087	4
Cariboo	490,243	441,219	18
Skeena	454,181	163,505	7
Omineca	308,000	231,000	10
Total	3,370,702	2,399,423	100

Angling license data can provide information about general trends in sport fishing and the residency of anglers. To provide activity estimates, it can be brought into a net economic value calculation with broad assumptions; an angling effort factor to multiply by license numbers and that the angling effort occurred close to home. When considering the whole Fraser Basin, the last assumption is not so critical because almost all angling effort by residents of the region would have occurred within its boundaries and the non-resident effort could be estimated by building a factor for basin to non-basin non-resident effort from the sport fishing surveys. A average angling effort can be taken from the sport fishing surveys.

Hunting

The annual Hunter Sample Survey of B.C. Environment Ministry provides data on number of B.C. resident hunters and hunter days by species and by Management Unit. Because of the smaller breakdown of dat a Fraser Basin figure can be developed by summing the results of the Management Units which fall within the Basin. The most recently available is from 1991. The species data can not be added together to arrive at a total activity figure because of multiple counting of days where a hunter seeks several species on the same trip.

The Hunter Sample Survey includes an estimate for number of hunters, but not for hunter days, for game-birds and waterfowl. In “TheValue And Characteristics of Resident Hunting

(Reid 1985) there is an estimate for average number of hunting days for game-birds, 10, and waterfowl, 9.8, but it is a total figure for all species. The activity estimates for big game for the Fraser Basin by species in 1991 are as follows.

Species	Hunter Days
Mule Deer	206,240
White-Tailed Deer	15,624
Moose	175,879
Goat	1,136
Mountain Sheep	11,116
Grizzly Bear	1,245
Black Bear	18,559
Cariboo	324
Elk	5.866
cougar	926
wolf	17,045

Rafting

The MOF survey carried out in 1989-90 produced a provincial estimate of 68,000 Recreational Activity Days for B.C. residents. Since rafting is carried out in rural areas, this study with its Provincial Forest Lands coverage provides an accurate reading on total volume. This study did not include non-residents. If the Kootenay and Northwest figures are removed from the provincial total, a Fraser Basin esimate would be 60,000 RADs.

Boating, Kayaking, Canoeing

These outdoor activities are well-known but little documented. Fishing and hunting activity are tracked because of the need to manage the harvest and the activism of well-organized participant groups, such as the B.C. Wildlife Federation and the Sport Fishing Institute. Users of water-borne recreation are not subject to the same degree of regulation. The regulation of railing by BC Parks focuses on the guides. It collects basic descriptive

information on the companies but does not ask them to submit financial, trip or customer volume. Only a portion of pleasure vessels have to be registered.

An indirect approach is to take participation figures from BC Parks 1991 survey and apply it to the adult population of the Fraser Basin. This provides a guesstimate of the number of adults who participate at least once per year. This figure could be multiplied against an estimate of the number of activity days per year but the BC parks survey did not collect this data. A possibility is to use a days per year estimate from the 1985-87 Public Area Recreation Visitor Study of the U.S. Department of Interior. This approach should only be seen as providing a gross estimate of resident activity. It does not account for non-resident activity, assumes that all Basin activity comes from residents and assumes that all resident activity occurs in the Basin.

The adult population of the Basin is approximately 1.5 million, and two-thirds reside in Greater Vancouver.

The following shows participation rates for water borne activities from the 1991 BC parks phone survey of British Colombians, activity days per year estimates from the U.S. study and an estimate of activity days per year for adult residents of the Basin.

Activity	Participation Rate (%)	Activity Days Nr.	Activity DaysNr. in Basin
Power-boating	28	18	7,367,522
lCanoeing I	27 I	6 I	2,368,132 I
Sailing	10	6	877,086
Kayaking	3	6	263,126

Other Water Dependent Recreation Activities

When trying to consider the recreational use of rivers, lakes and streams, it is difficult to draw the line between an activity which absolutely requires them and those which are enhanced because of its proximity. The debate could be taken to the point where all outdoor

recreational activities in the Basin are said to be directly dependent on the Fraser and its tributaries. From a conservative standpoint, only the obviously water dependent activities should be considered. Therefore, other activities which might be included in a study of this type are swimrning/going to the beach and wildlife viewing. Some might argue to exclude camping and wildlife viewing.

A total number of days estimate for swimming can be developed in the same way as was done for the boating activities.

Activity	Participation Rate (%)	Activity Days IYr.	Activity Days/Yr. in Basin
Swimming in lakes, streams, ocean	61	13	11,592,153

Camping and picnicking estimates can be developed from BC Parks and B.C. Ministry of Forests visitorship estimates. In 1990, within the Fraser Basin, BC Parks facilities had an estimated 1,078,346 overnight visits, ie. campers, and 9,037,000 day use visits, ie. picnickers. For 1991-92, the estimated number of recreation user days at B.C. Ministry of Forests recreation sites in the Fraser Basin is 440,822. Visitorship in private campgrounds is not available but a conservative estimate would be 500,000. A 1986 BC Parks study placed visitorship in private facilities at the same level as in BC Parks sites. A gross estimate of total campground visitorship would be 2,000,000 overnight visists.

BC Environment's non-consumptive use of wildlife study reports by MOE administrative region so Fraser Basin figures can not be developed fkom it. The aforementioned BC Parks study reports that 69 percent of its sample participated in dayhiking and 27 percent participated in overnight backpacking. It is a likely assumption that the ovemighters also participated in some dayhiking. This activity can be taken as a reasonable proxy for the non-consumptive use of environmental resources. Wildlife viewing, hiking and outdoor photography are activities usually undertaken during one trip or experience.

Activity	Participation Rate (%)	Activity Days /Yr.	Activity DaydYr. in Basin
dayhilcing	55	10	8,039,955
overnight backpacking	27	7	2,762,821

These estimates must be read in broad terms because of the use of the American annual volume data. Different areas have preferred outdoor recreation activities depending on cultural characteristics and resource opportunities. The American and B.C. participation rate differ significantly for some activities. The following table compares the rates horn the BC Parks survey with those from the U.S. Department of Interior survey.

Activity	Participation Rate, BC (%)	Participation Rate, US (%)
lPower-boating	I 28	I 21 [
Canoeing	27	9
Sailing	10	7
Kayaking	3	9
Swimming	61	35
Dayhiking	55	16
Overnight backpacking	27	5

Participation within the U.S. varies by region, too. For example, participation at least once in dayhiking and backpacking are at the 35 and 22 percent levels in the Roclcie Mountain states.

6.0 ANNUAL NET ECONOMIC VALUES FOR THE FRASER BASIN

6.1 Recreation Use Value

As previously mentioned annual net economic value for recreationists is a fimction of net economic value per activity day and the total number of annual activity days. Estimates for the latter were developed in the previous Section and estimates for the former were shown in Section Three. In the following table, the data from these Sections are used to develop a total net economic value estimate per activity.

The values by activity are not additive into a grand total for all activities and the values for the activities can not be compared agianst each other. The figures are developed from several studies of different vintages, including this one, so there maybe overlaps between activities which results in double and even multiple counting of activity days. As well, there will be under-counting for some activities because non-residents are not included. If a grand total for all activities was required, a special study would have to be structured to accurately develop the estimate.

The freshwater fishing per day values and activity are taken from the the 1990 National Sport Fishing Survey. The hunting per day values are inflated from the 1983 MOE study and the hunting activity from the most recent annual MOE hunter survey. The per day values for the other activities are drawn from the 1991 U.S. Forest Service financed study by Walsh et al (4th column) and the 1991 B.C. Ministry of Forests study (3rd column). The issue of whether the U.S. data is applicable to the Basin is diminished by the size and diversity of it; the Basin has a wide variety of sites as does the Walsh study. The activity volume for rafting is taken from the 1991 MOF study and the remaining activity volumes are taken from the estimates developed in the previous section of this report.

