

**THE CONTRIBUTION OF OUTDOOR-BASED
RECREATION OPPORTUNITIES TO LOCAL
ECONOMIES: THE ECONOMIC IMPACTS OF ROCK-
CLIMBING TO THE SQUAMISH REGION**

by

Randolph P. Morris
Bachelor of Natural Resource Sciences,
University College of the Cariboo, 1998

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APPROVAL

Name: Randolph P. Morris
Degree: Master of Resource Management
Title of Research Project: The Contribution of Outdoor-Based Recreation Opportunities to Local Economies: The Economic Impacts of Rock-climbing to the Squamish Region

Project Number: 425

Examining Committee:

Chair: Christina Semeniuk

Dr. Wolfgang Haider
Senior Supervisor, Associate Professor
Department of Resource Management, SFU

Dr. Peter Williams
Supervisor, Professor
Department of Resource Management, SFU

Date Defended/Approved:

04/20/07



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ABSTRACT

The town of Squamish has identified rock climbing as a major component of its strategy for outdoor-recreation based tourism development. Despite its reputation as a leading rock-climbing destination, little information has been collected about the activity in general or about its specific economic contributions. This research estimates the economic impacts of rock climbing on the Squamish region as generated during the 2004 climbing season. To accomplish this goal, the research uses a combination of visitor monitoring, and visitor surveying to estimate the number of climbers who visited the area during the study period, characterize the expenditure patterns of these visitors, and estimate their collective visitor expenditures in Squamish. These figures are then used to estimate a total economic impact on the region. Based on the findings, considerations and challenges associated with climbing-related economic development are provided.

Keywords: economic impact analysis; tourism development; recreation-based tourism; rock climbing; visitor monitoring

Subject Terms:

Leisure -- Economic aspects; Tourism -- Economic aspects -- British Columbia; Tourism -- British Columbia; Outdoor recreation -- British Columbia.

DEDICATION

This is dedicated to my best friend and partner, Grant Burns, who has patiently stood by as I pursued my research. With its completion, we now may be able to chase some of our dreams that we may have put temporarily on hold during this process. Thanks always for your encouragement. From this experience, I have no doubt that together we will achieve all of our dreams and more.

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CHAPTER ONE: INTRODUCTION

1.1 Background and Project Rationale

Rock-climbing is a recreational activity that is growing in popularity, attracting an increasing number of visitors to key destinations around the world. One such premier location is the Squamish area in British Columbia. The climbing sites around Squamish are well recognized for their regional, provincial, and international significance (McLane, 2001). Climbing has a long history in this region. The famous granite cliffs and rock faces of the Stawamus Chief have been climbed intensively for over 40 years; more recently, climbing has expanded to other rock faces, and the numbers of climbers using the area has increased steadily (BC Parks, 2004).

Despite its reputation as a leading rock-climbing destination, little information has been collected about the activity in general or about its specific economic contributions. This information is of interest to both the area's local municipal government (personal communication, Malleau, June 2004)¹ and climbing groups (CASBC, 2004). They feel that an understanding of the economic impacts of climbers in the Sea to Sky region will ensure that development and land management decisions in the area will be better informed by current, defensible, and credible economic data.

¹ Lee Malleau was the Economic Development Officer for the District of Squamish at the time of the study.

Economic impact analysis is a useful approach for quantifying the economic benefits of tourism in host communities and regions. Economic impact analysis estimates the benefits accrued to a specific area by particular activities or industries. It provides a measure of the economic activity generated by the sale of locally produced goods or services, such as tourism or recreation products, to consumers from outside the host community. Any estimate of economic impacts specific to rock climbing demands an understanding of the number of individuals visiting the Squamish area for the purpose of rock climbing, and the spending patterns associated their pursuits.

This study estimates the economic benefits of rock climbing to the Squamish area. Climbing participation at the various sites in the Squamish area will be documented, spending patterns of different rock climbing visitor segments will be characterized, and the collective economic impact of visitor spending on the area's regional economy will be estimated.

1.2 Study Area

This study focuses on the town of Squamish and the smaller, neighbouring communities of Furry Creek, Britannia Beach, Brackendale, Garibaldi Highlands and the Squamish Valley. Squamish is situated at the end of Howe Sound, on the west coast of British Columbia. The area is located about halfway between Vancouver and Whistler, BC on Highway 99, one of the province's busiest tourist corridors (see Figure 1-1).

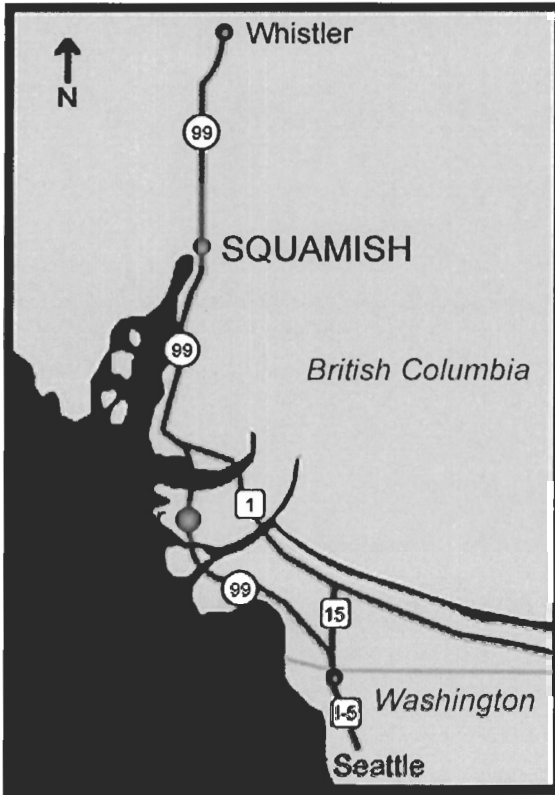


Figure 1-1 – Location of Squamish

The District of Squamish has a population of about 16,000, and is growing faster than most other British Columbian communities (District of Squamish, 2004). Traditionally, forestry was the staple economy for the community. However, in recent years, the relative contribution of the forest industry has been declining, and other sectors have been rising in importance. The service sector, particularly that portion related to tourism businesses, contributes to an increasing number of jobs linked to the area's economic base (Clover Point Cartographics et al., 2000).

Tucked between the ocean and the mountains, the Squamish area is naturally blessed for outdoor recreation and tourism pursuits. With an assortment of crags and rock features scattered throughout the vicinity, opportunities for rock

climbing are abundant. Most notable of these sites is the large, granite face of the Stawamus Chief. The Stawamus Chief, the quintessential backdrop to the town, is a centrepiece of rock climbing for many enthusiasts.

The climbing sites included in this study are found within 30 km north and south of Squamish, in close proximity to Highway 99 (see Figure 1-2). For this project, a set of site monitoring and intercept surveys activities were conducted at the following sites:

- Grand Wall, Bulleheads and bouldering field at the Stawamus Chief
- Apron of the Stawamus Chief
- Smoke Bluffs
- Murrin Provincial Park
- Chek and nearby cliffs (Chek, Rehabilitation Project, Sport Temple, The Gym)
- Rogues Gallery
- Upper Malamute
- The Papoose
- Shannon Falls
- Seal Cove
- Comic Rocks
- Swift Creek Crag

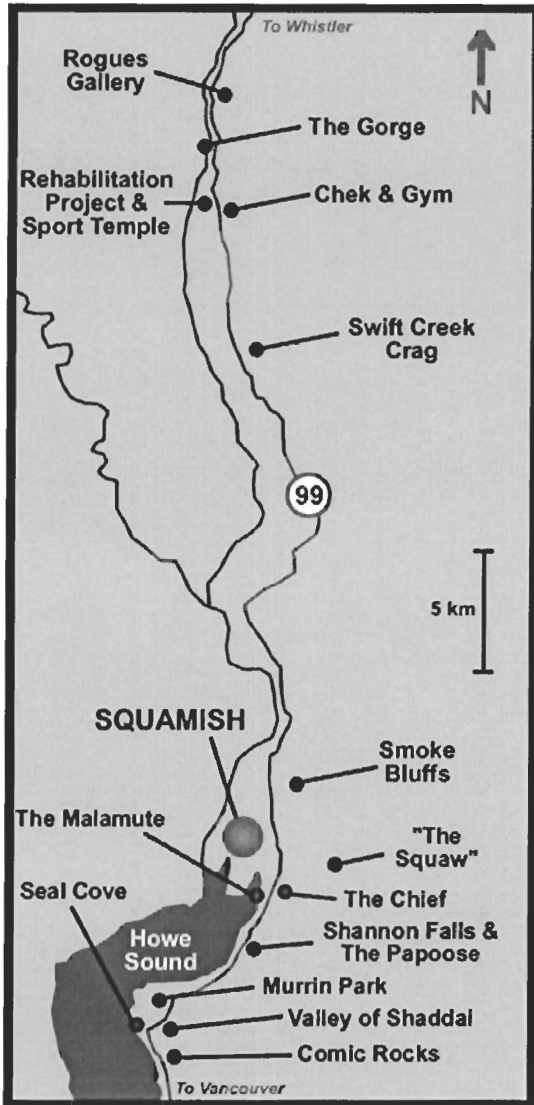


Figure 1-2 – Map of climbing sites in Squamish area

These sites offer a wide diversity of opportunities for various rock-climbing styles. An estimated 1,400 climbs exist in this area, with traditional, sport and aid routes of varying lengths all readily available (McLane, 2001). While the number of sport climbs and bouldering problems has risen dramatically in recent years, the Squamish area continues to be recognized particularly for the exceptional quality and quantity of traditional climbs.

1.3 Purpose and Objectives of Study

The purpose of this study is to estimate the economic impacts of rock climbing on the Squamish region as generated during the 2004 climbing season. Estimating the economic impacts involved estimating the number of climbers who visited the area during the study period, characterizing the traits of these visitors especially with respect to their expenditure patterns, and estimating their collective visitor expenditures in Squamish. For each of these objectives, the study compared the traits of specific segments of rock-climbers (e.g. residents, day visitors and overnight visitors). This study addressed its research objectives by collecting data through site monitoring and intercept-surveys during the 2004 field season, and via an Internet survey administered in the spring of 2005. The findings from these investigations are used in combination with regional economic sales multipliers to estimate the total economic impact of rock climbing on the region. Based on these estimates, this paper discusses their management implications for tourism and recreation development.

The research only addresses readily identifiable economic benefits specific to the host community. For the purposes of this investigation, economic benefits consist only of those benefits that have been introduced to the region because of rock-climbing. Non-market benefits such as the intrinsic values of the recreational opportunities and the health benefits of rock-climbing are considered intangible, and not addressed.

1.4 Research Questions

This investigation addresses the following research questions:

1. How many visitor-use days were attributable to rock climbers in the study area during the 2004 climbing season?
2. What proportion of total visitor-use days was attributable to each visitor group?
3. Did residents, day visitors and overnight visitors differ in their level of visitation?
4. What were the typical daily use patterns of rock climbers in Squamish?
5. Did daily use patterns differ significantly temporally and/or spatially?
6. What were the expenditure profiles for each visitor segment?
7. What were the characteristics of each visitor segment?
8. Did expenditure profiles differ amongst the visitor segments?
9. Did visitor segments differ according to the nature of their visitation?
10. What was the estimated total visitor expenditures associated with rock climbing in Squamish?
11. What were the estimated direct and indirect economic impacts associated with rock climbing in Squamish?

1.5 Organization of Document

This document is organized in five chapters. The first chapter provides an introduction to the paper, as well as a description of the background and rationale for the study, the study area, the research questions, and an overview of the research methods. Chapter Two reviews literature related to rural and regional economic development through outdoor-based recreation and tourism, methods for measuring economic impacts associated with outdoor-based recreation, applications of economic impact analyses in the context of recreation and tourism, and approaches for monitoring and estimating levels of recreational use in wilderness areas. Chapter Three describes the methods used to collect and analyze the data. Chapter Four presents the results of the study. It focuses on comparing the characteristics of day users, overnight visitors and resident climbers. In particular, it describes the visitation and participation patterns of these different user segments, estimates the total number of visitor use days, indicates total visitor expenditures in Squamish, and suggests the subsequent economic impact of rock climbing visitation. Chapter Five discusses the implication of these findings as they relate to the management and development of rock climbing in Squamish. Lastly, Chapter Six provides a brief summary and some concluding remarks regarding the findings and application of this research, and potential direction for further investigation.

CHAPTER TWO: LITERATURE REVIEW

2.1 Outdoor Recreation in Tourism Development

Many rural towns throughout BC are exploring ways of strengthening and diversifying their economies. In many cases, strengthening local economies involves stepping away from a dependence on natural resource-based primary production and exploring new opportunities for economic development and diversification. In these rural settings, local governments are increasingly turning towards tourism development as a source of economic growth (Barnes and Hayter, 1994). Tourism can have a positive affect on rural economies by injecting new dollars in local businesses, supporting local tax bases, and creating increased demands for locally available land, labour and capital (Sims et al, 2004).

Outdoor recreation can contribute substantially to the development of positive tourism economic contributions for communities. Unique recreational opportunities can provide communities with a competitive advantage in the development of productive tourism businesses (English and Bowker, 1996). Towns such as Squamish, which feature extensive high-quality outdoor recreation opportunities and exceptional natural amenities, have a considerable advantage with respect to developing their tourism economy. The economic contributions of outdoor-based recreation and tourism spending in rural areas are demonstrated repeatedly (English and Bowker, 1996; Cordell et al, 1990).

Recreation and tourism development can contribute to rural well-being, increasing local employment, wage levels, and income, reducing poverty, and improving education and health (Reeder and Brown, 2005).

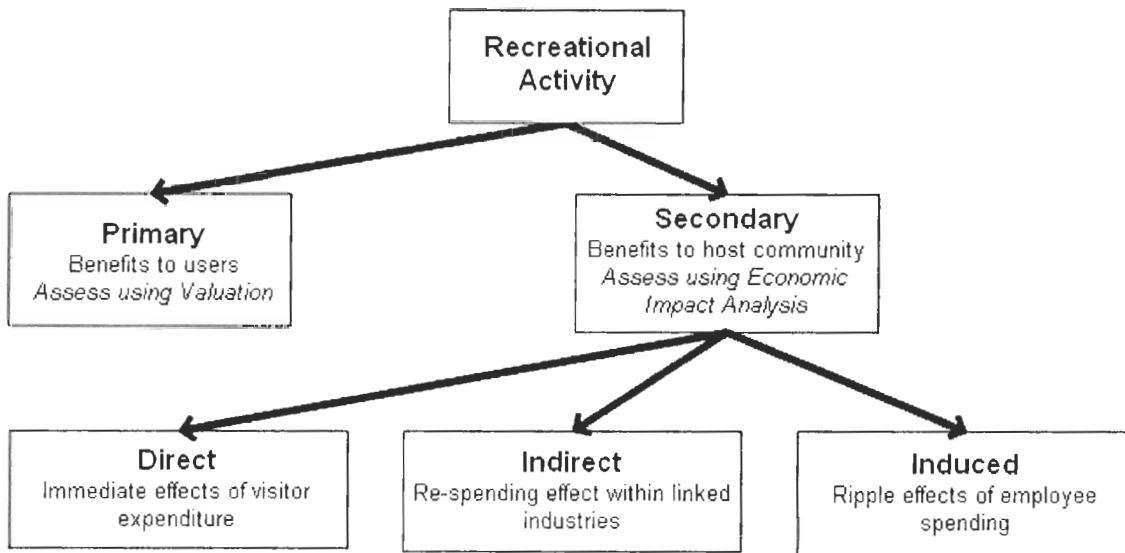
However, the promotion of tourism as a means of economic development is not without criticism. Case studies demonstrate that outdoor recreation-based tourism development can also create economic disadvantages. Critics typically focus on the types and quality of jobs created through tourism, the effects of recreational development on community infrastructure, and many equity-based social issues (Keith et al., 1996; McKean et al., 2005, Becker and Bradbury, 1994). With uncertainty surrounding the economic contributions of tourism in some rural communities, local government, businesses and public organizations in these regions are interested in knowing the current and potential impact of such outdoor tourism pursuits on their areas (Stynes, 1997).

2.2 Economic Contributions of Outdoor Recreation

When considering the economic contribution of recreation amenities at the community or regional scale, benefits to the host community are quantified using economic impact analyses (McDonald and Wilks, 1986). Economic impact analyses measure the present, or predict the future, economic activity generated by the sale of a locally produced good or service to consumers from outside the host community (Horne, 2004). Economic impacts are usually depicted as income earned by all individuals involved in production and sales, the total sales or output of a good or service sold, the number of jobs required to fulfil a given

level of production and sales, or the amount of taxation revenue generated from visitor spending (Ryan, 2003).