Activity	Activity Volume	BC Per Day Value ($)	Walsh Per Day Value ($)	BC Annual Value ($000)	Walsh Annual Value ($000)
Freshwater Fishing	by MOE region	varies by MOE region	$48.72	$38,932	$116,879
Big Game Hunting	by species	varies by species	$72.34	$20,868	$32,842
Rafting	60,000	$18.92	$40.35	$1,135	$2,421
Power Boating	7,367,522	$18.92	$40.84	$139,402	$300,889
Canoeing	2,368,132	$18.92	$40.35	$44,802	$95,554
Kayaking	263,126	$18.92	$40.35	$4,976	$10,617
Sailing	877,086	$18.92	$40.35	$16,593	$35,390
Swimming	11,592,153	$23.91	$29.59	$277,165	$343,012
Camping	2,000,000	$23.91	$31.02	$47,820	$62,040
Picnicking	9,037,000	$23.91	$27.57	$216,075	$249,150
Dayhiking	8,039,955	$24.95	$37.60	$200,598	$302,302
Backpacking	2,762,821	$24.95	$37.60	$68,937	$103,882

Preservation Non-Use Value

There has not been a study which posed a question on the preservation value of the Fraser River or its Basin. The Fraser River Basin contains a diversity of environmental amenities of varying quality. It would be a difficult task to frame a general preservation value question. The water quality of the Fraser, especially in the Lower Mainland, is viewed as less than satisfactory so a question having to do with maintenance of the status quo might meet with skepticism.

MOF asked a general preservation value question in its '89-90 survey. "What is the value that you personally would be willing to contribute voluntarily each year to protect and maintain the recreation resources of B.C.'s Provincial Forest lands for your own and future

generations?". The per adult estimates derived from this question can be taken as a ballpark figure for the amount a British Columbian would be willing to pay to maintain recreational opportunities over a large portion of the province's natural resources. The amount of resources in Provincial Forest lands is not known, at even a highly general level, to respondents. Therefore, BCers would be responding from an intuitive sense of what they could afford given their interest in outdoor recreation. If Fraser River Basin was substituted for B.C.'S Provincial Forest lands, the responses would not likely be much different. Many respondents would consider special familiar features of the Fraser Basin, as they try to respond to the survey, just as they would likely do with Provincial Forest lands.

If the question referred to a specific site, such as preserving Hells Gate, the mean value might be larger. Where an environmental amenity is perceived to have unique characteristics, respondents will attach a higher preservation value. For example in a CVM study of Grand Canyon views, there was a mean approximate annual preservation value of $200. Preservation value is a function of awareness. Once a person becomes aware of an amenity, they can place a preservation value on it. As they become more aware of the characteristics of the environmental amenity, they are likely to alter their valuation. As more information becomes available about an amenity, its value is likely to rise, both in terms of the mean per person value and the total value, ie. more people becoming aware of the amenity.

The provincial mean preservation annual value for Provincial Forest lands from the MOF study is $53.62. The total adult preservation value is reported as $114 million. Substituting Fraser River Basin for Provincial Forest lands would very likely result in a similar mean response.

7.0 Recommendations For Fraser River Basin

7.1 Considerations in Selecting a Methodology

Methodologies used to measure the value of non-market goods can not be assessed simply on their own merits. Although each method may be judged in terms of its consistency with economic theory, reliability and validity, it is more important to ensure that the method selected is the most appropriate, feasible and productive tool to use in the context of a decision-making framework. Before any further effort is made to collect new resource values, a review of the organizational framework and types of policy decisions to be made about recreational programs and the trade-off of resource alternatives is essential.

It is not so much a matter of determining which is the best method for valuing non-market goods as that which is appropriate for the type of activity and situation under study. Often, more than one method is required to collect the information essential for making complex policy decisions. This is evident when one considers that some resource economists advocate that existence values for environmental amenities should not be used within the framework of cost-benefit analysis (Rosenthal and Nelson 1992).

Many studies have been conducted on a routine basis to maintain benchmark values for guiding decisions about recreational resources. With economy in mind, the questions intended to measure the net direet benefits are often dropped into the framework of recurring data collection schemes whose foci is more descriptive than analytical. Few studies acknowledge that the recreation experience is an integrated hierarchical process in which some activities may enhance the perceived value of others (as fishing may enhance camping values), while the value of some activities may in fact be reduced by the success of others (as hunting may detract from the future benefit stream of wildlife viewing).

The economic concepts underlying the valuation methods are not always explicitly presented. Many of the studies do not review the economic theory and assumptions made relative to the choice of method selecte~ nor do they adequately define the variables. Many of the important terms are bantered about as tools of the trade. Concepts such as “net benefit”

and “willingness-to-pay” have been so loosely applied that the interpretation of results is difficult.

A lack of rigor is evident in measuring net direct benefits. The choice of either travel cost method or contingent valuation is not always justified. For travel cost (TCM) applications, the treatment of critical variables such as substitutable destinations and changes in quality are seldom discussed or accounted for in the estimation of benefits. The application of the contingent valuation method is often similarly deficient. There is seldom an effort made to create a realistic market scenario for the hypothetical questions posed. For both the TCM and CVM, questions are oflen asked without any preamble or supplementary information to improve reliability.

7.2 Theoretical Versus Practical Concerns

There is a significant body of academic research, especially in western U.S. universities, on natural resource recreation and preservation economics. A good portion of this work has focused on developing and improving methods to arrive at better estimates of use and non-use values. An important byproduct has been site-specific and regional values for a wide range of recreation activities and preservation situations. In a policy-making agency, the estimated values are of critical importance whereas improving definitions and estimation methodologies takes a back-seat. Good analytical technique is important because users must have confidence in the values. However, the methodological options must be weighed against an agency’s resource constraints for making estimations. They include budgets, staff or contractor capability and audience. The question of who is the audience for the work is important. Good technique is important at all times but a general, and even at times a professional, audience can sometimes lose confidence in a study because the research methods are impenetrable or the analytical sophistication made them lose confidence in and become skeptical about what they understood to be a relatively straightforward endeavor.

The following is a list of general criteria which distinguishes a good analytical technique for policy-making (Gunton, 1991).

- comprehensive, ie. examines all of the problem
- logical
- practical, ie. addresses resource constraints
- evaluable
- politically acceptable
- conclusive to learning
- flexible, ie. can deal with different situations
- decisive

7.3 Recommended Approach

In the following paragraphs an approach to estimating the recreation use and preservation non-use values in the Fraser Basin is outlined. It has been developed against the preceding criteria. The ultimate goal for the exercise is to have the developed values fidly considered in policy-making decisions about initiatives in the Basin and to improve appreciation about economic values of some items which have ofkn been overlooked. Application of these criteria raise the likelihood of these objectives being fullfilled while maintaining analytical integrity.

The following methodology provides an estimate of the consumer surplus, the net economic value, of resident recreationists (and "preservationists"). As discussed in the Introduction chapter, an estimate of total benefit from outdoor recreation in the Fraser River Basin would require the capture of other benefits and costs in a wider net. In Appendix II, an abbreviated outline for such a study is presented.

There are a few different analytical directions which can be followed and the examples are widely cited throughout this study. The proposed approach, hopefully, demonstrates the learning from these many other efforts and clearly addresses the forementioned criteria.

There are three critical dimensions in a study of recreation use and preservation non-use values.

- site
- demand estimation method
- survey method

The following are the recommendations for a Fraser River Basin study.

- Site - Basin boundaries as defined by Westwater Research
- Demand Estimation Method - Contingent Valuation Method
- Survey Method - Mail survey of sample of B.C. residents

Site

The Fraser Basin is not a political entity with legislated boundaries and does not have obvious physical limits, such as the crest of mountains which ring a valley. The lack of an official or commonly held definition leads to selecting a definition from the leading authority on the river. Westwater Research has defined the Basin as including all tributaries and their watersheds. Although a non-governmental organization, affiliated with University of B.C., Westwater Research has come to be identified as the leading authority on the scientific and legal dimensions of the Fraser. Its work is widely used and its deputy director was recently appointed to chair the inter-governmental committee coordinating a multi-year plan to improve the river. DFO has adopted Westwater's planning units.

Maps and descriptions of the Westwater defined Basin appeared earlier in the Introduction chapter of this report.

Estimation of Net Economic Value Per Day

In Chapter Two, the alternative demand estimation methods were outlined and compared. The first level of choice is between Contingent Valuation Method and Travel Cost Method. The other alternatives are not satisfactory for the proposed study. Choices about how to implement either method affects their results: in survey design and data analysis with the CVM and in selection of model specification and price with the TCM.

Although TCM is sometimes referred to as the direct method and CVM as indirect, in practise both are indirect in their estimation of environmental benefits. In Canada, there are no official prescriptions about the choice of method although the B.C. Government's

benefit-cost guidelines (1977), suggest use of TCM. The CVM method was less well-known at that time. The now disbanded U.S. Federal inter-agency committee, U.S. Water Resources Council (1983), authorized use of both methods but recommended CVM. Its detailed water project analysis guidelines are used and maintained by the Bureau of Reclamation in the U.S. Department of Interior. The Environmental Protection Agency's guidelines (1983) contained similar views.

The main shortcoming of TCM is that it can not estimate non-use preservation values, only recreation use values. Its secondary disadvantages are its greater reliance on statistical methods and its overt reliance on the indirect connection between trip cost and recreation activity value. The requirement for sophisticated statistics expertise limits the ability to conduct in-house studies and raises questions from general readers about the need to fall back on complex mathematics to come up with seemingly simple estimates of value. The theoretical basis of TCM compounds the difficulty in communicating to a wider audience, of even resource management professionals, the meaning of the net economic value concept.

The primary advantages of CVM are its ability to provide estimates of preservation non-use, in addition to recreation use, and the confidence that a more general reader has in understanding its basis. The academic criticism of CVM stems from its reliance on respondent intentions, as opposed to actual behaviour.Survey and Question Structure

A critical contributor to the validity of a CVM estimate is the structure of the survey and the wording of the questions. In the interests of simplicity and directness, researchers sometimes use a basic question about the respondent's perception of value without providing enough information through this question, or the others, for the respondent to fidl y understand what is being asked. A trade-off between brevity and detail is necessary but it shouldn't be done at the point where it compromises the integrity of the research effort.

There is a significant amount of academic writing on CVM and a portion directly addresses experience with survey and question structure (Mitchell and Carson 1989; Brookshire and Smith 1987; U.S. Water Resources Council 1983; Smith and Desvouges 1986; Cummings et al 1986; Whitehead and Blomquist 1991).

A few different types of CVM questions have been developed to ascertain a respondent's value perceptions.

- open-ended
- dichotomous choice
- bidding game

The open-ended question is often used because it is probably easiest for the respondent to understand and for the anal yst to calculate a mean or average value. The structure of an open-ended question might be along the lines of the following, "What is the maximum amount of money you would pay per year to guarantee that ABC River is protected? $ _."

A dichotomous choice (yes/no) question is often found in academic CVM studies. A possible question might be the following, "Would you be willing to contribute $N each year to a conservation find to preserve the ABC River in its present state?". The disadvantage of this type of question is that the analysis of the responses is relatively more complex. The responses give a distribution of WTP values when used within a statistical model. A mean WTP value is then calculated through a sophisticated equation.

A less common approach than the preceding two is the bidding game. The respondent is asked to answer yes or no to whether he or she is willing to pay the stated amount. The interviewer varies the amount in increments until the maximum amount, the final bid is identified. This approach lends itself well to an in-person interview but is more problematic within a mail survey because there is no "auctioneer", the interviewer (U.S. Water Resources Council 1983). A question example follows, "Would you pay (starting price) to help maintain ABC River in its present state? Yes (pay)_. Or would you refhse to pay? No bay) _." The bidding game helps the respondent to think about their perception of value and is in a familiar auction format. However, a bias maybe introduced through the bidding procedure (Mitchell and Carson 1989). The open-ended question has a greater chance of being given a quick not completely considered, answer. An improvement to the open-ended question is to set out a range of increasing values, for example, $10,$20,$30, etc. with a

blank at the end. The respondent can select one of the increments or fill in the blank. The format requires the respondent to pause and think about his or her perception of value.

Since a mail survey is recommended for a Fraser Basin study, either an open-ended or dichotomous choice format should be considered. The response problems of the open-ended question can be minimized by careful survey and question structure. The dichotomous choice format would require sophisticated in-house or contracted statistics capability and many readers might not fully understand the method and therefore not have much confidence in the results.

As previously stated, all methods produce estimates and no one method provides a clearly superior estimate. Given the practical advantages of the open-ended question format it should be considered for a Fraser Basin study.

A suggested approach, which" would require firther thought and pre-testing, is to ask for the total annual value of the river and then ask a follow-up question to distinguish between on-site use value and non-use preservation values (Sanders et al 1991; Mitchell and Carson 1989; Whitehead and Blomquist 1991). An outline of an example follows.

What is the maximum amount of money you would pay per year to guarantee that these waters are protected for recreation use?$ _____ .

What proportion (percent of 100) of the dollar value you reported in response to the previous question, would you pay to actually visit and undertake a recreation activity on or near these waters? _ %

There are several benefits that a user can derive in addition to use value. The value judgement to an inquiry about use is likely to include these other benefit dimensions. Respondents do not consciously sum or disaggregate the different benefit measures (Mitchell and Carson 1989). Some strategies have been devised to separate the components of total value snd the preceding example exhibits a decomposition approach. Total WTP is requested and then the more familiar direct use value is asked for. The preservation value is

a residual. This question strategy forces the respondent to consider what proportion of the total that direct use forms. In a mail survey, the respondent can go back and revise the original answer if it was referenced to direct use only.

Preservation can be broken into components and respondents asked to assign a proportion to each but this step is dependent on the respondents having a reasonable understanding of option (even quasi-option), bequest and existence value concepts or wanting to understand them through a written explanation in the questionnaire. From the standpoint of policy-making, having only the use and preservation values is satisfactory.

A less conventional strategy is to use the responses of non-users to a question requesting total value as representing preservation value only and the responses of users as being composed of use and preservation values.

Its is important that respondents be specifically directed to consider the implications of substitute sites. This can be accomplished through a preamble to the question(s) which solicit a value response. Where a unique site is involved such as Hells Gate, the matter of substitute sites is of little consequence but for most sites, there will be an overstatement of value in the absence of direct consideration of substitutes.

Survey Method

In studies of recreation use value, a variety of survey research methods have been employed phone interviews (BC parks 1991), in-person interviews (Cameron and James 1987) and mail surveys (Ministry of Forests 1991).