It is important to recognize the distinct difference between estimating the economic impacts associated with an outdoor recreational activity, and the value of such an opportunity to individuals. Both are similar in that they attempt to measure economic benefits, but differ substantially in their targeted beneficiary (Murphy, 1989). Economic impact analysis measures financial benefits to a host community. It is restricted to actual flows of money from market transactions within a particular geographical location (Stynes, 1997). In contrast, other measures of economic benefits focus upon the economic value placed by individual recreationists (the primary beneficiaries) on their recreational experience. This primary value includes both market and non-market values, and can be used to estimate the value of an amenity to society as a whole (see Figure 2-1). Economic impact analyses tend to emphasize the positive benefits of tourism within a specific host community, and do not reflect broader societal benefits.



Adapted from P. Murphy, 1989

Figure 2-1 – Economic impact beneficiaries of recreation

Within a region or host community, economic impacts result from the export and sale of locally produced goods and services to buyers from outside a host community. Tourism and non-local recreation have this capacity, bringing new income into a host community by attracting visitors who spend money earned elsewhere (Horne, 2003). The expenditures made by visitors translate into new income for the businesses directly involved in providing visitor services, and to those industries who indirectly supply these businesses. In addition, local government also benefit through the payment of taxes by visitors on these goods and services.

Economic impact analyses measure the income generated by the initial export sales, as well as the flow of expenditures through the industries and businesses that support the activity (Murphy, 1989). In a tourism context, a standard economic impact analysis traces the flow of money generated from

visitor spending. This begins with direct income generated at the businesses and government agencies where visitors initially spend their money.

Direct impacts are the production changes associated with the immediate effects of changes in visitor expenditures (Stynes, 1997). Visitors typically spend money on such goods and services as accommodation, transportation, food, guided activities, equipment rentals, and purchases. An increase in visitors typically results in a direct increase in sales for these businesses. The additional changes in business sales and the associated changes in payments to wages, support services and taxes represent a direct effect of tourism and non-local recreation.

In order to meet increased demand for these inputs, suppliers must make additional purchases on goods and services from other suppliers. The economic activity, including changes in sales, jobs and income, associated with these backward-linked industries is described as the indirect effects. Indirect effects include all of the economic activity generated by businesses that provide goods and services to tourism businesses (Stynes, 1997).

The final effect of tourism spending relates to the increased spending by households who earn income in tourism and supporting industries. Employees in tourism and supporting industries spend the income they earn from tourism on housing, utilities, groceries, and other consumer goods and services. These expenditures generate sales, income and employment throughout the region's economy. The changes in economic activity resulting from household spending of this related income are the induced effects of recreation (Davis, 1990). The

sum of the direct, indirect and induced effects represents the total effect of an activity, or the total economic impact (see Figure 2-1).

Through these linkages, recreation and tourism impacts virtually every sector of an economy (Leons and Dunn, 1999). The magnitude of these economic effects depends on the propensity of businesses to buy their supplies and services locally, thus reducing the amount of economic leakage. Recreation and tourism have the greatest economic impact on a community when the supporting businesses purchase their necessary inputs within the same region.

Community or regionally focused economic impact analyses generally consider only those expenditures that come from outside the region. That is, the economic contributions of recreational activities are measured by the injection of non-resident expenditures while visiting the community (Archer, 1996). As a result, economic impact studies usually only investigate visitor spending. Expenditures by locals are justified only in special circumstances. In particular, local expenditures are sometimes included when locals would otherwise travel elsewhere to pursue a recreational activity if that opportunity was not available locally. Local visitor spending that would otherwise have occurred outside the region should be included (Stynes, 1997).

Also, the definition of a visitor must be clearly identified. Depending on the situation, visitors may include seasonal residents, when these individuals are in the community specifically to engage in recreational activities (Stynes, 1999). The inclusion of seasonal residents is particularly relevant for some recreational activities that draw recreationists for long periods of time, such as skiing and rock

climbing. In these cases, while the individuals are essentially residents, they can be counted as seasonal visitors.

2.3 Rationales for Economic Impact Analyses

Communities, businesses, and government agencies are frequently interested in the economic impacts associated with tourism development. Whether investigating the impacts of the entire tourism industry, or of a specific tourism niche, economic impact analyses are used to quantify the economic benefits associated with specific tourist activities and to project potential changes in market activity resulting from the development of a project or policy that may influence visitation (Davis, 1990). This reasoning has occasionally been used to rationalize outdoor-recreation impact studies, assessing the merits of supporting or developing significant tourism attraction in communities. .

Much of the incentive for investigating the economic benefits associated with a specific recreational activity is linked to the ability to compare and position the economic contributions of such developments within the broader tourism industry, with other industries and with the area's broader economy base. Economic impact analyses can provide a better understanding of the role and importance of a recreational attraction to a region's economy (English and Bowker, 1996). Businesses, public officials, and the public in general may often underestimate or dismiss the economic benefits of such activities (Stynes, 1997). Such analyses can also provide a clear picture of the contributions made by visitor spending on local income and employment (English and Bowker, 1996). Better understanding of the economic contributions can lead to greater respect

for the activity among the community, and provide a clearer picture of the contributions made by visitor spending on the local income and employment (Stynes, 1997).

Similarly, an economic impact analysis provides one means of comparing future development scenarios and their subsequent contributions to the local economy. Economic impacts are frequently an important consideration in state, regional and community planning and economic development (Stynes, 1997). In planning decisions, economic impact analyses allow local government to evaluate potential development opportunities. In the case of tourism, economic impact analyses can provide a context to evaluate policy and management decisions that are likely to change visitation patterns. Potential actions such as increased marketing to particular segments of visitors, increased availability of affordable tourist packages, the development of more attractions, and development of desired accommodation types could increase visitor spending patterns. In contrast, policy changes that reduce recreational access, limit levels of use, and user fees, may have a negative impact on the local economy. An economic impact analysis allows policy makers to examine potential losses or economic growth associated with such changes.

Beyond their use by government agencies, developers and land use planners, economic impact analyses are also becoming a popular tool amongst advocacy groups who seek to protect amenities such as recreation opportunities. It is generally accepted that local government and decision-makers are more likely to allocate public spending, land access and other resources towards

outdoor recreation when they have a full understanding of the associated economic contributions (Stynes, 1997). By demonstrating the significant impacts associated with outdoor-based recreation and tourism, advocates for recreation can often convince decision-makers to allocate more resources to support these activities. Financial and non-financial support is increasingly common in communities where superior recreational amenities are thought to contribute significantly to local tourism (see Sims et al., 2004; English & Bowker, 1996; MBTA, 2006).

2.4 Measuring Economic Impacts of Recreation-Based Tourism

Measuring the economic impacts associated with tourism poses unique challenges when compared to other industries. Unlike conventional export industries, the products of tourism are not consumed exclusively by individuals from outside the host area. Restaurants, transportation and retail merchants all service local residents as well as tourists (Horne, 2004). Only a portion of the total sales for these businesses are from non-local sources and considered to have an economic impact. The economic impacts of tourism cannot simply be measured using the total income, sales or employment generated in these services.

Only accommodation services are generally considered to be exclusively tourism related. With the knowledge that all income and employment generated in accommodations can typically be attributed to tourism, it provides one avenue to estimate associated economic impacts. This method requires two pieces of

information: the relationship between number of accommodation jobs and tourism expenditures; and the proportional spending patterns of the average tourist for the area. This data is often generated in regional economic impact models and visitor studies. With such information, one can use the actual number of jobs in accommodation and estimate the overall economic impact of tourism, including the “mixed” services (Horne, 2004). Accommodation data, particularly when subject to commercial accommodation taxes, can also be used as a means of estimating total visitation to an area, even in areas with no defined ‘gated’ entry points. When combined with typical visitor spending profiles, the total economic impact can be generated with greater credibility than would be otherwise possible (Kelly, Williams, Schieven and Dunn, 2006). These methods are only feasible if investigating the economic impacts associated with the entire tourism industry, not in a particular segment or activity within the tourist industry.

Establishing the economic impacts at the regional level related to a specific tourism segment requires an understanding of visitation, visitor expenditures, and an economic model of the target economy (English et al., 1995). Collectively, this information can be used to estimate the direct impacts of specific types of tourism, and, subsequently, an estimate of the total economic impact to the region.

2.4.1 Estimating the Direct Impacts of Tourism Spending

To estimate the direct economic impact of visitor expenditures, one requires a thorough understanding of both the number of recreationists and of visitor spending patterns in the region. This information can come from a variety

of sources. Secondary data sources are often used, as they can save both time and money for researchers (Leones and Dunn, 1999; Goldman et al., 1997). Visitor centres, parks agencies, local attractions and businesses often keep records of visitation, while tourism research bureaus often have estimates of visitor spending. Secondary data, however, can pose some challenges. First, such sources are frequently not available, particularly when studies focus upon specialized tourism niches, such as rock climbing tourists (Leone and Dunn, 1999). In addition, when data is available, it often is not representative of the targeted population of visitor. Frequently, it involves inappropriate collection methods or sources. Secondary data should be used only when it captures the identified group segments within the population, is current, and follows consistent collection methods (Leone and Dunn, 1999). Otherwise, primary data collection procedures should be employed. .

The data source also depends on the method of analysis to be used when calculating the subsequent indirect and induced economic impacts. Certain methods of assessing economic impacts, such as Input-Output (I-O) Models, require very detailed visitor expenditures profiles in order to observe how expenditures are dispersed in different economic sectors (Davis, 1990). These models often require estimates of direct spending in all related economic sectors to predict the total economic impact of an activity. Because local residents and tourists often share the economic sectors associated with tourism, the financial accounts of these industries do not represent direct spending resulting from a

tourist activity (Horne, 2004). Instead, primary sources must be utilized, as only they can illicit precise information on spending within all sectors.

For site-specific analysis of recreational economic impacts, the best method for obtaining expenditure data is by randomly sampling and interviewing visitors (Archer, 1996; English et al., 1995). Expenditure data is typically collected within a set of clearly defined categories (English et al., 1995). Most spending information is best collected using on-site surveys. The task of recounting daily spending is easiest and most accurate when completed nearest the time of making the expenditure. However, on-site accounts of spending introduce the risk of missing expenditures that have not yet been made or that are infrequent. Accounts of daily expenditures will only capture a small sample of infrequently purchased items, such as rare but costly gear expenditures, making statistical analysis difficult. Stynes (1999) states that accounts of durable goods purchased by visitors and households are most accurate when reported in mail-out surveys as a summary of spending over an entire season. Based on the compilation of all survey results, it is possible to estimate the average spending habits for each different type of visitor group.

To project the total economic impact of a recreational activity, it is necessary to estimate the total number of visiting recreationists, as well as accurate estimates of spending habits. For many recreational activities, reliable visitation data is rarely available. Thorough records of visitation are most frequently available for activities that occur in controlled or intensively managed environments (e.g. ski hills, popular national parks). Therefore, economic impact

studies often need to incorporate some method to estimate levels of visitation (Archer, 1996). Approaches for visitor counting and monitoring are discussed in Section 2.6.

The amount of use and spending estimates are the two most important parts of an economic impact assessment (Stynes, 1997). When the number of tourists is multiplied by the average spending per visitor, the result is an estimate of total visitor spending in the region of interest. Total visitor spending, however, is not the same as the direct impacts for the region. Rather, when visitors make expenditures, some of their money immediately leaves the region through economic leakages, such as commodity taxes and non-local supply costs (Horne, 2003). The direct economic impact of tourism thus equates to the total visitor expenditures minus the various economic leakages.

2.4.2 Estimating Regional Economic Effects

Typically the objective of an economic impact analysis is to estimate both the direct impacts associated with an activity or industry, as well as the indirect and induced effects experienced in the region. Indirect and induced effects of these expenditures involve using an appropriate estimation technique, such as regionally specific economic multipliers or economic models (Cordell et al., 1990).

Economic multipliers, such as employment and income ratios, are used in conjunction with estimates of the direct economic input to estimate total economic impacts. Multipliers capture the secondary economic effects by

representing the interdependencies between sectors within a particular region's economy (Stynes, 1997). For example, a sales multiplier is a ratio that represents the secondary sales resulting from the direct sales to visitors. Its size is strongly influenced by the degree of leakage experienced by the local economy, which in turn is determined by the size and economic diversity of the community in question (Murphy, 1989).

Regional multipliers are estimated using different economic impact models, including the economic base, income-expenditure and I-O models (Davis, 1990). While all of these models are used to estimate economic impacts, different models are more suitable for use in particular situations. For example, the assumptions made by the economic base and income-expenditure models limit their application to small-scale economies. However, these models are generally cheaper and easier to develop. I-O models, on the other hand, are the most flexible and can be applied to large, complex economies. These are also typically the most expensive and time-consuming models to develop (Davis, 1990).

Analysts should give special consideration when deciding to use existing economic multipliers in an economic impact analysis. Existing multipliers should only be used if they are current and representative of the local economy (Stynes, 1997). If multipliers are not readily available, the analyst must weigh the advantages of developing a model to measure the indirect and induced effects against the associated costs in both time and money (Davis, 1990). In cases where relevant multipliers are not available or the use of a model is too cost-

prohibitive, an assessment of the direct economic impacts alone is most appropriate (Stynes, 1997).

The economic base model is the most commonly applied approach, although it is the most limited in terms of the scale of application. The base model focuses on the relationship between export production and the proportional response of non-export or service activity, assuming that export activity drives the economic activity. These relationships are assumed to be representative and constant across the sector (Horne, 2004). A local economy is assumed to be in equilibrium, with a certain amount of basic, or export-generated, economic activity generating a proportional amount of non-basic, or induced, economic activity. Any change in basic production will result in a proportional change in non-basic economic output. The multipliers produced using an economic base model, are represented by ratios between export production and economic conditions such as employment and income specific to each sector. The multipliers generated by these models are typically expressed as employment and income ratios, and provide the necessary information to translate direct impacts associated with export production into the total employment and income impacts within the community.

The income-expenditure model represents a somewhat more sophisticated model than the base model, though it is still restricted in its application. In contrast to the economic base model, the income-expenditure model describes economic impacts by explaining the relationship between income and the way this income typically becomes distributed through an

economy. The model demands an understanding of the expenditure patterns, or propensities, to calculate how any changes in income would be distributed through the economy. The propensities are a characterization of the proportion of income that typically goes towards local consumption, taxes, imported goods and savings. By focusing on income, this model is able to incorporate a greater spectrum of economic stimuli, including investments, tax cuts, government spending and changes in import levels (Davis, 1990). Whereas base models develop multipliers based solely upon changes in export consumption, income-expenditure multipliers also incorporate leakages through taxes, import spending and savings.

Similar to the base model, the income-expenditure model makes several assumptions that limit its application (Davis, 1990). First, the income expenditure model assumes that the coefficients remain constant. In the income-expenditure model, the proportions that describe the local economy, or marginal propensities, remain constant including tax rate and the propensity to consume locally. Second, like the base model, sectors are assumed to be homogenous in their patterns of cash flow. Both models also assume that the sectors have unlimited capacity to grow, serving any increase in demand. Fourth, the regional economy is assumed to experience no interregional feedback effects from any localized economic changes. These assumptions often do not meet with reality, and thus the predictions of these models should be considered with care.

The most technically sophisticated method of assessing economic impacts is with I-O models (Davis, 1990). This type of analysis is the most

comprehensive method available for studying economic impacts. It offers a flexible structure, enabling the researcher to adapt the model to suit particular settings or purposes (Fletcher, 1989). It also allows a greater level of detail, as the model can trace the effects of the initial impact through all sectors of the economy (McDonald and Wilks, 1986). It is specifically designed to reveal the linkages between sectors and to yield a distinct multiplier for each economic sector of the model (Davis, 1990). I-O models require explicit and extensive information regarding the purchasing and spending characteristics of each sector. These models assume that each sector buys inputs from, and sells its output to, each of the other sectors. I-O models attempt to quantify these linkages, and provide a means to predict economic impacts resulting from changes in one or more of these sectors. While the resulting output of these models allows for broader application and greater realism, the amount of data required and the complexity of the model lead to high costs of implementation. The high level of detail must be weighed against the associated costs in time, money and expertise.

Analysts must carefully consider the most appropriate method of economic impact analysis to use. Considerations include the type of information already available, the character of the local economy, the amount of resources available for the study and the degree of accuracy required. In many regions, multipliers have already been calculated, making the modelling process unnecessary. For example, the British Columbian government has published regional base multipliers for communities outside of the Greater Vancouver

Regional District as recent as 2001 as well as provincial sales multipliers using the British Columbia I-O Model (see Horne, 2004; Horne, 2003)

2.5 Case Studies of Economic Impact Analyses

Economic impact analyses have been widely applied to tourism and recreation, although the amount of peer-reviewed literature is limited. Research is typically a response to the desire of local government, businesses, or non-profit organizations to understand the contributions of tourism or specific recreational activities to their region. Business consultants undertake the majority of these investigations, though analyses by academic institutions are also common. Most economic impact analyses have been broad in scope, focusing on the tourism industry as a whole, or on broad tourism themes, such as park or nature-based tourism, which are inclusive of a wide range of visitor activities. Less common are studies that examine the economic impacts associated with particular recreation activities. Study areas of economic impacts also range dramatically in size and economic complexity. The scale of areas ranged from as small as the community and county level, to as large as the national level.