From the standpoint of obtaining a statistically valid sample and good answers, in-person interviews are the preferred alternative. Unfortunately, they are far and away, the most expensive alternative when studying a large region. The labour costs are relatively high, interviewers must be hired and sent to selected sites and they can only interview a handful of people each day. If the question is narrower, on-site use values, and there is only one or a few sites, the in-person approach becomes a more cost-effective alternative. The interviewer

can help a respondent to understand a questionnaire thereby improving the overall reliability of the results. The in-person interview is the easiest way to include non-residents in a sample.

Phone surveys, where the interviewer reads from a list of questions, would not be effective because of the difficulty of the questions, the need for the respondent to have the Fraser Basin boundaries identified and the temptation for the respondent to give a top of mind, rather than a reflective, answer.

Developing a phone interview sample for B.C. residents is a fairly straight-forward proposition.

A cost-effective alternative is to undertake a mail survey. There is a well-established procedure for undertaking one (Dillman 1978). The mail survey has reliability advantages, too. It permits longer explanations, use of maps to explain locations, official letterhead and cover letters from study managers to impress respondents of the survey's importance, and more time to reflect on answers.

Mail surveys on recreation use and preservation non-use values have a few drawbacks. They show self-selection bias because the most interested respond. The return rates on the total number mailed can be low and perhaps harm the sample's validity. The respondent maybe confbsed b y a question and has no interviewer to explain the matter.

BIBLIOGRAPHY

The Bibliography is divided into B.C. and non-B.C. materials.

B.C. Materials

ARA Consulting Group et al. (1991). Coastal Tourism Resource Inventory PhaseI: Mapping Methodolow. Sustainable Development Branch, B.C. Ministry of Tourism. Victoria, B.C.

Bowden, G.K. (1986). Economic Implications of Alternative Developments in the Stein River Valley. A Report prepared for the Wilderness Advisory Committee.

Bowden, G.K. and P.H. Pearse. (1968). Non-Resident Big Game Hunting and the Guiding Industry in British Columbia: An Economic Study, Study Report No. 2 in a series prepared for the B.C. Fish and Wildlife Branch. Victori~ B.C.

BC Parks. (1991). Recent Trends in Outdoor Recreation Participation By British Colombians. Victoria, B.C.

BC Parks. (annual). Park Data Handbook. Victoria B.C.

BC Tourism. (1990). Visitor '89...A Travel Survey of Visitors to British Columbia. Victoria, B.C.

BC Tourism. (1991). Resident Travel in British Columbia. Victoria B.C.

British Columbia Ministry of Environment and Ministry of Forests. (1983). Reservation of Old Growth Timber for the Protection of Wildlife Habitat on Northern Vancouver Island, Victoria, B.C.

British Columbia Ministry of Forests, Strategic Studies Branch. (1983). Impact Analysis; The Cost of Establishing Deer and Elk Reserves in TFLs 37 and 39, Old Growth Vancouver Island Study, Ministry of Forests, Victoria, B.C.

British Columbia Ministry of Forests, Recreation Branch. (1991). Outdoor Recreation Survey 1989/90). Technical Report 1991-1, Victoria, B.C.

British Columbia Ministry of Forests, BC Environment, and BC Tourism. (1990). Visitors '89- Ministry of Forests Insert. Victoria B.C.

Bryan, Richard C. (1975). A Survey of Customer Values. Percmtions and Future Management ODtions as thev relate to the Capilano River Sport Fishery, Environment Canada and B.C. Fish and Wildlife Branch.

Bryan, R.C. (1974). The Dimensions of a Salt-Water Sport Fishing Trip or What do People Look for in a Fishing TxiD besides Fish? Department of Fisheries and Oceans, Fisheries and Marine Service, Pacific Region. Vancouver, B.C.

Cameron, T.A. and M.D. James. The Determinants of Value for a Recreational Fishing Day; Estimates from a Contingent Valuation Survey, Fisheries and Oceans Canada, Technical Report No. 1503. VanCOUVer, B.C.

Canadian Resourcecon Ltd. and Quadra Economic Consultants. (1979). Economic and Resource Management Aspects of the Commercial Use of Fish and Wildlife Resources in British Columbia, Prepared for the B.C. Ministry of Environment, Fish and Wildlife Branch, Victoria, B.C.

Department of Fisheries & Oceans. (1985). Freshwater Sport Fishing in British Columbia, 1985. Information bulletin produced jointly with the B.C. Ministry of Environment and Parks.

Department of Fisheries & Oceans. (1985). Sport Fishing in British Columbia Tidal Waters, 1985. Information bulletin produced jointly with the B.C. Ministry of Environment and Parks.

Dorcey, Anthony H. J.(ed.) (1991). Perspectives on Sustainable Development in Water Management: Towards Agreement in the Fraser River Basin. Westwater Research Centre, U.B.C. Vancouver, B.C.

Dorcey, Anthony H.J. (cd.) (1991). Water in Sustainable Development: Exploring Our Common Future in the Fraser River Basin. Westwater Research Centre, U.B.C. Vancouver, B.C.

Environment Canada. (1979). "Measuring Outdoor Recreation", The Final Report of the Canadian Outdoor Recreation Demand Study. Ottaw~ Ont.

Environment Canada (Canadian Wildlife Service) and the B.C. Ministry of Environment, Ottawa. "The Importance of Wildlife to Canadians in 1987:"

Series:

"Trends in participation in wildlife-related activities, 1981-2006", (1992).

"The economic significance of wildlife-related recreational activities", (1990).

"Highlights of a national survey", (1989).

"The Recreational Economic Significance of Wildlife", (A Jacquemot, R. Reid, and F.L. Filion, 1986).

"AII Executive overview of the Recreational Economic Significance of Wildlife", (1985).

"A user'S Guide to the Methodology of the 1981 National Survey" (F. Filion, G. Weisz, and B. Collins, (1985).

"Highlights of 1981 National Survey", (1983)

Fisheries and Oceans (Canada). (1988). "Sport Fishing in British Columbia Tidal Waters, 1985". Circular, Ottawa, Ont.

Fisheries Council of British Columbia. (1991). Commercial vs. Sports Fisheries: The Value Vancouver, B.C.

Fraser River Estuary Management Program (FREMP). (1990). Proposed Fraser River Recreation Plan, Vancouver, B.C.

Gunton, Thomas. (1991). Economic Evaluation of Forest Land Use Tradeoffs, SFU Natural Resources Management Program, Working Paper 157. Burnaby, B.C.

Gunton, Thomas. (1991). "Economic Valuation of Non-Market Values for Forest Planning", in Forest Resources Commission Report. Volume 2. Victoria B. C..

Gunton, Thomas and Ilan Vertinsky. (1991). "Methods of Analysis for Forest Land Use Allocation in British Columbia Options and Recommendations", in Forest Resources Commission Report. Volume 1, Victoria, B.C.

Gunton, Thomas, et al (1986). Stein River Watershed Resource Evaluation, Simon Fraser University, Burnaby, B.C.

Heaps, Terry. (1985). An Analysis of the Present Value of Stunmage Under a Variety of Economic and Managment Conditions. Economic Council of Canada, Discussion Paper No. 284.

Loose, Verne W. (cd.) (1977). Guidelines for Benefit-Cost Analysis. Victoria B.C. Environment and Land Use Committee Secretariat.

MacMillan Bloedel Limited. (1983). Reservation of Old Growth Timber for Protection of Wildlife Habitat on Northern Vancouver Island: A Submission, Vancouver MacMillan Bloedel.

McDaniels, Timothy. (1974). "A Benefit/Cost Analysis of the Capilano Salmon-Steelhead Hatchery", M.A. Thesis for SFU Department of Economics. Burnaby, B.C.

Meyer, Philip A. (1978). Updated Estimates for Recreation and Preservation Values Associated with the Salmon and Steelhead of the Fraser River, Fisheries and Environment Canada.

Meyer, Philip A., and Philips, Susan D. (1977). Local Perceptions Concerning Recreation on the Coquitlam River. Fisheries and Environment Canada and B.C. Fish & Wildlife Branch.

Meyer, Philip A. (1976). "Perceptions on Recreation and Sport Fisheries of the Chilliwack/Vedder River", Environment Canada and the B.C. Department of Recreation and Conservation.

Meyer, P.A. (1975). A Comparison of Direct Questioning Methods for Obtaining Dollar Values for Public Recreational and Preservation, Technical Report Series No. PAC/T-75-6. Environment Canada Fisheries and Marine Services. Vancouver, B.C.

Meyer, Philip A. (1974). Recreational and Preservation Values Association with the Salmon of the Fraser River. Environment Canada Fisheries and Marine Service. Vancouver, B.C.

Mos, Gerard J. and M.C. Harrison. (1974). Resident Boating in Geortia Strait. Environment Canada, Fisheries and Marine Service (Southern Operations Branch, Pacific Region).

Outdoor Recreation Council of B.C. (1991). Demand For Outdoor Recreation in the Lower Mainland. Major parks plan Technical Report No. 1. GVRD, Burnaby, B.C.

Outdoor Recreation Council of B.C. (1992). A River Recreation Strategy for British Columbia: A Framework for Identifying and Managing the Recreational Values of B.C.'s Rivers, Vancouver, B.C.

Outdoor Recreation Research Council of B.C. (1989). Outdoor Recreation Research Inventory for British Columbia 1984-1989. Vancouver, B.C.

Outdoor Recreation Council of B.C. (1989). Riverfest II. Comgress Proceedings, Vancouver, B.C.

Outdoor Recreation Council of B.C. (1988). Outdoor Recreation Travel in British Columbia. Economic and Regional Development Agreement. Vancouver, B.C.

Pope, Liz. (1986). Using Cost-benefit Analysis to Evaluate Forest Land Use Alternatives, Natural Resources Management Program, Simon Fraser University, Report No. 40, 1986. Burnaby, B.C.

Quadra Economic Consultants. (no date). Fish and Wildlife in British Columbia: A Review of Resource Values, Study Report No. 7 on the Economics of Wildlife and Recreation, Prepared for the British Columbia Fish and Wildlife Branch. Victoria B.C.

Reid, Roger. Series of reports for the B.C. Ministry of Environment, Wildlife Branch:

"The Value and Characteristics of Freshwater Angling in British Columbia" (1986).

"The Value and characteristics of Resident Hunting: Results of the 1981 Provincial Survey", (1985).

"The Value and Characteristics of Non-Resident Hunting: Results of the 1981 Provincial Survey", (1981).

Reid, Roger, Michael Stone and Fran Rothman. (1986). Report on the British Columbia Survey of Non-Hunting and other Wildlife Activities for 1983, Prepared for the Wildlife Branch, B.C. Ministry of Environment, Victoria B.C.

Sewell, W.R.D. and J. Rostron. (1970). Recreational Fishing Evaluation, Report for the Department of Fisheries and Forestry. Ottawa, Ont.

Shaffer, Marvin and Associates. (1987). An Analysis of the Economic Efficiency Indications of Alternative Chinook Allocations in the Gulf of Georgia, Prepared for Fisheries and Oceans Canada. Vancouver, B.C.

Shaffer, Marvin and Associates. (1986). An Analysis of the Economic Benefits of Recreational and Commercial Fisheries, (Report on Methodology). Prepared for Fisheries and Oceans Canada, Pacific Region. Vancouver, B.C.

Simon Fraser University Natural Resources Management Program. (1986). Stein River Watershed Resource Evaluation, Research Report No. 5, SFU, Burnaby, B.C.

Simon Fraser University Natural Resources Management Program. (1990). Wilderness aml Forestry: Assessing the Cost of Comprehensive Wilderness Protection in British Columbia SFU, Burnaby, B.C.

Spargo, R.A. (1971). Evaluation of Sport Fisheries: An Experiment in Methods, Environment Canada, Fisheries Service, Ottawa Ont..

Stanbury, W.T., Vertinsky, Ikm, and Thille, H. (1990). The Use of Cost-Benefit Analysis to Allocate Forest Lands Among Alternative Uses. Forest Resources Commission. Victoria B.C.

Stone, Michael. (1988). Economic Values and ImDacts of Freshwater SDOrt Fishing in British Columbia, Report for the B.C. Ministry of Environment, Victoria, B.C.

Stone, Michael. (1988). British Columbia Freshwater Results of the 1985 National Survey of Sport Fishing B.C. Ministry of Environment and Parks, Fisheries Technical Circular No. 79. Victoria, B.C.

Wooley, Frances. (1985). The Travel Cost Method: Potential Use in Evaluating the B.C. Tidal Sport Fishery. Report for the Department of Fisheries and Oceans, Pacific Region. Vancouver, B.C.

Non-B.C. Materials

Adamowicz, Wiktor L. (1991). "Habit Formation in a Discrete Choice Model for Recreation Demand: Estimation and Welfare Measurement". Department of Rural Economy Staff Paper 91-11. University of Alberta

Adamowicz, W, J. Louviere, and M. Williams. (1992). "Combining Revealed and State Preference Methods for Valuing Environmental Amenities", Draft Paper, Edmonton, Alta.: University of Alberta.

Arsanjani, F., N.E. Bockstael, I.E. Strand Jr., and K.E. McConnell. (1989). "Sample Selection Bias in the Estimation of Recreation Demand Functions: An Application to Sportsfishing". Department of Agricultural Economics, University of Maryland, College Park.

Balkan, E. and J. Kahn. (1988). "The Value of Changes in Deer Hunting Quality: A Travel Cost Approach", ***Applied Economics, 20,533-539.***

Bell, Frederick W. and Vernon R Leeworthy. (1989). "Recreational Demand by Tourists for Saltwater Beach Days". ***Journal of Environmental Economics and Management, 18(3)*** (May), 189-205.

Bishop, R.C. (1982). "Option Value: An Exposition and Extension", ***Land Economs 58*** (Feb.), 1-15.

Bishop, Richard C. and Thomas A. Heberlein. (1990). "The Contingent Valuation Method", in R.L. Johnson and G.V. Johnson (eds.), ***Economic Valuation of Natural Resources.*** Boulder, Colo.: Westview Press.

Bishop, Richard C., Thomas A. Heberlein, and Mary Jo Kealy. (1983). "Hypothetical Bias in Contingent Valuation: Results from a Simulated Market", ***Natural Resources Journal 23(3), 619-633.***

Bishop, R.C. (1978). "Endangered Species and Uncertainty: The Economics of a Safe Minimum Standard", ***American Journal of Agricultural Economics, 60*** (Feb.), 10-18.

Bishop, R.C. and T. Heberlein. (1979). "Measuring Values of Extrarnarket Goods: Are Indirect Measures Biased?" ***American Journal of Agricultural Economics, 61*** (Dec.), ***926-930.***

Bockstael, Nancy E., Ivar E. Strand Jr., Kenneth E. McComell and Firuzeh Arsanjani. (1990). "Sample Selection Bias in the Estimation of Recreation Demand Functions: An Application to Sportfishing", ***Land Economics, 66(1)*** (Feb.), 40-49.