Analysts should be cautious when comparing results of economic impact studies. With varying spatial scales and differences in regional market behaviours, results are rarely transferable, even when examining similar activities. Furthermore, impact analyses frequently differ in their methods of measurement, particularly in the inclusion of local spending and in the models used to predict the indirect and induced impacts. Douglas (1975) describes the

challenges of interpreting and comparing the many park studies. Problems occur because different economic units of measure are often used in these studies, and the areas of interest were generally poorly defined. These problems are common across most economic impact studies.

2.5.1 Economic Impacts of Wilderness Recreation and Outdoor-based Tourism

The most common economic impact analyses have focused on the broader impacts of tourism on larger-scale economies, particularly at the provincial or state level. Government agencies and other tourism management bodies often undertake comprehensive studies examining the economic impacts of tourism. For example, Tourism British Columbia regularly produces estimates of economic activity generated by tourism within BC. With this broad scope, the economic impacts of tourism are considerable. Tourism British Columbia estimated that tourism generated \$9.5 billion in industry output, 111,890 full-time equivalent jobs, and contributed \$5.4 billion to the provincial gross domestic product (GDP) (see Table 2-1).

The non-profit group Tourism Vancouver has also regularly conducted economic impact analyses of tourism on the Greater Vancouver region. These studies have been effective in monitoring and describing changes in tourist spending in this region (Tourism Vancouver, 2006). With an estimated total industry output of \$8.05 billion in 2005, the results show that a huge proportion of the economic impacts associated with tourism in the province are garnered in the metropolitan area.

Table 2-1 – Summary of economic impact analyses of tourism industry

Tourism (All)									
Scope	Scale	Author / Organization	Date	Location	Non-Local Expend. ^a	Industry Output	Employment	GDP	Income
All tourist activities	Province	Tourism BC	2002	BC	\$4.1 B	\$9.5 B	111,890	\$5.4 B	\$2.6 B
All tourist activities	Province	Tourism BC	2003	BC	\$4.0 B	\$9.2 B	114,270	\$5.0 B	\$3.2 B
All tourist activities	Region	Tourism Vancouver	2006	Greater Vancouver	\$4.3 B	\$8.05 B	98,683	\$3.8 B	\$2.53 B

^a All figures presented in current dollars at time of study, unless otherwise stated.

Many economic impact studies have focused on setting-specific tourism segments. These studies typically examine the economic impacts associated with a particular tourist setting, without focusing specifically on a particular type of recreation. A sample of economic impact studies that examine Canadian setting-based tourism segments are presented in Table 2-2. One common example of such analyses is the examination of the economic benefits associated with parks and protected areas. Parks have been shown to have enormous economic value at both the provincial and federal level. A study conducted by Alberta Economic Development (2000) estimated that the Albertan Rocky Mountain national parks contributed \$1.05 billion to the provincial economy in 1998. On a lesser scale, Kluane National Park and Reserve generated a total economic impact of \$5.07 million in the Yukon Territory in 1999 (Outspan Group Inc, 2005).

The British Columbian park system has also been the subject of repeated economic impact assessments. Four economic impact assessments have been completed on this park system between 1985 and 1999 (Opryszek, 2001). The most recent analysis estimated the total direct effects of British Columbia's provincial parks in 1999 at \$533 million, with 90% of these direct effects coming from visitor expenditures. The largest single visitor expenditure category was food-related items, including spending on groceries, and restaurants. Together, these represented \$247 million in direct visitor expenditures. The report estimates that for each dollar invested annually by government in the protected areas system, there were about \$10 dollars in annual visitor expenditures, and

concludes that the recreational draw of BC's provincial parks has contributed greatly to the provincial economy.

Studies have even examined the economic impacts associated with a single park on a local community. A study at Mactaquac Provincial Park, New Brunswick, showed that this park generated an economic impact of \$1.75 million on the local community, including the impacts of visitor expenditures and local operation costs (Williams, 1995). Thus, even at the local scale, the economic impact of parks can be considerable.

Table 2-2 – Summary of economic impact analyses for setting-specific tourism segments

Setting-Specific Tourism Segments (Multiple Activity)									
Scope	Scale	Author / Organization	Date	Location	Non-Local Expend. ^a	Industry Output	Employment	GDP	Income
Park tourism	Province	Alberta Economic Development	2000	Rocky Mountain National Parks, AB	\$954.8 M	\$1.05 B	28,135	-	-
Park tourism	Province	Outspan Group Inc.	2005	Kluane National Park, YT	\$3.16 M	\$5.07 M	57.5	\$2.60 M	\$2.17 M
Park tourism	Province	MWLAP (Opryszek)	2001	BC	\$486.1 M	\$533 M	9,100	\$521 M	-
Park tourism	Region	University of New Brunswick (Williams)	1995	Mactaquac Provincial Park, NB	\$708,675	\$1.75 M	28.6	\$962,823	\$561,693
Trail tourism	Region/ Province	Pricewaterhouse-Coopers	2000a	East-Central AB	\$6.79 M	\$7.85 M / \$15.87 M	107.5 / 159.7	\$3.23 M / \$7.36 M	-
Commercial nature-based tourism	Province	Tourism BC	2005	BC	\$908.9 M	\$1.55 B	20,776	\$783 M	\$556.2 M
Non-commercial coastal recreation	Region	Outdoor Recreation Council of BC	2003	Central & North Coast, & Queen Charlotte Is, BC	\$11.36 M ^b	-	-	-	-

^a All figures presented in current dollars at time of study, unless otherwise stated.

^b Total non-local visitor expenditures to the three regions within the study area.

Besides parks, analysts have examined other setting-specific tourism segments, including nature-based commercial tourism, non-commercial coastal recreation, and trail tourism (Tourism BC, 2005; ORCBC, 2003; PricewaterhouseCoopers, 2000a). Several studies have focused upon the value of trails for a local economy. In 2000, the Community Futures Development Corporation of Powell River, BC commissioned a feasibility study of a new trail system in the area (Synergy Management and ADR Forestry, 2000). An economic impact analysis was not completed specifically for the area. Rather, the report summarized the findings of impact studies for other trail systems, including the Bruce Trail, Ontario; the West Coast Trail, BC; and several trails in Nova Scotia. The average spending of all these analyses was determined to be \$149 per visitor per trip. Thus, the impact analyses were used to project the regional impact at various use levels, with a maximum annual benefit of \$1.49 million. Similarly, in 2000, the province of Alberta hired contractors to assess the economic significance of the newly established Trans Canada Trail project (PricewaterhouseCoopers, 2000a). This economic analysis focused on the regional and provincial scale, and included both local and non-local expenditures in its assessment of economic impacts. The projected total economic impact attributed to recreational use of these trail sections were estimated at \$7.85 million for the region, and \$15.87 million for the province.

Many investigations have been much more focused, targeting specific leisure activities. Studies have focused on activities as diverse as whitewater rafting, snowmobiling, recreational boating, downhill skiing, mountain biking and

rock climbing. The tourist industries surrounding highly commercialized recreational activities such as downhill skiing, heli-skiing and white-water rafting have been studied in various locations in Canada and the United States. In Alberta, PricewaterhouseCoopers (2000b) estimated the provincial economic impact of downhill skiing in the Rocky Mountains. The ski industry in this area resulted in an estimated \$399 million in economic benefits to the province, representing 10,400 full-time equivalent jobs. In Canada, economic impact analyses have focused on skiing for many years, with published research reaching back as far 1985 (Murphy, 1989). They have established that the ski industry generally makes large contributions to surrounding communities. Similarly, commercial heli- and snowcat skiing have also been shown to have substantial economic impacts. Within British Columbia, commercial backcountry ski operations had an estimated total economic impact of \$103 million in 2001 (Brent Harley and Associates, Western Management Consultants, and Williams, 2002).

On a lesser scale of commercialization, mountain biking has a substantial economic impact in the Sea to Sky corridor of British Columbia. Visitors to this region, which included North Vancouver, West Vancouver, Squamish and Whistler, spent an estimated \$10.3 million during 2006, not including expenditures made at the commercially-operated Whistler Bike Park. These expenditures translated into an estimated 194.8 jobs in this region. This substantial economic impact reflects the expensive nature of this activity, with exceptionally high expenditures on gear..

Table 2-3 – Summary of economic impact analyses for specific recreation tourism segments

Specific Recreation Tourism Segments (Single Activity)									
Scope	Scale	Author / Organization	Date	Location	Non-Local Expend. ^a	Industry Output	Employment	GDP	Income
River recreation ^c	Region	USDA Forest Service (Cordell et al.)	1990	Upper Delaware / Delaware Water Gap / New Rivers, USA	-	\$13.35 M / \$6.93 M / \$2.57 M	291.9 / 156.4 / 59.9	-	\$5.58 M / \$3.24 M / \$1.22 M
Whitewater recreation ^d	Region	Oregon State University (Johnson and Moore)	1993	Klamath / Jackson Counties, OR, USA	-	\$653,900	21	-	\$327,100
Snowmobiling ^e	State	Michigan State University (Stynes et al.)	1998	MI, USA	\$40 M	\$63 M	1,500	-	\$36 M
Downhill skiing	Province	Pricewaterhouse-Coopers	2000	Rocky Mountains, AB	-	\$399 M	10,400	-	-
Snowcat and Heli-Skiing	Province	Brent Hartley and Associates, et al.	2002	BC	-	\$103 M	2,459	-	-
Recreational boating	National	Goss Gilroy Inc	2003	Canada	-	\$11.5 B	110,000	\$7.1 B	-
Rock climbing	Region	University of Tennessee (Sims et al.)	2004	Obed River, Morgan County, TN	\$45,000	-	-	-	-
Mountain biking	Region	Western Canada Mountain Bike Tourism Association	2006	North Vancouver / Squamish / Whistler, BC	\$10.32 M	\$20.43 M	194.8	\$9.33 M	\$6.35 M

^a All figures presented in current dollars at time of study, unless otherwise stated.

^b Measured in US 1986 dollars.

^c Measured in US 1982 dollars. Used conservative estimate from the three models presented, with the moderate estimate of visitation.

^d Measured in US 1997 dollars.

Researchers have also investigated the regional economic impacts of whitewater rafting. In response to a perceived growth in river recreation, Cordell, Bergstrom, Ashley, and Karish (1990) assessed the economic effects of river recreation on three regions in north-eastern United States. This study included both guided and unguided recreational river use. The results indicated that visitor spending stimulated considerable economic activity in the local areas surrounding these rivers, with total economic impacts in 1986 ranging from \$US2.57 million in the New River Gorge region of Virginia and West Virginia, to \$US13.35 million in the Upper Delaware region of Pennsylvania and New York. Johnson and Moore (1993) also investigated river recreation at the regional level. In their study, whitewater recreation resulted in a local economic impact of \$653,900 on the Klamath and Jackson counties in Oregon, USA.

2.5.2 Economic Impacts of Rock-climbing

While economic impact analyses are used frequently in the assessment of the economic contributions attributed to an array of outdoor recreational activities and facilities, only recently has rock climbing been studied for its economic contributions to a region. This research has been limited to Red River Gorge, Kentucky and the Obed Wild and Scenic River (OWSR), Tennessee in the United States (personal communication, Tierney, April 2004)². Only the results from the research conducted at OWSR have been published. Sims, Hodges and Scruggs (2004) found that rock-climbing visitors to OWSR had a direct economic impact

² Shawn Tierney was the Access and Acquisitions Director of the Access Fund of United States in 2004.

of US\$45,000 on Morgan County, TN, and US\$120,000 on the state of Tennessee. No similar studies have been identified in Canada.

While variations in scale and regional market differences confound direct comparisons, general comparisons with other types of outdoor recreation suggest that the economic impacts generated by rock climbing tourism are less than a number of other recreation types. The greatest economic impacts are typically generated by highly commercialized activities. These activities generate local economic activity through their development and operations expenditures, in addition to visitor expenditures. In contrast, rock climbing and other outdoor recreational opportunities often are provided with little or no developmental or operational costs; all of the economic benefits associated with these activities are largely due to visitor expenditures. Based on a review of economic impact studies, activities that involve increased commercialization or infrastructure management, such as park settings, result in greater economic impacts on host communities. As such, while public outdoor recreation activities such as rock climbing can produce significant economic benefits for an area, these impacts can be increased through further commercialization of such activities.

2.6 Estimating Visitation in Wilderness Areas

The estimation of visitation is a fundamental component of effective recreation and tourism management, and a necessary component of any tourism-focused economic impact analysis. While many sources of visitation data are commonly available to managers, estimates differ greatly in their quality and accuracy. In many tourism and commercial recreation situations, accurate

visitation data are readily available through such methods as sales records or gate counts. However, estimating visitation to public-accessed wilderness areas is often particularly challenging.

2.6.1 Need for Quantifying Visitation

Despite the challenge involved with quantifying visitation, the need for comprehensive and precise measurements of human use in the management of wilderness areas has been repeatedly identified (Hollenhorst, Whitman and Ewert, 1992; Cope et al., 1999; Eagles, McLean and Stabler, 2000; Watson et al., 2000). Beyond their application in economic impact assessments of tourism, data on public use of wilderness areas are critical for many management activities, including site maintenance, provision of visitor services, ensuring a satisfactory visitor experience and protection of natural resources (Eagles, McLean and Stabler, 2000). Park managers frequently use visitor counts as indicators of specific problems or objectives within protected areas. The management of issues, such as crowding and user conflicts, often rely on an understanding of visitor use. As such, visitor data can be used to monitor adherence to use limitations, minimize issues such as user conflicts and crowding, ensure a satisfactory visitor experience, or to justify allocations of infrastructure and services (Muhar et al, 2002).

Similarly, local communities and businesses also have a keen interest in levels of use (Hornback and Eagles, 1999). An understanding of visitation can aid local decision-making by characterizing demand for recreation tourism, evaluating visitor carrying capacity of wilderness, as well as contributing to

analyses of economic impacts related to recreation tourism. This may, in turn, provide justification for the allocation of funding and resources towards the provision of more wilderness recreation opportunities (Cope et al. 1999).

2.6.2 Methods Available for Estimating Visitation

A wide array of techniques for collecting and estimating visitation data are available. These methods differ in cost, equipment requirements, labour requirements, reliability, accuracy, and the type of information that can be collected. The methods can be generally categorized into interview methods, direct observations, counting devices, and inferred counts (Cessford et al., 2002; Muhar et al. 2002). Of these methods, automatic counting equipment and manual observation are used most frequently (Cope et al., 1999).

2.6.2.1 Interviews

Interview methods are those techniques that rely on self-reported estimates of recreation participation, such as visitor surveys. Interview methods are powerful in their ability to collect multiple types of information, including routes, distribution, group size, visitor characteristics, and behaviour (Muhar et al., 2002). While powerful in their ability to describe visitor characteristics, visitor surveys provide mainly qualitative information and need to be combined with quantitative data from other counting methods in order to provide an accurate picture of visitor use.

Estimates of participation derived from interviews need to be considered with caution as interviews are susceptible to response error. Due to their

reliance on the recollection of respondents, the amount of response error tends to increase with the difficulty of the recall-task. Response error will increase with increasing periods of time over which respondents have to estimate their participation (e.g. day, month, year), and with the amount of time that has passed between the time period of interest and the actual interview (Chase and Harada, 1984). Thus, to achieve the most accurate estimates of visitation, surveys are best conducted near the time of visit, with questions ideally focusing on shorter time-periods.

2.6.2.2 Direct Observation

Direct observation techniques rely either on human observations or on camera recordings taken on-site to collect visitor data. Direct observations are a more objective, quantitative approach to data collection than interview methods, as they do not rely on subjective self-reporting of individuals (Keirle and Walsh, 1999). These methods are often a good alternative in situations where available technologies are cost-prohibitive, reliability of counting devices is a concern, or site characteristics make other methods unfeasible.

Direct observation using field observers requires a statistically sound sampling approach in which an observer (or multiple observers) counts the number of visitors to a site for a specified amount of time over a pre-determined sampling schedule. Direct observations using field observers are generally accurate, flexible and mobile, and can include descriptive data. However, they can also be costly in staff time and frequently conducted unsystematically (Cessford et al., 2002). The costs can be offset somewhat if volunteer labour is

available, or if personnel are able to combine observations with other tasks in the vicinity of observation points (Watson et al., 2000). This technique alone is difficult to use in large wilderness and backcountry areas where use is widely dispersed (Hollenhorst et al., 1992). While various techniques use direct field observations, most of these methods are best for smaller sites, where visitors can be accurately counted instantaneously or over a relatively short time-period in a relatively concentrated area (Hollenhorst et al., 1992). Variations include external site counts (entrance/exit counts), internal stationary counts and internal roaming counts (Watson et al., 2000).

One system of direct observation commonly used in smaller sites is instant-count sampling, in which observers count visitors at randomly selected times throughout the day. These counts are assumed to be “instantaneous”, with counts of visitors taking very little time, and that visitors are likely to stay on the site long enough to be counted in that brief time (Schreuder, Tyre and James, 1975, Tyre and Siderelis, 1979). This method can only be applied when the site is small enough that a count of visitors takes little time. If a site is amenable to such a counting system, however, this method is generally inexpensive, and minimizes interactions between observers and users (Schreuder, Tyre and James, 1975).