Bockstael, N. E., K.E. McConnell and I.E. Strand. (1989). "A Random Utility Model for Sportsfishing: Some Preliminary Results of Florida", ***Marine Resource Economics, 6, 245-260.***

Bockstael, N. E., I.E. Strand and W.M. Hanemann. (1987). "Time and the Recreational Demand Model", ***American Journal of Agricultural Economics, 69(2), 293-302.***

Bodden, K. and P. Lee. (1986). "The 1985 Economic Survey of Alberta Resident Pheasant Hunters", Alberta Forestry, Lands and Wildlife, Fish and Wildlife Division, Technical Report No. 1.

Bowker, J.M. and John R. Stoll. (1988). "Use of Dichotomous Choice Nonmarket Methods to Value the Whooping Crane Resource", ***American Journal of Agricultural Economics, 70, 372-381.***

Brookshire, David S., Larry S. Eubanks, and Alan Randall. (1983). "Estimating Option Price and Existence Values for Wildlife Resources," ***Land Economics, 59*** (Feb.), 1-15.

Brookshire, D. S., M.A. Thayer, W.D. Schulze, and R.C. D'Arge. (1982). "Valuing Public Goods: A Comparison of Survey and Hedonic Approaches", The American ***Economic Review, 72, 165-177.***

Brookshire, D. S., A. Randall, and J.R. Stoll. (1980). "Valuing Increments and Decrements in Natural Resource Service Flows", ***American Journal of Agricultural Economics. 62, 478-488.***

Brookshire, D., B. Ives, and W. Schulze. (1976). "The Valuation of Aesthetic Preferences", ***Journal of Environmental Economics and Management, 3,325-346.***

Cameron, Trudy Ann. (199 1). "Interval Estimates of Non- Market Resource Values from Referendum Contingent Valuation Surveys". ***Land Economics, 67(4) (Nov.), 413-421.***

Cameron, T.A. (1988). "The Determinants of Value for a Marine Estuarine SportfisheryThe Effect of Water Quality in Texas Bays", AERE Workshop Paper, University of Washington, June 22-23.

Clawson, M. and J.L. Knetsch. (1966). ***Economics of Outdoor Recreation.*** Baltimore, Md.: Johns Hopkins University Press.

Coursey, Don L., John L. Hovis, and William D. Schulze. (1987). "The Disparity Between Willingness to Accept and Willingness to Pay Measures of Value", ***Quarterly Journal qf Economics, 102*** (Aug.), 679-690.

Coyne, A.G. and W.L. Adamowicz. (1992). "Modelling Choice of Site for Hunting Bighorn Sheep", ***Wildlife Society Bulletin, 20,26-33.***

Cummings, R, D. Brookshire, and W. Schtdze. (Eds.) (1986). ***Valuing Environmental Goods: An Assessment of the Contingent Valuation Method.*** Totowa, N.J.: Rowman and Allenheld.

Davis, R. (1963). "Recreation Planning as an Economic Problem", ***Natural Resources Journal, 3*** (Oct.), ***239-249.***

Desvouges, W., V.K. Smith, and A. Fisher. (1987). "Option Price Estimates for Water Quality Improvement", ***Journal of Environmental Economics and Management, 14,248-267.***

Dillman, D.A. (1978). Mail and Telephone Surveys: The Total Design Method. New York Wiley and Sons

Domelly, Dennis M., John B. Loomis, Cindy F. Sorg, and Louis J. Nelson. (1985). "Net Economic Value of Recreational Steelhead Fishing in Idaho", Fort Collins, Colo.: USDA Forest Service, Resource Bulletin RM-9.

Duffield, John W., (1984). "Travel Cost and Contingent Valuation: A Comparative Analysis", in Advances in Applied Micro-Economics, VO1.3, 67-87

Duffield, John W., (1992). "Contingent Valuation: Issues and Applications", in Natural Resource Darmwes: Law and Economic$. Ward, Kevin and John Duffield.

Duffield, John W. (1992). "An Economic Analysis of Wolf Recovery in Yellowstone Parlc Visitor Attitudes and Values", in John D. Varley and Wayne G. Brewster (eds.) ***Wolves for Yellowstone: A Report to the US'. Congress.*** Vol. IV. Research and Analysis, National Park Service.

Duffield, John W., Christopher J. Neher and Thomas C. Brown. (1992). "Recreation Benefits of Instream Flow: Application to Montana's Big Hole and Bitterroot Rivers", ***Water Resources Research, 28,2169-2181.***

Edwards, Steven F. (1992). "Rethinking Existence Values", Land ***Economics, 68(1) 120-122.***

Edwards, Steven F. and Glen D. Anderson. (1987) "Over-looked Biases in Contingent Valuation Surveys: Some Considerations. ***Land Economics 63(2),*** 168-178.

Edwards, Steven F. and Glen D. Amderson. (1987). "Contingent Valuation Surveys", ***Land Economics, 63(2)*** (May), 168-178.

Fletcher, Jerald J., Wiktor L. Adamowicz, and Theodore Graham-Tornasi. (1990). "The Travel Cost Model for Recreation Demand: Theoretical and Empirical Issues", ***Leisure Science, 12,*** 119-147.

Freeman, A. Myrick. (1985). "Supply Uncertainty, Option Price and Option Value. ***Land Economics, 61(2)*** (May), 176-180.

Freeman, A. Myrick. (1979). The ***Benefits of Environmental Imvrovement.*** Baltimore, MD.: Johns Hopkins University Press.

Freilich. H.R. (cd.) (1989). "Wilderness Benchmark 1988", Proceedings of the National Wilderness Colloquium. Tamp% Fla.: Southeastern Forest Experimental Station.

Hanley, N.D. (1989). "Valuing Rural Recreation Benefits: An Empirical Comparison of Two Approaches", ***Journal of Agricultural Economics, 40(3),*** (Sept.), 361-374.

Hay, Michael J. and Kenneth E. McConnell. (1984). "Harvesting and Non-Consumptive Wildlife Recreation Decisions", ***Land Economics, 60(4) (Nov.), 388-396.***

Hay, Michael J. and Kenneth E. McConnell. (1979). "An Analysis of Participation in Non-Consumptive Wildlife Recreation", ***Land Economics, 55(4) (Nov.), 460-471.***

Hof, John and David King. (1992). "Recreational Demand by Tourists for Saltwater Beach Days", ***Journal of Environmental Economics and managements 22,281-291.***

Hueth, D.L. and E.J. Strong. (1988). "A Critical Analysis of Three Recreation Valuation Methods", Research Paper for the PNW U.S. Department of Agriculture. 1988, (395) 11-30.

Johnson, Rebecca L. and Gary V. Johnson (eds.) (1990). ***Economic Valuation of Natural Resources: Issues. Theory and Applications.*** Boulder, Colo.: WestView Press.

Johnson, Rebecca L., N. Stewart Bregenzer and Bo Shelby. (1990). "Contingent Valuation Question Formats: Dichotomous Choice versus Open-Ended Responses", Chapter 12 in Johnson and Johnson (eds.), (ibid.).

Kopp, Raymond J. (1992). "Why Existence Value Should Be Used in Cost-Benefit Analysis", ***Journal of Policy Analysis and Management,*** 1 l(l), 116-122.

Knetsch, J.L. and J.A. Sinden. (1984). "Willingness to Pay and Compensation Demanded Experimental Evidence of Unexpected Disparity in Measures of Value", The ***Ouarterly Journal of Economics,*** XCIX :3 (Aug.), 507-521.

Knetsch, Jack L., (1988). "Valuation Disparities and Environmental Policies", in Proceedings: Technolow Transfer Conference 1988, Research and Technology Branch, Environment Ontario

Krutilla, John V. and Anthony C. Fisher (1975). The ***Economics of Natural Environments: Studies in the Valuation of Commodity and Amenity Resources.*** Baltimore: The Johns Hopkins University Press for Resources for the Future.