An alternative type of direct observation involves the filming of visitors using on-site cameras and subsequent counts by analysts. As with human observations, camera recordings are typically accurate, flexible and can include descriptive data (Cessford et al., 2002). Unlike human observation, this method

also gives researchers freedom from strict on-site sampling schedules, and has greater accuracy in times of high site use (Arnberger, Haider and Brandenburg, 2005). In contrast, the disadvantages of video surveillance include high costs and vulnerability of equipment, as well as functionality issues, including the considerable staff time involved with the analysis, high power requirements, and data storage (Ivy, 2002). Because of these issues, this type of system is not in widespread use.

2.6.2.3 On-site Counters

On-site counters are now one of the most common approaches to estimating use in wilderness areas and recreation sites. On-site counters are devices that have the capacity to record visitor presence and store these counts at sites (Cessford et al., 2002). As counting of persons in the field can be very labour-intensive, automatic counting devices are often applied in order to reduce costs (Muhar et al., 2002). In general, the main shortcomings of on-site counters are that the devices are often expensive, have mixed reliability, and may need regular servicing (Cope et al., 1999). Calibration and site-specific set-up of counting devices can be challenging (Muhar et al., 2002). While accuracy is generally good with most counters, measurement error is such that visitor estimates are best for monthly and daily estimates, but often questionable for hourly counts (Muhar et al., 2002). On-site counters are also somewhat limited in the physical settings in which they can be used. They are difficult to use in areas with dense network of paths or in areas of unconstrained use (van der Zande et al., 1985)

Counters rely on many different technologies, including mechanical balers, electro-mechanical units, photoelectric units, acoustic sensors, and pressure-sensitive pads, each with particular strengths and weaknesses (Cope et al., 1999). The first widely used automatic counters were mechanical and electro-mechanical counters. They were relatively inexpensive but produced low quality data. Mechanical and electro-mechanical counters generally have poor to moderate accuracy, are less reliable due to mechanical failures, and require regular full inspections and servicing. Alternative styles of counters were designed to operate without any mechanical stages in the recording process to address these problems (Cope et al., 1999).

Photoelectric units, including active and passive infrared counters, are slightly more expensive, but are capable of collecting data with a high level of accuracy if care is taken in installation and calibration, and regular maintenance is performed (Watson et al., 2000). These types of counters produce good estimates of site use, but still have potential for measurement error (Muhar et al., 2002). With infrared counters, wildlife or any other moving object, such as branches blowing in the wind, can trigger false counts. Visitors walking in groups or individuals wearing very dark colours can also be miscounted. Researchers can reduce these errors through careful installation and calibration.

2.6.2.4 Inferred Counts

Researchers will often use secondary or indicative data counts in estimating on-site visitation. These inferred counts come from secondary data sources, such as access permits, ticket sales, mandatory and voluntary

registration records, or from indicative counts, such as vehicle counts, traces of use and accommodation (Cessford et al., 2002). Inferred counts can often be very inexpensive and easy to gather. However, this method requires an understanding of the relationship between the secondary data source and actual visitation (Watson et al., 2000). For example, visitation estimates based on voluntary trail registries require an understanding of the proportion of visitors who register in comparison to the total visitation. Data will not be accurate if registration rates are unknown or only crudely estimated (Watson et al., 2000). Inferred counts require some calibration using more accurate monitoring methods, such as observation or automatic counters (Cessford et al., 2002).

When comparing inferred count techniques, estimates acquired from mandatory registration systems typically are the most accurate. As long as most individuals comply with the registration requirements, the accuracy of visitor counts based on permitting information is usually high (Watson et al., 2000). The accuracy of use estimates acquired from voluntary visitor registration is usually more variable, depending upon the maintenance of the registration station and the adequacy of registration rate estimates.

Indicative estimation techniques typically have highly variable accuracy (Cessford et al., 2002). The accuracy of these estimates depends on the strength of the relationship between actual visitation and one or more predictor variables. Common examples of predictor variables include the number of parked vehicles, weather and amount of litter. Indicative estimations may involve significant costs in the initial research stage as researchers develop the

relationship between visitation and the predictive variable. However, the costs will decline if the resulting predictive relationship is used in subsequent years (Watson et al., 2000).

2.6.3 Choosing a Methodology

The selection of monitoring methodologies depends on the nature of information required, physical characteristics of the area of interest, and resources available (Cope et al. 1999). The objective of the monitoring program will dictate the the necessary type of measure and required accuracy. For example, an economic impact assessment typically requires only an estimate of the total number of visits, whereas an assessment of the relationship of crowding with visitor satisfaction may require a measure of visitor density (Muhar et al., 2002).

The selection and design of a monitoring methodology are also influenced by the physical characteristics of the site of interest. The type of system used to count visitors will change depending on the size of the area, the types of recreationists who use the site, the number of access points, particular attractions within the site, and physical constraints that may hinder the functionality of particular counting methods (Cope et al., 1999). Different site characteristics, in combination with management objectives and resources, will demand the utilization of different monitoring tools (Cessford et al., 2002). For example, a recreational area characterized by a wide network of trails with multiple access points would be difficult to monitor using automatic counters exclusively. Rather, an area such as this might require an advanced system of

visitor flow modeling, using information from counters at major access points and descriptive information collected by cameras or field observers at major trail nodes (Hinterberger, Arnberger and Muhar, 2002).

While many monitoring methods are available, the choice of methodology will ultimately depend on the availability of resources. The constraints of allocating limited hardware and staffing resources must be balanced with the desired outcomes to achieve the most efficient methodology (Cope et al. 1999). In some cases, limited resources may result in trade-offs with data accuracy. For this reason, it is crucial for the success of a monitoring system that the required accuracy level is clearly defined. Reasonable accuracy would be defined as the level which is good enough to detect changes that are significant for making management decisions (Muhar et al., 2002).

As monitoring techniques have their own individual advantages and disadvantages, often a monitoring framework that utilizes a combination of monitoring techniques will compensate for the disadvantages of a single method (Muhar et al., 2002). In particular, a combined monitoring scheme is often valuable for calibrating data (i.e., comparing one method with another method). For example, counts from direct observation or automatic counters can be combined with vehicle counts as a means of developing a cost-effective predictor of visitation. Once a correlation between the two counting systems has been established, researchers may be able to use the predictor variable to estimate use in subsequent years.

CHAPTER THREE: METHODS

This document is based on empirical research conducted during and immediately following the 2004 rock-climbing season. This study used three methods of data collection:

1. On-site instant counts of rock climbers;
2. An intercept survey of rock climbers;
3. An Internet survey of rock climbers.

Instant counts (Schreuder, Tyre and James, 1975) at the sites and the administration of intercept surveys were conducted between May 23 and September 26, 2004 at the 16 main climbing sites in the study area. The Internet survey was distributed following the climbing season in January 2005. The present document draws upon results from all three components. The current chapter provides a basic overview of these three data collection methods, as well as of the methods of analysis used to estimate the total economic impact associated with rock climbing in Squamish.

3.1 Site Monitoring

For this economic analysis of rock climbing in Squamish, a combination of techniques were used to estimate the number of visits to the various climbing sites in the study area. With the objective of estimating the economic impact of

rock climbing on the local community, it was very important that the monitoring system was capable of estimating total visitation to the region (Kelly et al, 2006).

An economic impact assessment also requires an understanding of the spending profiles of different visitor segments. Thus, the monitoring system needed to be able to estimate the total number of visitors, and collect visitor characteristics that could be used in segmenting the population. Consequently, a combined approach of visitor interviews in coordination with a counting system was employed.

The counting system faced several other constraints. The study area encompassed many climbing sites, most of which are characterized by multiple access points and complex trail networks. Furthermore, the study had only limited financial resources as the research was supported by a non-profit, climbing advocacy group. With such limitations, an extensive system of automatic counters and intercept counts was not feasible. Rather, a site monitoring system was developed that used a combination of direct observational counting and interviews. This mix of methods was chosen due to its flexibility and cost-effectiveness.

Our approach of estimation used direct observational counting at the rock faces, in combination with on-site interviews to estimate the number of visitors per day. Following a pre-determined random sampling schedule, observers conducted near-instantaneous counts at each site. These site-counts estimated the number of climbers present at a given location at one particular time. Therefore, these estimates represent only a fraction of the total daily visitation to

any given site. Recognizing that the site counts likely underestimate the actual number of visitors during the day, the average patterns of daily use has been used as a correction factor to adjust for visits throughout the day. A similar approach was used by Fulton and Anderson (2003) to estimate visitation to Waterfowl Protection Areas in Minnesota.

This system has some similarities with the augmented instant-count method of estimating use, as described by Schreuder et al. (1975), primarily in the system of data collection and the assumptions. In the instant-count method, on-site counts are assumed to be near-instantaneous and representative of all the visitors on the site at a particular moment. The number of recreation visits is estimated using repeated instant counts of visitors on site, and concurrent (or point-sample) interviews with visitors asking them to predict their length of stay. The total estimator as described by Schreuder et al. (1975) is:

Equation 1

$$\hat{V} = \left(L_0 / n \right) \times \sum_{j=1}^n \sum_{i=1}^{c_j} 1 / u_{ij}$$

where \hat{V} is the number of visits, L_0 is the length of the season in hours, n is the number of samples taken, c_j is the count of people in j^{th} sample ($j = 1, \dots, n$), and u_{ij} is the length of stay reported by the i^{th} person at point j .

As in the augmented instant-count system developed by Schreuder et al. (1975), the method in this study used a combination of random near-instant counts and visitor estimates of length of stay. Following the assumptions of

Scheuder et al. (1975), the counts were considered to be representations of the number of people at a site at a specific time. Likewise, the study's method required estimates on visitors' length of stay to calculate total visitation. However, the manner in which this information was collected and subsequently utilized was different.

Unlike the augmented instant-count method, site counts and intercept surveys were conducted separately. Counted individuals were not paired directly with an estimate of length of stay, as in the instant-count method. The process of interviewing each counted individual, as suggested by Schreuder et al. (1975), was too onerous given the number of visitors and the number of surveyors available to conduct this study. Rather, this study separated these processes.

This method utilized visitors' estimates of length and timing of stay as a way of adjusting instant site counts to reflect visitation throughout the day. Recognizing that site counts are based on a single point in time during the use day, a mean of these counts would tend to underestimate the actual number of visitors during the day (Schreuder et al., 1975).

This method used the premise that daily visitation patterns can be described as a proportion of the number of visitors who reported being on site at different times throughout the course of the day (e.g. 18% of respondents reported climbing at 9 AM during weekdays) (see Section 4.5). Descriptions of timing and duration of visits were used to develop an average pattern of daily use. Following a similar approach as Fulton and Anderson (2003), site counts have been then adjusted using daily use patterns to reflect visitation for the entire

day. The influence of day of week, month, weather and site were examined to reduce the amount of error in extrapolating site visitation. Once individual site-counts were adjusted, these estimates were extrapolated to the entire season, with segmentations accounting for differences in weekend days and mid-week days.

Although other systems for counting may be preferred, this system for estimating visitation was used due to its low cost and minimal requirements for labour. With very few available resources, both technological and human, this study required a very minimalist approach. Such a system allowed for counts to be conducted by one individual.

To ensure adequate representation, sampling days were strategically allocated over weekdays, weekends and holidays of each month. During the day, data collection was undertaken at one of two time blocks: a morning/afternoon block and an afternoon/evening block – each shift being approximately 6 hours in length. The start and finish times of each individual site count were recorded. On average, a count at one specific site took about 45 minutes, though the count times varied significantly by site size.

Photosensitive trail counters were considered and tested for use in this study as a means of calibrating observational counts (Cessford et al., 2002). While it was not feasible to monitor all rock climbing sites of interest, trail counters were installed at the Grand Wall area of the Stawamus Chief, which experiences both high visitor-use and has concentrated visitor access.

Unfortunately, the counters, which were donated, were dated and no longer fully functional. Therefore this method of counting needed to be abandoned.

The influences of several factors were considered when examining site monitoring data in order to identify the most accurate way to estimate total visitation. Throughout the analysis, site counts were segmented according to site, month, and day type (i.e., weekend, mid-week and holiday) and significant differences identified. This provided a better understanding of the influencing factors on site visitation, and allowed for more precise estimates of visitation.

3.2 Intercept and Internet Surveys

An economic impact analysis of rock climbing also required the characterization of different visitor segments and their associated expenditure profiles. Expenditure profiles were generated using data from two surveys: an intercept survey that collected information specific to the respondent's immediate trip, such as trip expenditures; and a follow-up, Internet survey with the capacity to explore the respondent's climbing activities throughout the season. While much of the necessary data were obtainable using the intercept survey, some of the visitor characteristics, such as infrequent expenditures and estimates of total visitation, were seasonal in nature, making the Internet survey necessary. Furthermore, an Internet survey provided an opportunity to explore other facets of visitation that would have made the intercept survey too long.

An investigation specifically on the supply side of climbing-based tourism was considered as part of the economic impact analysis. Such a process would

have involved contacting and interviewing commercial rock climbing operators from Squamish to identify their expenditures, revenues and employment. An examination of commercial rock climbing operators would have provided a means of substantiating some of the results of the visitor surveys, while providing another window into the economic impacts of rock climbing. While such a process would have been a valuable supplement to this research, interviews were not possible due to time and budgetary constraints.

Intercept surveys were conducted with a random selection of climbers following the site counts. The researcher intercepted rock climbers encountered at each site, gave a brief introduction, and then asked if they were willing to participate in the survey. Only one individual per travelling party was interviewed. The surveys were conducted orally and designed to take about ten minutes. The primary focus was on gathering details on the climber's current trip, daily expenditures and general use patterns. Two variations of the intercept surveys were developed. One version was designed for Squamish residents and the other for visitors to the area (see Appendix A: Intercept Survey Questionnaire). Respondents were also asked if they would be willing to participate in a full questionnaire and, if so, to provide their contact information.

The follow-up questionnaire was developed as an Internet survey (see Appendix B: Internet Survey). It was administered to those intercept respondents who supplied their e-mail address, as well as to individuals on the CASBC

newsletter mail-list.³ The Internet survey also consisted of two slightly different versions, one for residents of Squamish and the other for visitors. Recruits from the intercept survey were emailed a link, and unique passwords. Individuals on the CASBC mail-list were notified through an electronic newsletter, and assigned a universal identification and password. The Internet survey asked for more details on rock climbers' experiences and activities in the Squamish area, including individual expenditures, socio-demographic characteristics, and impressions of Squamish as a climbing destination.

Data from the intercept and Internet surveys were analysed using the Statistical Package for Social Science (SPSS). Descriptive statistics were calculated for all questions and further statistical tests were performed where appropriate⁴. All frequencies shown throughout the report are the valid percentage of respondents and do not include missing answers. Comparisons between categorical groups used the Pearson's chi-square test. Parametric analyses included independent samples t-tests (for comparisons between two groups) and the one-way analysis of variance (or ANOVA) procedure (for comparisons between three or more groups).

Though calculated automatically for independent samples t-tests, the Levene test for equality of variance comprised an additional step in ANOVAs. When the results of this test suggested the assumption of equal variance was

³ An Internet survey was chosen as the means of conducting further data collection as 82% of the intercept respondents who were willing to complete a full questionnaire preferred this to a mail version.

⁴ Please note that while non-responses were removed for purpose of analysis, at no time did this compromise the resultant sample size.

questionable, the Brown-Forsythe F-test was used instead of the F-ratio. Since a statistically significant F-ratio only indicates that the population means under investigation are likely significantly different, further tests were required to determine the groups accounting for these differences precisely. The Bonferroni procedure was used for this purpose when equal variances were assumed and Tamhane's T2 was used when the assumption of equal variances was violated. In each case, a significance level of $p < 0.05$ was applied.

In order to characterize rock climbers, the two survey data sets were analysed comparatively for differences between residents, day visitors and overnight visitors. To accurately describe the rock climbing population, respondents were asked during the intercept survey to identify themselves as a seasonal or permanent resident of Squamish, or as a day or overnight visitor to the area. In this study, only 5.6% of the intercept respondents described themselves as seasonal residents, which differed significantly from permanent residents in 10 of 50 comparisons⁵. Seasonal residents were typically grouped with the permanent residents for resident/visitor comparisons, except when a significant difference was noted, and a meaningful comparison could be made between seasonal and full residents. The number of day visitors and overnight visitors were sufficiently large to treat them as separate groups.

In the Internet survey, one fundamental comparison was between visitors and residents. As this survey examined respondents' activities throughout the

⁵ The 10 items where differences were identified between seasonal and permanent residents included: Length of residency; Ratings for Water Recreation, Land Recreation, and Size as Motivations to Live in Squamish; Days/Year climbing in Squamish; Days/Year Climbing Indoors; Participation in Traditional Climbing; Participation in Mountaineering; Age; Income.

2004 climbing season, many respondents could not identify themselves clearly as a day visitor or an overnight visitor. Rather, many rock climbing visitors spent time in Squamish as either one of the visitor types at different times of the year. Similar to the intercept survey, only a small percentage (4.3%) of the Internet-survey respondents identified themselves as seasonal residents. Again, these individuals were grouped with the permanent residents, except in those cases where the seasonal and permanent residents differed significantly.

3.2.1 Statistical Significance

Statistical inference depends on the use of a random sample to estimate the characteristics of a population. The study design ensured that all site users had an equal chance of being counted and interviewed, by varying the timing and location of both the intercept surveys and monitoring counts. As a result, the responses of the 393 individuals who participated in the intercept survey are likely a good representation of the greater population of rock climbers.

Slight biases may have been introduced due to some challenges during the intercept survey. First, individuals who were involved in a course or a guided trip were often unavailable or unwilling to participate in the intercept survey as they were engaged in lessons at the time of the random sampling. This situation arose several times over the field season. Therefore, this group may be under-represented in the data. Second, visitors who spoke little or no English were difficult to survey. Due to this communication barrier, it is safe to assume that these respondents likely originated from further away and may have spent more to visit the site as well as in the region. This second bias was encountered

during three or four intercepts only. In both cases, the result was likely an underestimation of expenditures by some visitors, although these conditions were rare and should not have affected the sample excessively.

Internet surveys were sent to two groups: individuals who completed the intercept survey, and all recipients of the CASBC newsletter. CASBC newsletter recruits were included in the full survey to provide an opportunity to increase the sample size. These newsletters are distributed via email to over 700 individuals, with 30 to 40% being CASBC members. In order to draw statistical conclusions regarding the population of rock climbers in Squamish using CASBC newsletter recipients, the CASBC newsletter sample needed to be compared to the sample of intercepted respondents for similarity.

Comparisons between these two groups resulted in only 16 significant differences out of a total of 150 variables.⁶ Throughout the report, only these significant differences are mentioned; otherwise the two groups are assumed to be equally representative of the rock climbing community throughout the study.

3.3 Economic Impact Assessment

3.3.1 Estimation of Direct Impacts of Visitor Expenditures

The estimation of the direct impacts attributable to visiting climbers was achieved by calculating the total expenditures of rock climbers in the Squamish

⁶ Significant differences were identified between intercept respondents and CASBC newsletter recruits for 16 items. Newsletter recruits gave lower responses to days climbing at Murrin Park, Chief boulders, Rogues Gallery & Chek; had less interest in Sport climbing & Bouldering; had more memberships in CASBC & BCMC; gave higher ratings to the importance of "dogs off-leash" & support of "mandatory dog-leashes"; made fewer visitor purchase of gear & guides in Squamish; were more likely to return to Squamish; and had higher income, age and age categories.

and by the subsequent subtraction of losses due to regional economic “leakage”. As different segments of visitors had unique expenditure patterns, this analysis was completed according to the spending characteristics of two segments: day visitors and overnight visitors. Total expenditures were calculated based on the number of visitor use days for each visitor segment multiplied by the segment’s spending profile.

According to Stynes (1999), in a segmented analysis, total spending was estimated using the following formula:

Equation 2

$$S_j = N \times \sum_{i=1}^m M_i \times s_{ij}$$

where S_j is the total spending within the designated region in spending category j ($j = 1, \dots, J$), N is the total number of visitors, m is the number of segments, M_i is segment i 's share of total visits ($i = 1, \dots, m$), and s_{ij} is the average expenditures of a member of segment i on spending category j . The s_{ij} vector is also called the expenditure pattern or “spending profile” for the segment.

The final calculation of direct economic impact of visitor spending is the conversion of actual expenditures in the community to money that actually stays in the community. This conversion involves the application of multipliers that represent income lost to the region due to external production and provincial taxations. Leakage was calculated using BC Stats estimates of tax rates and production losses (see Horne, 2004).

3.3.2 Estimation of Economic Impacts of Visitor Expenditures

The total economic impact of climbing-related tourism in Squamish on the provincial economy was calculated by adding the direct impacts associated with visitor expenditures with the resulting indirect impacts. Indirect impacts were estimated using output multipliers produced by BC Stats (Horne, 2003). Multipliers produced for the province of BC were used as none were available specifically for the region of Squamish. As only provincial-scale multipliers were available, induced impacts had to be omitted. They were deemed inappropriate to use when the sample includes BC residents (personal communication, Horne, September 2005)⁷.

For most tourist expenditure categories, the indirect impacts were calculated simply by applying the appropriate sector multipliers. In the case of retail goods, an additional step was necessary. When tourists purchase goods, not all of the money benefits domestic industries that produce goods nor does it all go to the retail trade sector. Instead, retail expenditures are split among several sectors, including the retail industry, wholesale industry, the producers and moneys lost to front-end taxes. The percentage of retail spending that goes into each sector has been estimated for the province of British Columbia by Horne (2003) (see Table 3-1). As most production occurs outside the region of interest, these costs are lost and not included in the total economic impact. After retail expenditures were partitioned into retail, wholesale and production sectors,

⁷ Dr. Garry Horne worked at the BC Ministry of Management Services, and authored *British Columbia Provincial Economic Multipliers and How to Use Them (2003)* and *British Columbia's Heartland At the Dawn of the 21st Century 2001 Economic Dependencies and Impact Ratios for 63 Local Areas (2004)*

economic multipliers for indirect impacts are then applied. The sum of the direct impacts and the indirect impacts were considered to the total economic impact of rock climbing in the community of Squamish.

Table 3-1 – Tourist spending on goods: Where the money goes

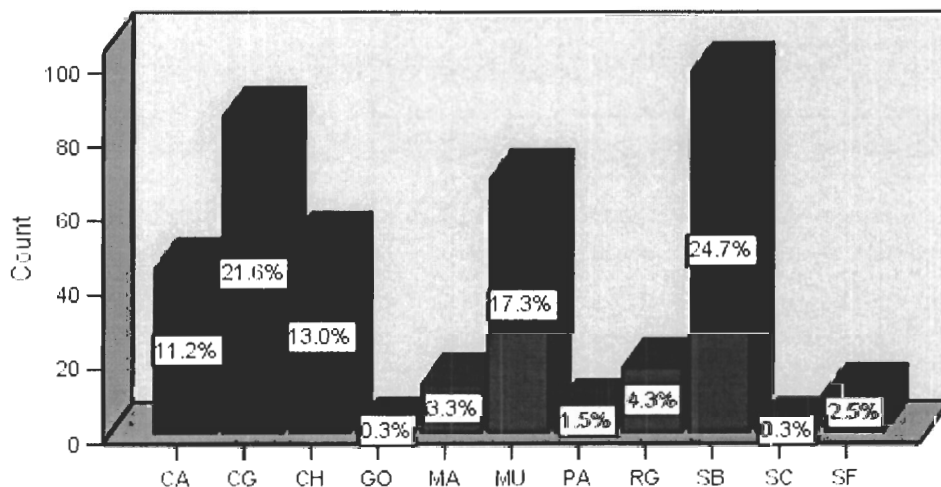
Sector	Percentage
Provincial Commodity Taxes	13.2
Federal GST	5.3
Other Federal Taxes	6.5
Retail Margin	28.4
Wholesale Margin	8.2
Production	38.4
Total	100.0

Adapted from Horne, 2003

CHAPTER FOUR: RESULTS

4.1 Summary of Study Participation

A total of 393 intercept surveys were completed by climbers at 11 sites over the course of the season (see Figure 4-1). Of these, 24.7% (n=97) were conducted at the Smoke Bluffs, followed by the Grand Wall area of the Chief with 21.6% (n=85). Some sites had such low use that few to no intercept surveys were administered over the season. Only one intercept survey was conducted at Seal Cove over the season. No surveys were conducted at Rehabilitation Wall, The Gym, Sports Temple, Comic Rocks, and Swift Creek Crag. Similarly, only one intercept survey was conducted at the Gorge, although this was because climbers are generally inaccessible except at the parking lot.



(See Appendix C: Site Name Abbreviations for explanation of site codes)

Figure 4-1 – Number of intercept surveys administered at each climbing site

Of the 393 intercept respondents, 340 provided their email addresses to participate in the full questionnaire. In addition, 47 individuals were intercepted who did not want to participate in the intercept survey, but were interested in completing the full survey. Contact information for the full survey was collected from all 387 individuals, though only 320 were willing to provide their email address. In contrast, only 266 were willing to provide their mailing address. Reasons for not providing an email address included concerns over “junk” mail and spam, or infrequent access to the Internet. The follow-up questionnaire was conducted as an Internet survey, as the majority of respondents preferred email communication over regular mail. A mail version was not distributed due to the cost.

In addition to the recruits from the intercept survey, another 245 individuals were recruited to participate in the Internet survey through the CASBC electronic newsletter. In total, the Internet survey had 376 respondents, of whom 34.5% (n=129) were recruited during the intercept survey, and 65.5% (n=245) were invited to participate via the broadcast newsletter (see Figure 4-2).

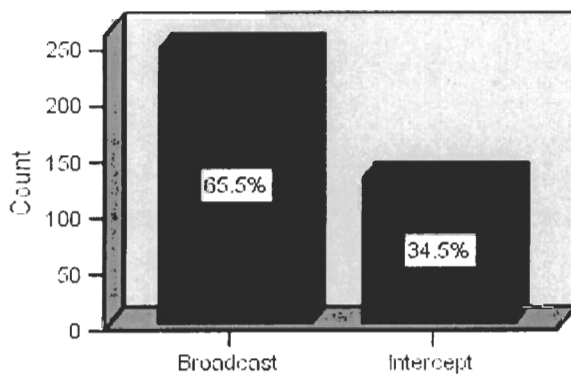


Figure 4-2 - Number of respondents by recruitment method

Of the original 320 intercept respondents who agreed to participate in an Internet version of the follow-up survey, only 129 (40.3%) took part. While similar response rates have been observed in other surveys conducted under similar circumstances, this study's capture rate may have been affected by the length of time between the intercept survey and the Internet survey. The intercept survey was completed in September 2004 while the Internet survey was initiated in January 2005. During this period, contact information or interest level might have changed. Approximately 70 addresses were returned as undeliverable. This may have occurred for any one of the following reasons: the respondent changed her/his e-mail address in the meantime, an inaccurate address was provided or transcribed during the interview, or the recipient had an SPAM filter set at a high level of protection preventing the e-mail from being delivered. This large number of undeliverable emails poses a concern and challenge for future Internet surveys.

4.2 Demographics of Study Participants

Basic demographics of the participants were collected during both the intercept and Internet surveys in order to test for non-response biases. The demographic characteristics reported in this document are from the intercept sample. Only in cases where significant differences were noted between the two survey methods were demographics from the Internet survey highlighted.

Overall, the majority of rock climbers were young males with lower incomes. Of the 393 intercept survey respondents, 27% (n=107) were female

and 73% (n=286) were male. This distribution was the same regardless if the climber was a resident, day visitor or overnight visitor.

While the age of respondents varied from as young as 18 to greater than 60, the majority fell within the range of 20-29 years of age, with 52% (n=203) of the sample in this category (see Figure 4-3). While none of the respondents were younger than 18, several climbing parties clearly included younger children.

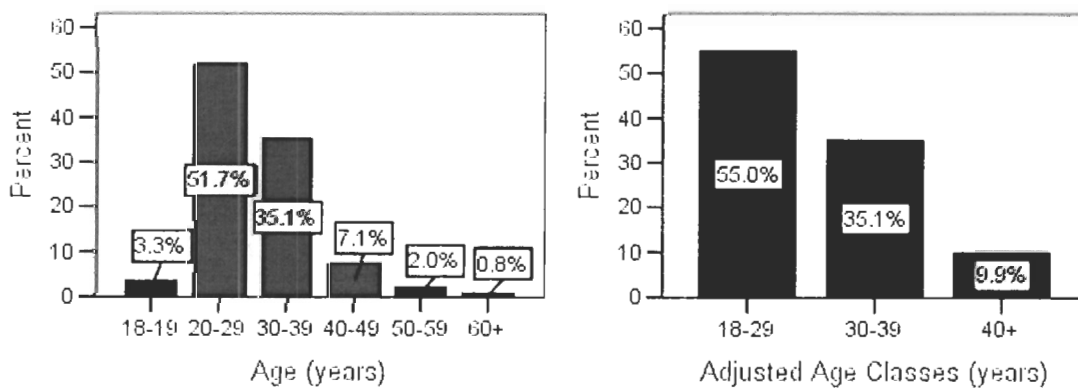


Figure 4-3 - Intercept respondents in original age categories (left) and consolidated age categories (right)

When segmented by visitor type, the age distribution was significantly different amongst residents, day visitors and overnight visitors ($\chi^2=9.78$, $df=4$, $p=0.044$). Overnight visitors tended to be proportionally younger than the other visitor groups, with 63% (n=107) of this group being 10-29 years old, compared to day visitors at 46% (n=71) and residents at 55% (n=38) (see Figure 4-4).

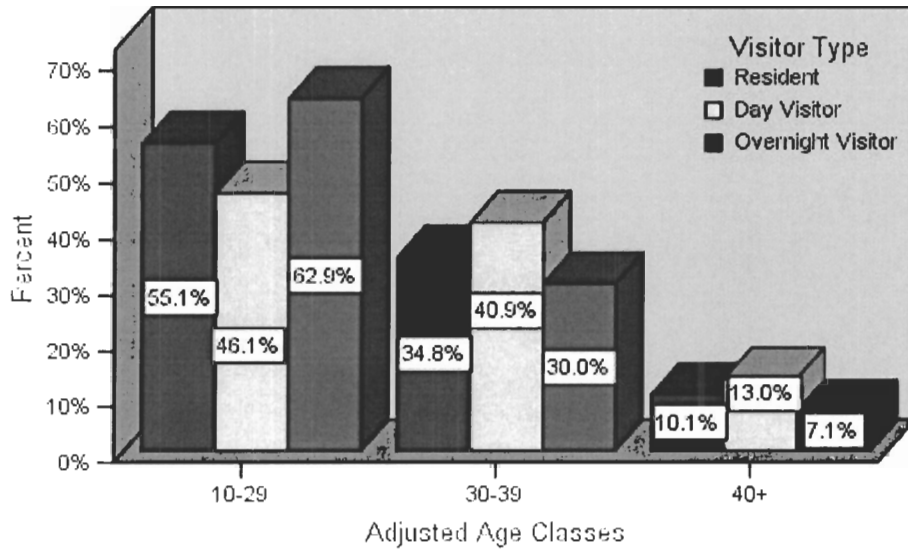


Figure 4-4 – Intercept respondents in each age class by visitor type

Interestingly, respondents of the Internet survey tended to be older than those of the intercept survey. Forty-one percent (n=151) of the Internet respondents were within the range of 30-39 years old compared to 35% (n=138) from the intercept. This upward bias of the Internet survey is likely due to the newsletter recruits who, with a mean age of 34.6 years old, were significantly older than the intercept recruits ($F=13.03$, $df=1$, $p=0.000$).

The distribution of income levels was largely reflective of the age distribution. Of the 390 intercept respondents, 33% (n=129) of the sample reported an annual income of *less than \$20,000*, and another 30% (n=118) reported an annual income of *\$20,000 to \$39,999* (see Figure 4-5). Respondents reported income in all categories including the highest annual category of *greater than \$80,000* (6.9%; n=27).

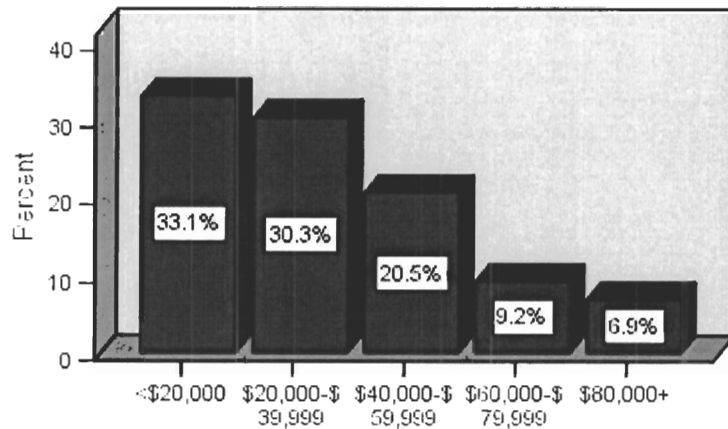


Figure 4-5 – Respondents in each income category

Comparing the incomes of intercept respondents between visitor types, a significant difference in the distributions emerged ($\chi^2=19.724$, $df=8$, $p=0.011$). Residents were more likely to belong to the lower annual income categories (see Figure 4-6). Day visitors had a much more even distribution of incomes, with fewer individuals having incomes of *less than \$20,000*, and more being in the higher income brackets. The distribution of income for overnight visitors was between those of day visitors and residents in all categories. Significant differences in income were also noted between the intercept and Internet respondents.⁸ Again, this discrepancy was likely attributable to the inclusion of CASBC newsletter recruits in the Internet survey, who had higher average incomes than the intercept recruits.