Langford William A. and Donald J. Cocheba. (1978). "The Wildlife Valuation Problem: A Critical Review of Economic Approaches". Occasional Paper No. 37, Canadian Wildlife Service.

Loomis, John and Michael Creel. (1992). "Recreation Benefits of Increased Glows in California's San Joaquin and Stanislaus Rivers. ***Rivers, 3(l),*** (Jan.), 1-13.

Loomis, John and Joseph Cooper. (1990). "Comparison of Environmental Quality-Induced Demand Shifts Using Time-Series and Cross Section Data", Western ***Journal of Agricultural Economics, 15(1), 83-90.***

Loomis, John and Joseph Cooper. (1990). "Economic Benefits of Instream Flow to Fisheries: A Case Study of California's Feather River", ***Rivers,*** l(l), 23-30.

Loomis, John B. (1990). "Expanding Contingent Value Sample Estimates to Aggregate Benefit Estimates: Current Practices and Proposed Solutions", ***Land Economics, 63(4), (Nov.), 396-402.***

Loomis, John B., Dennis M. Donnelly, Cindy F. Sorg and Lloyd Oldenburg. (1985). "Net Economic Value of Hunting Unique Species in Idaho: Bighorn Sheet, Mountain Goat, Moose, and Antelope", Fort Collins, Colo.: USDA Forest Service, Resource Bulletin, RM-lo.

Loomis, J. (1982). "Use of Travel Cost Models for Evaluating Lottery Rationed Recreation: Application to Big Game Hunting", ***Journal of Leisure Research, 2, 117-124.***

McCloskey, Michael. (1990). "Evolving Perspective on Wilderness Values: Putting Wilderness Values in Order", in ***Preparing to Manage Wilderness in the 21st Century***. Asheville, N. C.: Southeastern Forest Experimental Station.

McCollum, Daniel W., George L. Peterson, J. Ross Arnold, Donald C. MarkStrom, and Daniel M. Hellerstein. (1990). "The Net Economic Value of Recreation on the National Forests: Twelve Types of Primary Activity Trips Across Nine Forest Service Regions", Fort Collins, Colo.: USDA Forest Service, Research Paper RM-289.

McConnell, K.E., I.E. Strand, S.K. Valdes, and Q.R. Weninger. (in draft 1992). "The Economic Value of Mid and South Atlantic Sportfishing", University of Maryland, College Park.

McConnell, Kenneth E. (1985). "The Economics of Outdoor Recreation", in A.V. Kneese and J.L. Sweeney (eds.). ***Handbook of Natural Resource and Energ y Economics.*** North Holland, Amsterdam: Elsevier Science Publishers.

McComell, K. (1975). “Some Problems in Estimating the Demand for Outdoor Recreation: An Application to Sportfishing”, ***American Journal of Agricultural Economics, 57*** (May), ***330-334.***

McConnell, K. and Strand, I. (198 1). “Measuring the Cost of Time in Recreation Demand Analysis”, ***American Journal of Agricultural Economics, 63*** (Feb.), 153-156.

Meier, Charles E. and Randall, Alan. (1991). “Use Value under Uncertainty: Is There a “Correct” Measure?”. ***Land Economics, 67(4), (Nov.), 379-389.***

Miller, R.J. (1971). “Alberta’s Hunting and Fishing Resource: An Economic Evaluation”, Alberta Department of Agriculture, Economics Division, Resource Economics Branch.

Milon, J. Walter and Roger Clemmons. (1991). “Hunters’ Demand for Species Variety”, ***Land Economics, 67(4) (Nov.), 401-12.***

Mitchell, Robert Cameron and Richard T. Carson. (1989). ***Using Surveys to Value PubIic Goods, the Contingent Valuation Method,*** Washington, D. C.: Resources for the Future.

Morey, Ed. (1992). “What is Consumer’s Surplus Per Day Use? and What does it Tell Us about Consumer Surplus?” Staff Paper Department of Economics, University of Colorado.

Morey, Ed. (1991). “A Discrete-Choice Model for Recreational Participation, Site Choice and Activity Valuation When Complete Trip Data Are Not Available”, ***Journal qf Environmental Economics and Management, 20, 181-201.***

Morey, EL Robert D. Rowe, and Michael Watson. (1992). “A Repeated Nested-LOGIT Model of Atlantic Salmon Fishing with Comparisons to Six Other Travel-Cost Models”, Departmental Paper, Department of Economics, University of Colorado.

Moser, David A. and C. Mark Dunning. (1986). "A Guide for Using the Contingent Value Methodology in Recreation Studies, National Economic Development Procedures Manual – Recreation", Vol. 2, IWR Report 86-R-5. Fort Belvoir, Vs.: Institute for Water Resources.

Muth, Robert M. and R.J. Glass (1989). "Wilderness and Subsistence-Use Opportunities: Benefits and Limitations", in ***Wilderness Benchmark 1988, Proceedings of the Nationa(Wilderness Colloquium,*** Tampa, Florida. Asheville, N. C.: Southeastern Forest Experimental Station.

Nickerson, Peter H. (1990). "Demand for the Regulation of Recreation: The Case of Elk and Deer Hunting in Washington State", ***Land Economics, 66(4) (Nov.), 437-447.***

Peterson, George L. and Alan IGUNWl, (eds). (1984). ***Valuation of Wildland Resource Benefits. Boulder, Colo.: Westview press.***

Phillips, William, Denis DePape, and Leonard Ewanyk. (1978). "A Socioeconomic Evaluation of the Recreational Use of Fish and Wildlife Resources in Alberta, with particular reference to the AOSERP Study Area", prepared for the Alberta Oil Sands Environmental Research Progra. University of Alberta.

Power, T.M. (1991). ***Wildland Preservation and the Economy of Utah.*** Southern Utah Wilderness Alliance. University of Montana, Economics Department.

Randall, Alan, John P. Hoehn, and David S. Brookshire. (1983). "Contingent Valuation Surveys for Evaluating Environmental Assets," ***Natural Resources Journal, 23,635-649.***

Randall, Alan. (198 1). ***Resource Economics: An Economic Avuroach to Natural Resource and Environmental Policv.*** Columbus, Ohio: Grid Publishing.

Rockel, Mark L. and Mary Jo Kealy. "The Value of Non-consumptive Wildlife Recreation in the United States", ***Land Economics, 67(4) (Nov.), 422-434.***

Rosenthal, Donald H. and Robert H. Nelson. (1992). "Why Existence Values Should ***Not*** Be Used in Cost-Benefit Analysis", ***Journal of Policv Analvsis and Management,*** 1 l(l), 116-122.

Rosenthal, D.H. (1987). "The Necessity for Substitute Prices in Recreation Demand Analysis", ***American Journal of Agricultural Economics, 69,828-837.***

Rubin, Jonathan, Gloria Helfand, and John Loomis. (1991). "A Benefit-Cost Analysis of the Northern Spotted Owl", Jo***umal of Forestry, 89 (12),*** (Dec.), ***25-30. .***

Sanders, Larry D., R.G. Walsh and J.R. McKean. (1991). "Comparable Estimates of the Recreational Value of Rivers", ***Water Resources Research,*** Vol. 27. No. 7, (July), 1387-1394

Scodari, Paul F. (1992). Wetland Protection Benefits. Washington, DC.: Environmental Protection Agency

Shaw, W. Douglass. (1992). "Searching for the Opportunity Cost of an Individual's Time", ***Land Economics, 68*** (l), (Feb.), 107-115.