⁸ When the Internet respondents were segmented according to their recruitment type, a significant difference in income distributions was noted ($\chi^2=14.23$, $df=4$, $p=0.007$). Intercept recruits demonstrated a similar distribution of incomes as in the intercept survey results, with 31% ($n=39$) of this segment reporting an income of less than \$20,000, and a generally declining trend with increasing income. Conversely, CASBC newsletter recruits reported higher incomes more frequently, with the highest proportion (26%, $n=62$) having an annual income of between \$40,000 and \$59,999. Equally as many of the newsletter respondents reported having incomes in the higher brackets as in the lower.

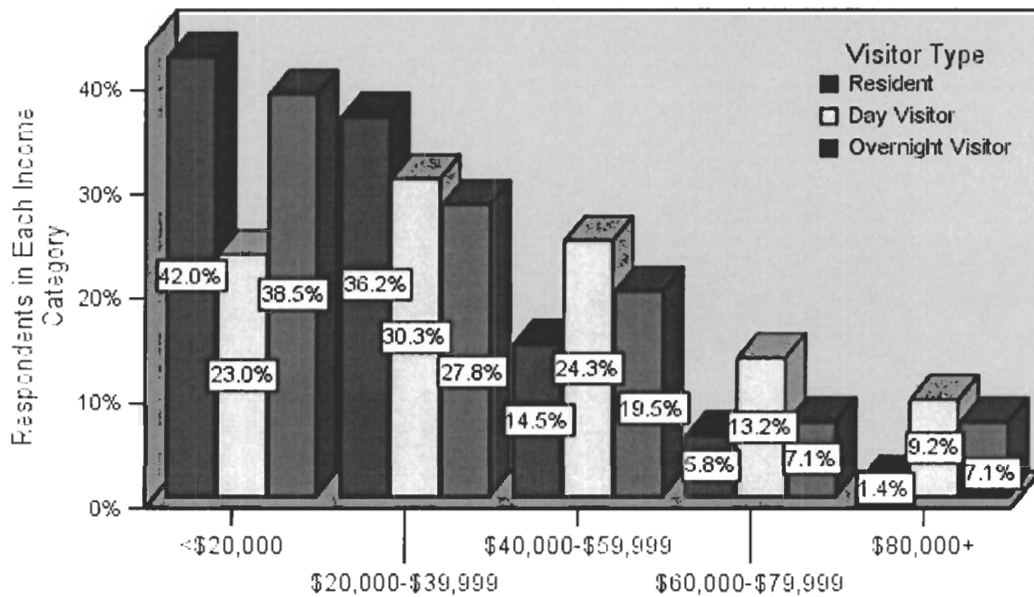


Figure 4-6 – Distribution of annual incomes for intercept respondents by visitor type

4.3 Travel to Squamish Area

Of the 393 intercept survey respondents, a total of 82.4% (n=324) were visitors to Squamish, with 39.2% (n=154) being day visitors and 43.3% (n=170) being overnight visitors. Full time residents of Squamish comprised 12.0% (n=47) of the sample and seasonal residents made up 5.6% (n=22) (see Figure 4-7).

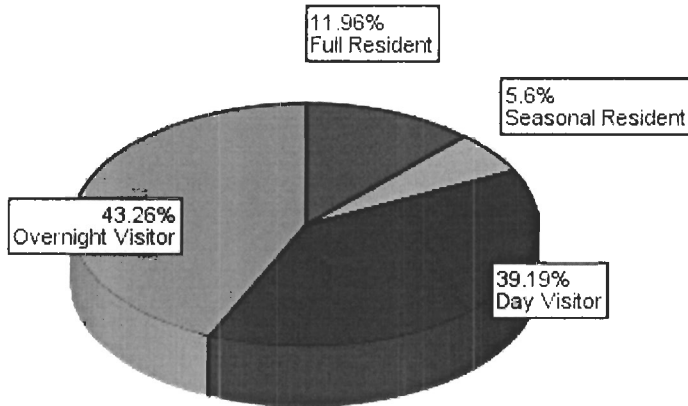


Figure 4-7 – Proportion of visitor types at climbing sites

Of the visitors surveyed, the vast majority claimed that Squamish was their main destination (93.6%, n=278). Only for 4.7% (n=14) replied that Squamish was a stop along a lengthier trip, and only 1.7% (n=5) visited Squamish as an unplanned side trip while in the area. Furthermore, all visitors, regardless of whether they were day visitors, domestic overnight visitors or international (i.e., overseas) overnight visitors, rated rock climbing as the greatest motivation for visiting Squamish (see Figure 4-8)

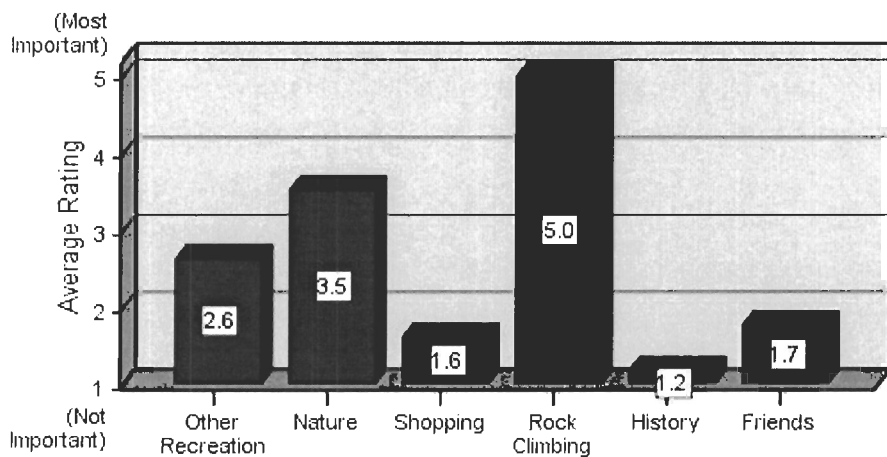
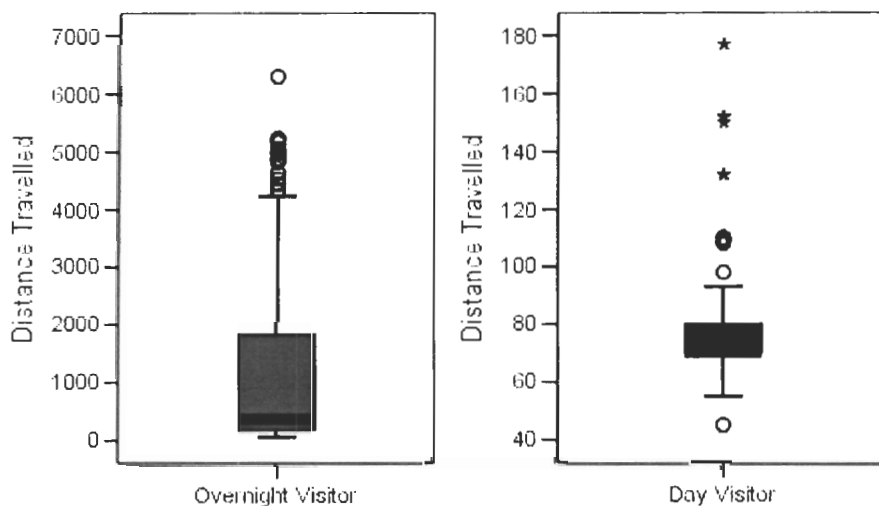


Figure 4-8 – Mean importance for potential motivations for visiting the Squamish region

Visitors travelled great distances to climb in Squamish. Day visitors to Squamish travelled an average of 77.5 km and a median distance of 70 km (n=151), which reflects the typical distance to the Lower Mainland. Overnight visitors travelled an average of 1,961 km (n=170), which ranged between 60 km and 15,435 km. With the sample of overnight visitors, several extreme outliers were identified, largely the result of overseas travellers. Even when the 12 overseas visitors were discounted from the sample, the mean distance travelled by the remaining overnight visitors was considerable, at 1,335 km (n=158) (see Figure 4-9). While the mean distance traveled by overnight visitors was very large, the median travel distance was much lower, at 374 km.



Note: '*' represents extreme values and 'o' represents outliers in comparison to the normal range of the sample

Figure 4-9 - Box-plot of distances travelled to Squamish by Overnight Visitors (overseas visitors excluded - left) and Day Visitors (right)

The majority of visitors to Squamish were from Canada. Over three quarters of the respondents to the Internet survey were Canadian (77.1%, n=239), and another 18.8% (n=58) were American (see Table 4-1). The

remaining 3.7% (n=12) of visitors originated from an assortment of European and Australasian countries, including France, Ireland, UK, Germany, Netherlands, Sweden and New Zealand.

Table 4-1 – Origin of visitors to Squamish by country

Country of Residence	Frequency	Percent
<i>Canada</i>	239	77.1%
<i>Ireland</i>	1	0.3%
<i>USA</i>	58	18.7%
<i>France</i>	4	1.3%
<i>Germany</i>	2	0.6%
<i>Netherlands</i>	1	0.3%
<i>New Zealand</i>	1	0.3%
<i>Sweden</i>	1	0.3%
<i>UK</i>	2	0.6%
Total	309	100.0%

Canadian visitors came from every province and territory, with the exception of Newfoundland and the Northwest Territories (see Table 4-2). Almost 80% (n=188) of Canadian visitors were from British Columbia, representing 60.6% of all visitors in general. Alberta was the second most common residence of Canadian visitors, being home to about 4.5% (n=14) of Canadian visitors.

American visitors were from 14 different states, from as far away as New York. The closest state, Washington, was the most common state of residence for American visitors, being home for 63.8% (n=37) of American visitors, and 12.1% of entire Internet sample (see Table 4-2). Each of the other states was home to only a few surveyed visitors, with frequencies ranging from one to three individuals.

Table 4-2 – Origin of Canadian and US visitors to Squamish by home state/province

Visitors from Canada				Visitors from USA			
<i>Province of Residence</i>	<i>Frequency</i>	<i>% of Canadian Visitors</i>	<i>% of ALL Visitors</i>	<i>State of Residence</i>	<i>Frequency</i>	<i>% of USA Visitors</i>	<i>% of ALL Visitors</i>
<i>AB</i>	14	5.9%	4.5%	<i>AL</i>	1	1.7%	0.3%
<i>BC</i>	188	78.7%	60.6%	<i>CA</i>	3	5.2%	1.0%
<i>MB</i>	9	3.8%	2.9%	<i>GA</i>	1	1.7%	0.3%
<i>NB</i>	2	0.8%	0.6%	<i>IL</i>	1	1.7%	0.3%
<i>NS</i>	2	0.8%	0.6%	<i>MT</i>	2	3.4%	0.7%
<i>NT</i>	2	0.8%	0.6%	<i>NV</i>	1	1.7%	0.3%
<i>ON</i>	9	3.8%	2.9%	<i>NY</i>	2	3.4%	0.7%
<i>PEI</i>	1	0.4%	0.3%	<i>OR</i>	2	3.4%	0.7%
<i>QC</i>	4	1.7%	1.3%	<i>PA</i>	1	1.7%	0.3%
<i>SK</i>	4	1.7%	1.3%	<i>TX</i>	1	1.7%	0.3%
<i>YT</i>	1	0.4%	0.3%	<i>UT</i>	1	1.7%	0.3%
<i>N/A</i>	3	1.3%	1.0%	<i>VT</i>	1	1.7%	0.3%
				<i>WA</i>	37	63.8%	12.1%
				<i>WI</i>	1	1.7%	0.3%
				<i>N/A</i>	3	5.2%	0.8%
Total	239	100.0%	77.1%	Total	58	100.0%	18.7%

4.4 Time Spent in Squamish Area

Individuals were asked to provide insights into their time spent rock climbing, particularly in the Squamish area. Not only did this help characterize the sites in terms of their popularity, but it also allowed total seasonal expenditure estimates to be translated into daily expenditure units.

Overall, respondents reported a mean of 32 days per year climbing in Squamish (n=393). However, when analysed according to visitor type, the number of days spent climbing in the region differed significantly ($F=73.608$, $df=2$, $p=0.000$). Residents reported the most number of days climbing in Squamish per year, with an average of 82 days (n=69). Day visitors had the next

highest mean with 30 days per year (n=154), followed by overnight visitors who had a mean of 13 days per year (n=170) (see Figure 4-10).

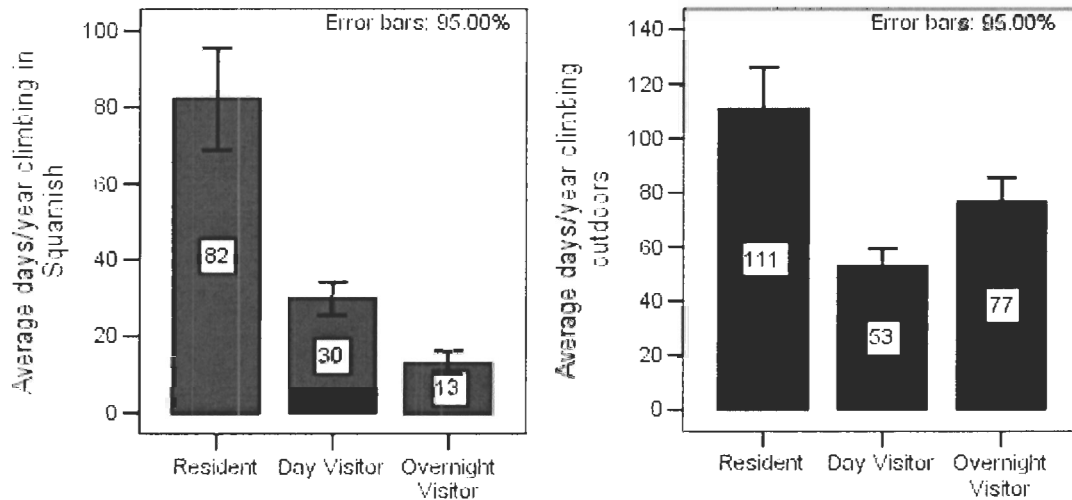


Figure 4-10 - Mean days per year climbing in Squamish (left) and climbing outdoors in general (right) by visitor type (Whisker indicates 95% confidence interval)

Respondents spent an average of 73 days per year rock climbing outdoors. Of the three groups, residents of Squamish spent the most days climbing outdoors, with an average of 111 days per year (n=69). Residents spent significantly more days climbing outdoors than both overnight and day visitors (F=25.644, df=2, p=0.000). Overnight visitors were next highest, with 77 days per year (n=170), followed by day visitors with 53 days per year (n=154) (see Figure 4-10).

4.5 Patterns of Daily Use

The intercept survey also contained questions about timing of site use in order to characterize the daily cycle of visitation. Respondents were asked at what time they started climbing that day and at what time they intended to finish.

From these responses, a general pattern of daily use was developed for each site, describing the relative proportion of climbers present at the climbing sites over the course of a day (see Figure 4-11). Following a similar method used by Fulton and Anderson (2003), these proportions were used to adjust the site counts for visits made at times other than when the sampling occurred. The line in Figure 4-11 represents the proportion of respondents who reported climbing at each time relative to the total sample of climbers. Daily cycles were then compared by several criteria, such as time of week, month and site.

The daily use cycles differed slightly between an average weekday and weekend, with significant differences noted at several times throughout the day. In all cases, climbers reported start times as early as 7 AM and completion times as late as 10 PM. However, more climbers tended to begin the day sooner on the weekend than on weekdays. A greater proportion of respondents reported climbing in the morning and early afternoon hours on weekends, compared to mid-week days, with significantly higher visitation at 9-10 AM ($\chi^2=4.979$, $df=1$, $p=0.026$), 12-1 PM ($\chi^2=7.31$, $df=1$, $p=0.007$), and 1-2 PM ($\chi^2=4.06$, $df=1$, $p=0.044$). During the weekend, over 70% of visitors were on site between 12 PM and 4 PM, with the peak use occurring between 1 PM and 3 PM.

Weekdays, in contrast, tended to be quieter earlier in the day than weekends, with the peak occurring between 3 PM and 4 PM. Likewise, visitors tended to stay later on weekdays, with significantly more climbers at both 5-6 PM ($\chi^2=4.35$, $df=1$, $p=0.037$) and 7-8 PM ($\chi^2=6.38$, $df=1$, $p=0.012$). These differences are expected and are likely a reflection of visitor's available time. On

weekdays, more people likely work during the day, and climb later in the afternoon; on the weekends, more visitors are not constrained by work, and are therefore able to start climbing sooner and spend more time on site.

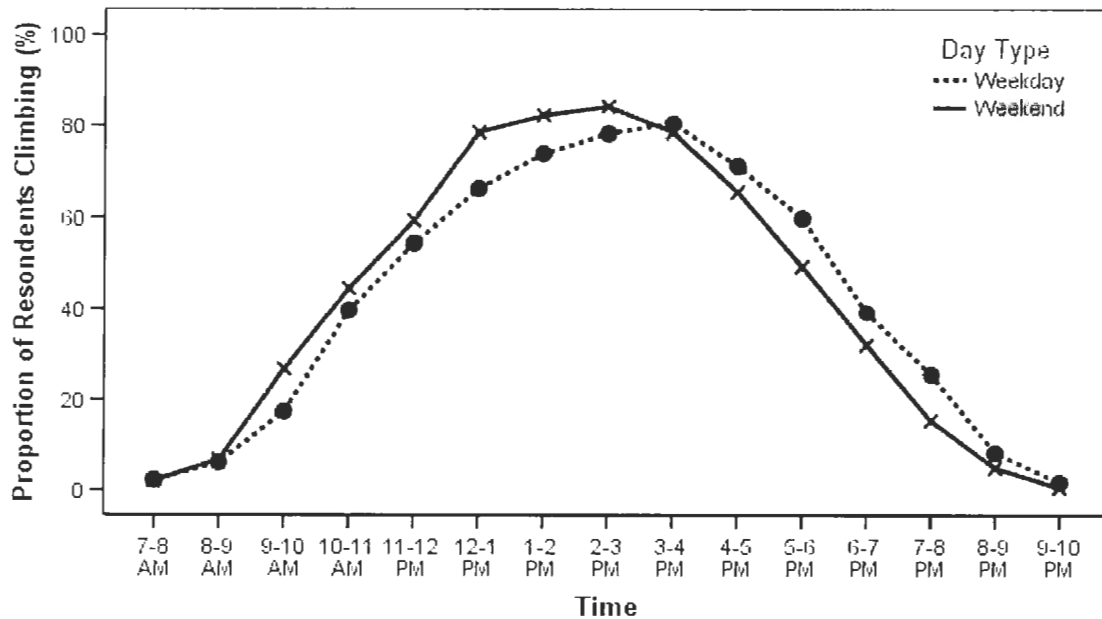


Figure 4-11 – Average daily use cycles of climbing sites aggregated by day type

When responses were compared according to site, the daily cycles of use for individual sites were remarkably similar (see Figure 4-12). Sites with fewer than five intercept surveys (i.e., Seal Cove and the Gorge) were excluded, as no inferences on total use could be made. While several sites exhibited unique patterns of daily use, a significant difference in the proportions of use was only detected for 9-10 PM ($\chi^2=22.34$, $df=8$, $p=0.004$). This reflects the relatively small sample size taken from the Papoose site, in which a few late climbers likely influenced the proportional use of this site.

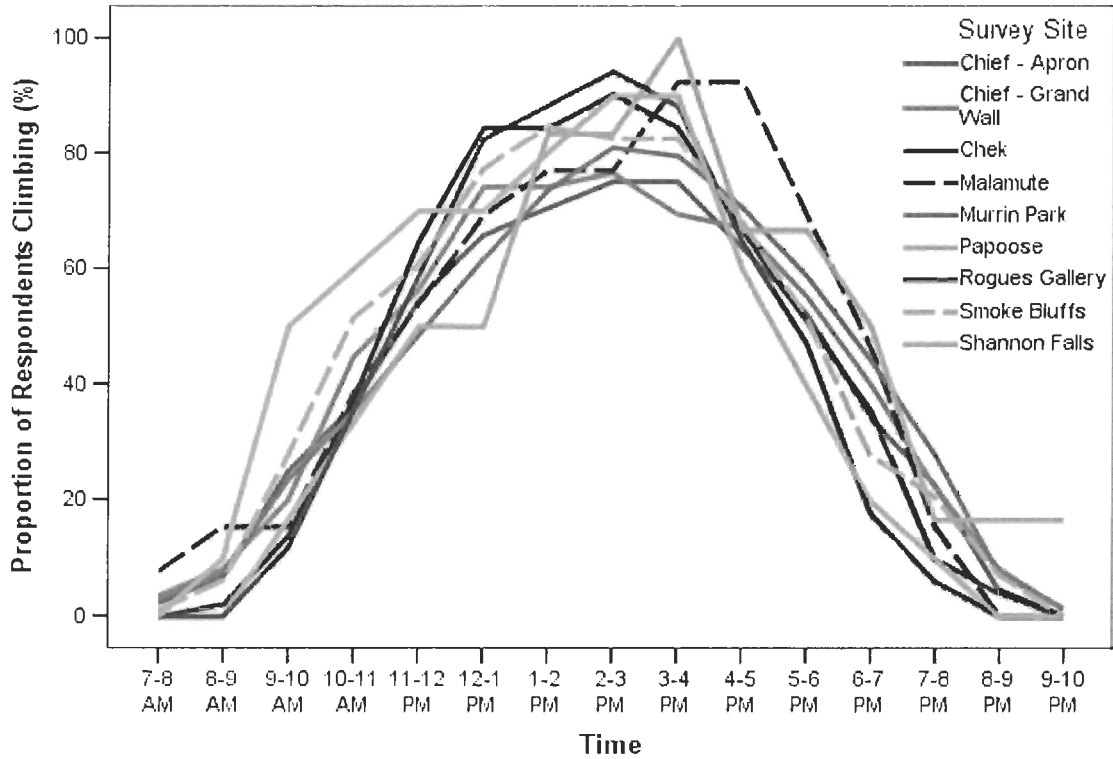


Figure 4-12 - Average daily use cycles aggregated by climbing site

Daily cycles of use varied somewhat when compared between months. Significant differences emerged in the start and finish times (see Figure 4-13). In particular, a greater proportion of climbers started earlier in July and August, particularly in comparison to September, with the proportion of respondents climbing between 9 and 10 AM being significantly different ($\chi^2=11.08$, $df=3$, $p=0.011$). Similarly, the proportion of respondents climbing in the evening in September was also lower, with significant differences being noted for 7-8 PM and 8-9 PM. The compressed daily cycle for September is likely a reflection of the shortened days of the season and less need to avoid the afternoon heat.

Other significant differences in the proportion of respondents climbing at each time are identified at 12-1 PM ($\chi^2=8.67$, $df=3$, $p=0.034$) and 3-4 PM

($\chi^2=13.19$, $df=3$, $p=0.004$). July was typically busier through the middle of the day than the other months, with more than 80% of visitors being on site from 12 PM through to 4 PM. August, on the other hand, showed a significant decline in use earlier in the afternoon when compared to the other months, beginning around 3-4 PM. This difference may have been partially caused by the weather. A number of sampling days in August occurred on rainy days and therefore may have shortened climbers' visits.

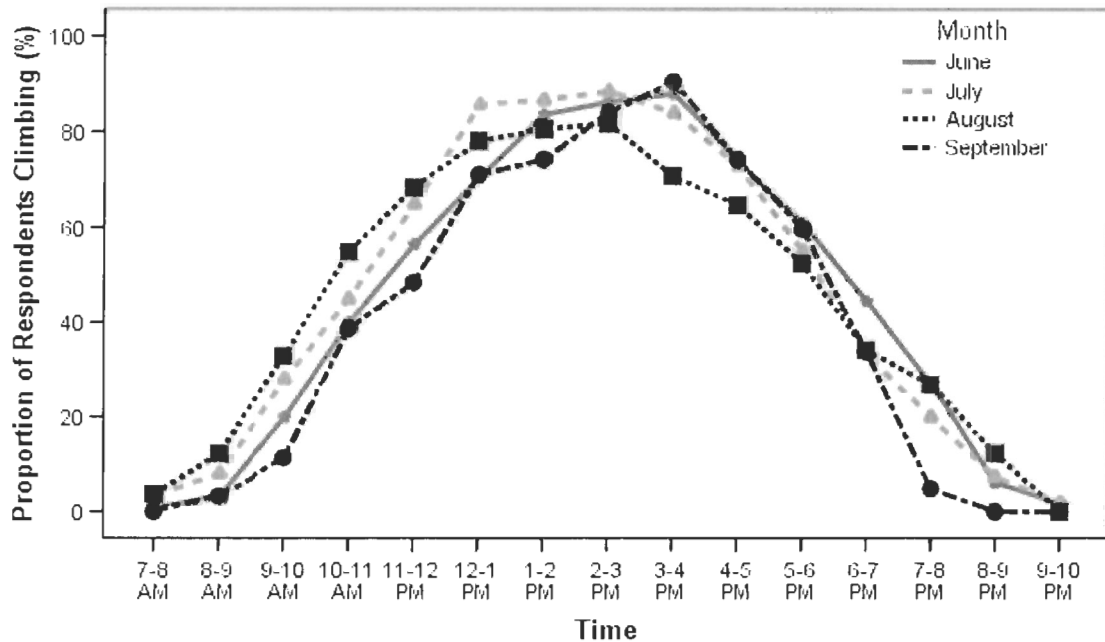


Figure 4-13 - Average daily use cycles aggregated by month

4.6 Site Counts of Climbers

During the study period, 222 roving site counts were completed over 35 randomly selected days of sampling (see Table 4-3). A site count consisted of a complete visual tally of all climbers observed at the site, and averaged 45 minutes in length, with some variation due to the size of the climbing site. Site

counts were conducted at all primary climbing sites in the Squamish area. Thus, site counts were a representation of the number of visitors at a site, at a particular time during the day. In combination with the daily use cycle, the site counts provided a means to extrapolate the total number of rock climbing visitors in the Squamish area during the 2004 season. This, in turn, provided an important component of information needed to estimate the economic impacts of rock climbing to the area.

Table 4-3 – Monthly summary of climbing site counts

<i>Month</i>	<i># of Sampling Days</i>	<i># of Site Counts</i>	<i># of Climbers Observed</i>
May	3	18	283
June	11	69	888
July	8	51	969
August	8	56	517
September	5	28	501
Total	35	222	3158

The average number of climbers observed during the site counts for each month provides an indication of visitation over the entire climbing season. Overall, July had the highest mean number of climbers per site count, with an average of 19.0 individuals per site count (n=51). At 9.2 individuals per site count, August had the lowest mean number of climbers per site count (n=56) (see Figure 4-14).

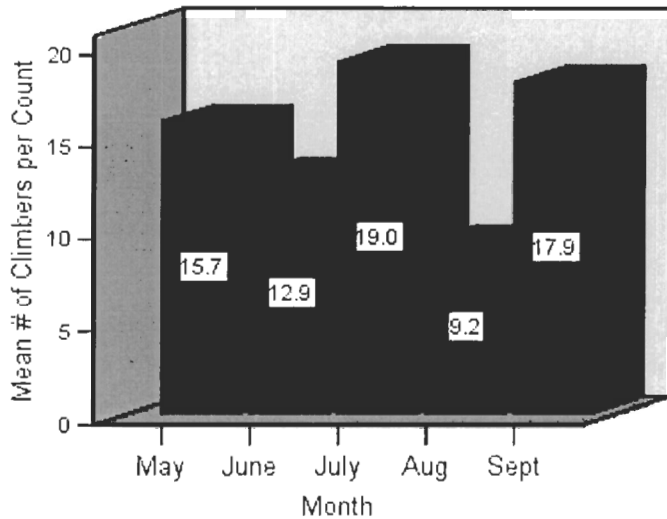
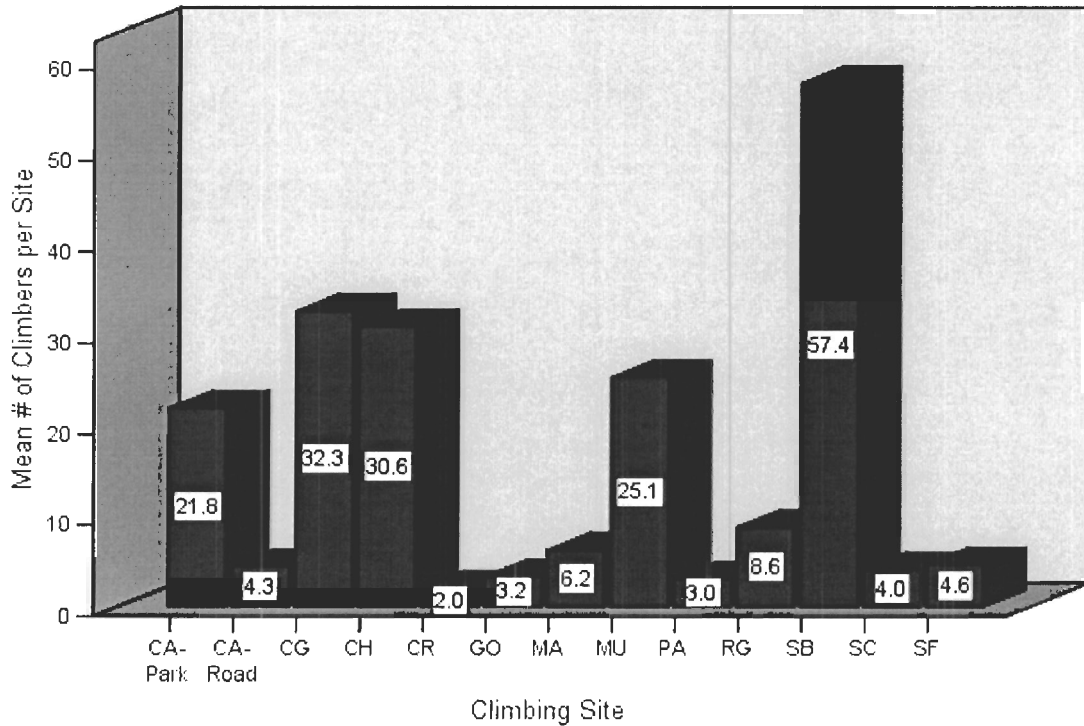


Figure 4-14 - Average number of climbers observed per site count by month

The primary cause for low visitation in August was probably poor weather on sampling days. Of the 56 site counts taken in August, 30 counts were completed on rainy days. Four of the eight sampling days recorded precipitation. Weather data for August shows that the month had 13 days with precipitation and 17 days without (Environment Canada, 2005). In contrast, July 2004 only had 6 days with precipitation.

The intensity of use varied widely between the various climbing sites, reflecting the differing popularity of each area (see Figure 4-15). Consistent with visitor estimates of site visitation, the Smoke Bluffs climbing area received the highest average number of visitors per count during the study period, with a mean 57.4 climbers per count (n=18). The Grand Wall area of the Stawamus Chief (which includes the bouldering area) was second, with an average of 29.8 climbers per count (n=19). The Apron of the Stawamus Chief, Chek and Murrin Provincial Park composed the other major destinations, with average site counts

of 19.5 (n=19), 28.4 (n=14) and 23.9 (n=20) visitors, respectively. Several of the small climbing sites had no observed use, including the Swift Creek Crag, Sport Temple and Rehabilitation Project.



(See Appendix C: Site Name Abbreviations for explanation of site codes)

Figure 4-15 - Average number of climbers per count by site

4.7 Estimation of Total Visitation

The actual site-counts estimated the number of climbers present at a given location at one particular time. Therefore, these estimates represent only a fraction of the total daily visitation to any given site. In order to estimate the total number of visitors per day at each site, the individual site counts needed to be adjusted using a reliable factor of adjustment. Following a similar method as Fulton and Anderson (2003), such an adjustment was possible by using the patterns of typical daily use cycles, as described in Section 4.5.

The daily cycles of use describe visitors present at a location at hourly intervals throughout the course of the day as a proportion of the total number of respondents. During the intercept survey, respondents were asked when they started their day of rock climbing, and when they expected to finish. This information allowed for a comparison at each time interval of the number of respondents who were climbing in relation to the total number of respondents. Table 4-4 represents the changing proportions of average site use on weekends and weekdays at each time interval. For example, at 9-10 AM on weekdays, 18% of all intercept respondents indicated that they were climbing. Later in the day, at 1-2 PM, a greater proportion of climbers report using the site, with 77% of the total respondents stating that they were on-site at this time. Thus, a site count that took place between 9-10 AM on a weekday, on average, only represented 18% of the total daily visitors.

These proportions of site use were used with the actual site counts to calculate a total daily site count and ultimately, to estimate the total number of climbers within the Squamish region per day. Each initial site count was paired with the appropriate proportion of visitors on site, according to the time of the count. For example, if 30 individuals were counted at the Smoke Bluffs from 9-10 AM on a weekday, on average these 30 individual represent only 18% of the estimated total daily site visitation. Consequently, the estimated total daily visitation for the Smoke Bluffs was 167 individuals (i.e., $30/0.18 = 167$).

Table 4-4 - Percentage of respondents who reported climbing in each hourly time period by day type

<i>Time</i>	<i>Weekday</i>	<i>Weekend</i>
7-8 AM	2%	2%
8-9 AM	6%	7%
9-10 AM	18%	29%
10-11 AM	41%	47%
11-12 PM	57%	63%
12-1 PM	69%	84%
1-2 PM	77%	87%
2-3 PM	82%	89%
3-4 PM	84%	82%
4-5 PM	74%	69%
5-6 PM	63%	52%
6-7 PM	41%	34%
7-8 PM	27%	16%
8-9 PM	9%	5%
9-10 PM	2%	1%

This method was used for each climbing site to estimate a total daily site count. Separate estimates were made for weekdays and weekends. Different weights could have been specified for each unique site, as well as for weather, day type, and available light. However, in order to achieve greater accuracy, a much more intensive sampling effort would have been required. Instead, every site count was adjusted by the time of day and whether the count took place on a weekend or weekday, as outlined in Table 4-4.