Shelby, Bo, Thomas C. Brown and Johnathan G. Taylor. (1992). "Streamflow and Recreation", Fort Collins, Colo.: USDA Forest Service, General Technical R~ort RM-209.

Smith, V. Kerry. (in press for 1993). "Non-market Valuation of Environmental Resources: An Interpretive Appraisal", forthcoming in ***Land Economic.***

Smith, V. Kerry. (1987). "Non-use Values in Benefit Cost Analysis", ***Southern Economic Journal, 54(1)*** (July), 19-26.

Smith, V. Kerry, William H. Desvousges, and Am Fisher. (1986). "A Comparison of Direct and Indirect Methods for Estimating Environmental Benefits." ***American Journal of Agricultural Economics, 68(2)*** (May), ***280-290.***

Sorg, Cindy F. and Louis J. Nelson. (1987). "Net Economic Value of Waterfowl Hunting in Idaho", Fort Collins, Colo.: Resource Bulletin for the USDA Forest Service, Resource Bulletin RM-14.

Sorg, Cindy F. and Louis J. Nelson. (1986). "The Net Economic Value of Elk Hunting in Idaho", Fort Collins, Colo.: USDA Forest Service, Resource Bulletin RM-12.

Sorg, C.F. and J. Loomis. (1985) "An Introduction to Wildlife Valuation Techniques", USDA Forest Service, Rocky Mountain Research, ***Wildlife Socieiv Bulletin, 13, 38-46.***

Sorg, Cindy F., John B. Loomis, Dennis M. Donnelly, George L. Peterson, and Louis J. Nelson. (1985). "Net Economic Value of Cold and Warm Water Fishing in Idaho", Fort Collins, Colo.: USDA Forest Service, Resource Bulletin RM-11.

Sorg, C.F. and J.B. Loomis (1984). "Empirical Estimates of Amenity Forest Values: A Comparative Review", USDA Forest Service, General Technical Report RM-107.

Stevens, Thomas H., Jaime Echeverri~ Ronald J. Glass, Tim Hager, and Thomas A. More. (1991). "Measuring the Existence Value of Wildlife: What do CVM Estimates Really Show?" ***Land Economics, 67(4) (Nov.), 390 Ao0.***

Stoll, John R., John B. Loomis, and John C. Bergstrom. (1987). "A Framework for Identifying Economic Benefits and Beneficiaries of Outdoor Recreation". ***Policy studies Review, 7(2), 443-452.***

Strong, E.J. and D.L. Hueth. (1988). "Further Comparison of Results From Three Recreation-Valuation Methods", Research paper Pacific NorthWest: U.S. Department of Agriculture, August 1988, (395), 93-99.

Swanson, Cindy S., Michael Thomas, and Dennis M. Donnelly. (1989). "Economic Value of Big Game Hunting in Southeast Alaska", Fort Collins, Colo: USDA Forest Service, Resource Bulletin RM-16.

Thomson, Cynthia J. and Stephen J. Crooke. (1991). "Results of the Southern California Sportfish Economic Survey", Technical Report for the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOM), Southwest Fisheries Science Center, La Jolla California.

U.S. Department of the Interior. Fish and Wildlife Service (USFWS), and the U.S. Bureau of the Census (1982). 1980 ***National Survey of Fishing, Hunting and Wildlife -Associated Recreation.*** Washington, D. C.: GPO.

U.S. Water Resources Council. (1983) ***Principles and Guidelines for Water and Related Land Resources Implementation Studies.*** Washington, D.C.

Walsh, Richard G., Dorm M. Johnson, and John R McKean. (1990). "Nonmarket Values from Two Decades of Research on Recreation Demand", in ***Advarices in ADDIied Micro-Economics, 5, 167-193.***

Walsh, Richard G. and J.B. Loomis. (1989). "The Non-traditional Public Valuation (Option, Bequest, Existence) of Wilderness", in ***Wilderness Benchmark 1988, Proceedings of the National Wilderness Colloauium*** in Tampa, Florida.

Walsh, RG. (1986). ***Recreation Economic Decisions: Comparing Benefits and Costs.*** Venture Publishing, Colorado State University.

Walsh, Richard G., L.D. Sanders and J.B. Loomis. (1985). "Wild and Scenic River Economics: Recreational Use and Preservation Values". Report for the American Wilderness Alliance, Colorado.

Walsh, R, Loomis, J. and Gillman, R (1984). "Valuing Option, Existence and Request Demand for Wilderness", ***Land Economics, 60(1), 14-29.***

Walsh, Richard G., Richard A. Gillman and JohrI B. Loomis. (1982). "Wilderness Resource Economics: Recreation Use and Preservation Values", Report for the American Wilderness Alliance, Denver, Colorado.

Whithead, John C. and Glenn Blomquist. (1991). "Measuring Contingent Values for Wetlands: Effects of Information About Related Environmental Goods", ***Water Resources Research,*** Vol. 27, No. 10, (Oct.), 2523-2531

Willis, K.G. and G.D. Garrod. (1991). "An Individual Travel-Cost Method of Evaluating Forest Recreation", ***Journal of agricultural Economics, 42(1)*** (Jan.), ***33-42.***

Willis, Ken G. (1989). "Option Value and Non User Benefits of Wildlife Conservation", ***Journal of Rural Studies, 9(3], 245-256.***

Willis, K.G. and J.F. Benson. (1988). "A Comparison of User Benefits and Costs of Nature Conservation at Three Nature Reserves".Regional studies, ***22,417-428.***

Young, John S., Dennis M. Domelly, Cindy F. Sorg, John B. Loomis, and Louis J. Nelson. (1987). "Net Economic Value of Upland Game Hunting in Idaho", Fort Collins, Colo.: USDA Forest Service, Resource Bulletin RM-15.

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APPENDIX II METHODOLOGY FOR ESTIMATING TOTAL BENEFITS

The following methodology has been adapted from Shaffer (1986).

Consumer Surplus of Resident Recreationists

- average consumer surplus per day for each recreation category multiplied by the number of activity days, over a year, for each recreation category
- only the consumer surplus of residents is taken into account because the focus is benefit to the referent society;

Consumer Surplus of Resident "Preservationists"

- average consumer surplus per year for each preservation category multiplied by the portion of the population of the referent society which holds these views and hence the economic values

Producer Surplus of Supply Industries

- the number of resident recreation days in the chartering, guiding and other recreational service industries multiplied by average resident spending per day plus the number of non-resident recreation days in the chartering, guiding and other recreational service industries multiplied by average non-resident spending per day, all multiplied by the net income realized in the recreational services industry per dollar of revenues. Net income is defined as total wages, salaries and pre-tax return less the opportunity cost of employed labour and capital
- total expenditures by recreationists on goods and services multiplied by the net income realized in the supplier industries per dollar of revenues

Net Return to Government

- amount of fee, tax and license derived from recreation industries less cost for all governments of regulating and helping to provide the recreational experiences

Net Return Lost in Other Industries

- total amount of resident spending multiplied by the proportion of resident spending which would otherwise be spent in the referent society, plus the total amount of non-resident spending multiplied by the proportion of non-resident spending which would otherwise be spent in the referent society, all multiplied by an average net income per dollar of revenues in the affected industries (which can be assumed to equal the average net income realized in Canadian service industries).
- the premise is that if the recreation spending did not occur the money would be spent elsewhere so the lost return needs to be netted out

Net Return Lost in Conflicting Resource Industries

. the increase in real costs or loss of revenues in the conflicting resource industries, such as timber harvesting, due to the recreation activity