Based on these adjusted site estimates, the average number of visitors for each site was extrapolated (see Figure 4-16). The Smoke Bluffs had the highest estimated use, both on the weekends (e.g. 102 visitors per day) and weekdays (e.g. 89 visitors per day). The Grand Wall and bouldering areas of the Chief had the second highest average daily visitation, with 70 individuals per day on weekends and 42 individuals per weekday. Several of the smallest sites had no

recorded visitors on some day types. These included Comic Rocks and Seal Cove. Sites with no or very low estimated use have been grouped together in Figure 4-16.

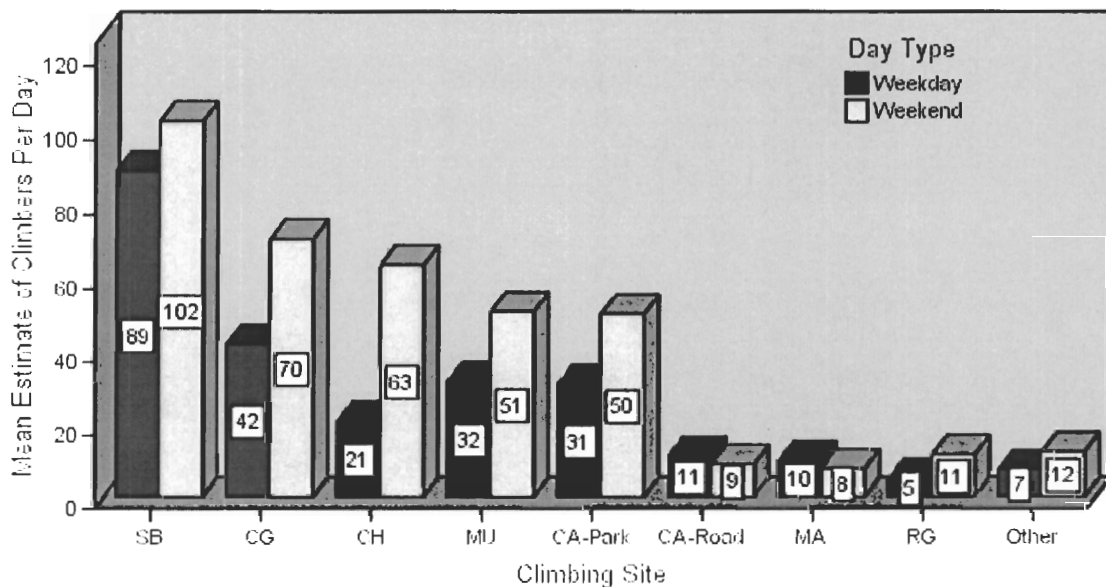


Figure 4-16 – Estimated average number of rock climbers by climbing site and by day type

These average daily site estimates are crucial for extrapolating the total seasonal use of the rock climbing areas around Squamish over the study period. Based on the sum of these adjusted site estimates, the average daily visitation to all Squamish rock climbing sites is 247 climbers on a weekday, and 378 on each day of the weekend. The study period, which lasted primarily from June to September 2004, had 85 weekdays and 37 weekends and public holidays. Using the daily use estimates, the climbing sites in the Squamish region experienced approximately 34,871 visitor use days over the study period. When these visits were allocated according to the proportion of visitor types, the

estimates suggest approximately 13,664 visits were by overnight visitors, and 15,084 were by day visitors.

While visitation was only monitored for the summer months of 2004, local observations suggest that this number would be significantly higher if estimated for the entire year. Regardless of the time of year, the parking lots for several of the key areas, including the Smoke Bluffs and the Grand Wall of the Stawamus Chief, are often busy whenever the weather permits rock climbing (i.e., even in February). Sunny, dry periods are not unusual in spring or autumn, and can result in many off-season site visitors.

Under the assumption that rock climbers will use the climbing areas in Squamish when the weather permits, it is possible to estimate the number of visitor use days for the shoulder season and, subsequently, the entire year. Over the 2004 year, Squamish had approximately 74 days with no precipitation outside of the study period (Environment Canada, 2005). Fifty of these days were reasonably warm (10°C or warmer) and would likely have been suitable for climbing.

Shoulder-season visitation was calculated using the daily visitation estimates extrapolated for the study period (see Section 4.5) and the number of good climbing days throughout the off-season. This calculation assumed that the average daily visitation remains relatively constant through the seasons when the weather is favourable for climbing. Further monitoring throughout the year is needed to confirm the amount of visitation, and provide a more confident estimate for annual use.

With 17 weekend days and 33 mid-week days having no precipitation and air temperatures greater than 10°C, additional off-season visitation to Squamish was estimated at 14,577 (see Table 4-5). When added to the study period estimate of 34,871 visitor use days, the annual estimate of visitation to the Squamish area was 49,448.

Table 4-5 – Estimated number of visitor use days in Squamish for the 2004 shoulder season

	<i># of Optimal Shoulder Season Days:</i>	<i>Visitation Estimate</i>	<i>Total Estimated Shoulder Season Visitation</i>
Weekend days:	17	378	6,426
Mid-Week days:	33	247	8,151
Total:	50		14,577

4.8 Expenditure Profiles for Visitors

In combination with estimates of total visitation, an economic impact analysis required explicit data on visitor expenditures. Most expenditure data were collected via the intercept survey. However, additional durable goods, guide fees or course expenses were collected in the Internet survey. In order to systematically capture these less-frequent but significantly larger expenditures, data were collected after the conclusion of the rock-climbing season. In contrast, the five spending categories considered in the intercept survey were typical daily spending items including groceries, restaurants and bars, accommodation, gas and oil, and recreational expenses. Expenditure estimates were collected as the daily spending per party, but subsequently converted to “per individual”, in order to extrapolate to total visitor spending.

4.8.1 Daily Expenditures

Of the five daily expenditure categories, visitors spent the most on food and beverage. Overnight visitors spent an average of \$11.96 per day at restaurants and bars, compared to day visitors who spent an average of \$7.77 (F=8.613, df=1, p=0.004) (see Figure 4-17). Overnight visitors spent significantly more than day visitors in both food and beverage categories. Likewise, overnight visitors spent an average of \$7.95 per day on groceries, compared to day visitors who spent about \$2.98 per day (F=6.650, df=1, p=0.010). Collectively, food-related expenditures accounted for roughly 65% of all daily expenditures, regardless of visitor type.

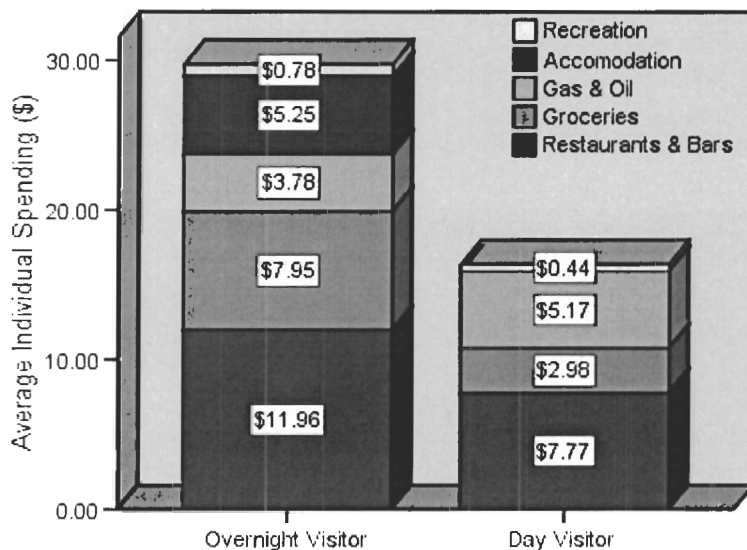


Figure 4-17 - Average daily spending per person by categories and visitor type

Spending on accommodation was limited exclusively to overnight visitors (see Figure 4-17). Their nightly spending ranged from \$0.00 to \$50.00 per individual. On average, however, individual overnight visitors spent approximately \$5.25 per night (n=170) for accommodation, with a median of

\$3.00. These low accommodation expenses reflect the large proportion of overnight visitors who camped at the provincial campground (53.5%, n=91), camped for free on public lands (21.2%, n=36) or stayed with friends or family (8.2%, n=14).

Gas and oil were common expenses. Visitor spending averaged \$5.59 per day on fuel in the Squamish area. While gas and oil expenses were not significantly different between day and overnight visitors, the average day visitor tended to spend slightly more per day on fuel (\$5.17 per day) compared to overnight visitors (\$3.78 per day). Overnight visitors likely spent slightly less on fuel per day. They typically did not have to drive far once they arrived to Squamish, and their fuel expenditures were spread over several days.

The majority of respondents (87.0%, n=281) did not spend anything on other recreation activities. As a result, the average expense on recreation was very low, at \$0.62 per day. No significant difference was identified between day and overnight visitors, who spent a daily average of \$0.44 and \$0.78 respectively.

4.8.2 Climbing-Related Gear, Course and Guide Expenditures

Unlike the previously mentioned daily expenditures, information about occasional purchases such as climbing gear, courses and guided trips was collected in the Internet survey to ensure adequate representation. Visitors and residents alike were asked to estimate their seasonal expenditures in a number of spending categories related to climbing. These categories included

expenditures in Squamish on climbing-related gear, courses and guides (see Table 4-6), as well as expenditures on climbing gear in Vancouver.⁹

Most residents and visitors made climbing gear expenditures in Squamish during the season. Of the Internet survey respondents, 55.5% (n=172) of visitors and 84.4% (n=54) of residents reported making gear purchases in Squamish. These occasional expenditures were significantly different between the two groups. Residents spent much more locally on these occasional climbing related items (on average \$400.83, s.d. = 360.23), compared to visitors who spent \$140.14 (s.d. =132.30) (F=63.38, df=1, p=0.000).

Table 4-6 - Occasional expenditures on climbing-related goods and services in Squamish by visitor type over the season

Expenditure Type	Visitors		Residents		Significant Difference in Spending (p<0.05)?
	% Who Made Purchase	Average Seasonal Spending	% Who Made Purchase	Average Seasonal Spending	
Gear in Squamish	55.5%	\$140.14	84.4%	\$400.83	✓
Gear in Vancouver/GVRD	74.8%	\$474.42	71.9%	367.93	x
Courses in Squamish	5.5%	\$382.35	3.1%	\$900.00	x
Guided Trips in Squamish	1.6%	\$650.00	1.5%	\$300.00	x

Visitors and residents of Squamish also made climbing-related gear expenditures in Vancouver and the Lower Mainland. Seventy-five percent (n=232) of visitors to Squamish made gear purchases in Vancouver. Total gear expenditures by visitors and Squamish residents over the season in Vancouver

⁹ Two significant differences were identified when comparisons were made by recruitment type. A greater proportion of intercept recruits made expenditures on gear in Squamish than CASBC newsletter recruits ($\chi^2=3.837$, df=1, p=0.050). Likewise, intercept recruits also purchased proportionally more guided trips in Squamish ($\chi^2=5.106$, df=1, p=0.024).

were not significantly different, though visitors reported spending slightly more at \$474.42 per season, compared to \$367.93 for Squamish residents.

Only a relatively small percentage of respondents reported seasonal expenditures on rock climbing courses and guided trips. Approximately 5% (n=17) of visitors and 3% (n=2) of residents reported taking any climbing courses over the course of the study period. Visitors who took courses spent an average of \$382.35 over the season. Residents who took courses spent considerably more over the season, at \$900.00. Because only a small proportion of the sample made these expenditures, however, no statistically significant difference could be found. Only 1.6% (n=5) of visitors and 1.5% (n=1) of residents made expenditures on guided trips. On average, those visitors who hired guides spent \$650.00 seasonally, compared to residents who spent \$300.00. Again, no significant differences were identified due to small sample sizes.

In collecting this data after the completion of the season, the expenditures represented seasonal totals for the sample. In order to be able to estimate total expenditures for all visitors to the rock climbing sites, it was necessary to convert the seasonal expenditures into an average daily expenditure. Daily expenditure estimates were calculated by dividing the seasonal expenditures by the number of days the respondent visited the climbing sites.

Once converted into a daily estimate, comparisons were possible between the different expenditures. With both residents and visitors, gear expenditures in Squamish composed the majority of the seasonal expenditures (see Figure 4-18). Residents spent an average of \$9.92 per climbing day on gear in

Squamish while visitors typically spend \$6.49 per climbing day. Average daily expenditures on guides and courses are much less, particularly amongst residents of the Squamish area. For each day climbing, residents spent an average of \$0.60 while visitors spent an average of \$4.21. In neither case was a significant difference identified.

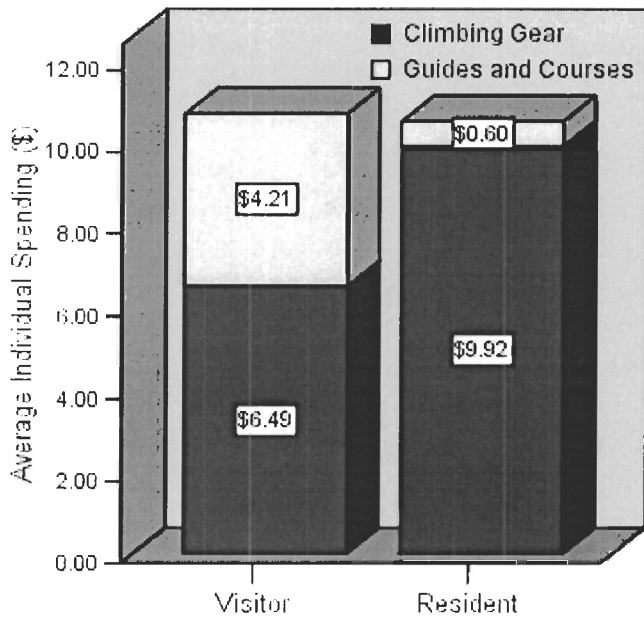


Figure 4-18 – Average daily expenditure on gear and courses by visitor type

It is important to note that the Internet data likely underestimates these daily expenditures. From the sampling methods, respondents provided two pieces of information that were used to estimate daily expenditures: their total seasonal expenditure estimates, and their estimated number of days spent climbing in Squamish over the year. These two variables differed in their time scale, with the total expenditures estimated for the summer of 2004, whereas the number of days in Squamish was estimated for the full year. Thus, the daily estimates of expenditures were calculated using seasonal expenditure data but

annual visitor use data. This likely resulted in an underestimation of the average daily expenditure. However, as the large majority of the climbing days took place during the summer months, the degree of underestimation is likely to be quite minimal.

4.9 Total Visitor Expenditures in the Squamish Region

After estimating the number of recreationists and of visitor spending in the region (see Sections 4.7 and 4.8) the total expenditures of rock climbers in the Squamish area was estimated by multiplying the number of climbers with their average daily expenditures. As different types of visitors had unique spending patterns, this analysis was completed according to the spending characteristics of two segments: day visitors and overnight visitors.

According to Stynes (1999), in a segmented analysis, total spending is the sum of the total number of visitors in each segment multiplied by the average expenditures for each segment (see Equation 2). Because the expenditure patterns of rock climbers differed between the types of visitor, it was first necessary to determine what proportions of the total visitor use days were attributable to the different visitor types (see Table 4-7). From the intercept data, 82% (n=324) of the respondents were from outside the Squamish area, of which 43.3% (n=154) were day visitors and 39.2% (n=170) were overnight visitors. The remaining climbers were residents, about two-thirds full time residents, and one-third temporary. When the total estimated visitor use days were allocated according to the proportion of visitor types, the estimates suggest approximately

13,664 of the 34,871 visitor use days were overnight visitors, and 15,084 were day visitors.

Table 4-7 - Total visitor use days by visitor type

<i>Visitor Type</i>	<i>% of Respondents</i>	<i>Visitor Use Days</i>
Full Resident	12.0%	4,170
Seasonal Resident	5.6%	1,952
Overnight Visitor	39.2%	13,664
Day Visitor	43.3%	15,084
Total	100%	34,871

To calculate the total expenditures of each visitor type for the study period, the number of visitor use days for each visitor type was multiplied by their respective average daily expenditures. The expenditures of visitors are of particular importance, as these expenses represent the import into the local economy that would not be available in Squamish if it were not for the opportunity to rock climb. As determined in Section 4.8, overnight visitors spent an average of \$29.72/day and day visitors spent an average of \$16.37/day. The total seasonal expenditure for each visitor group comprised the average daily spending multiplied by the number of visitor use days for each visitor group (see Table 4-8). With an estimated 13,664 visitor use days and an average daily expenditure of \$29.72/day, overnight visitors accounted for an estimated \$406,163 in expenditures from June to September 2004. Day visitors accounted for approximately \$246,964 of direct spending through daily expenditures.

Table 4-8 – Total estimated visitor spending from June to September 2004 on daily expenditure items

Spending Type	Total Spending		Total
	Overnight Visitor	Day Visitor	
Accommodation	\$71,726.26	-	\$71,726.26
Restaurants/Bars	\$163,437.61	\$117,255.09	\$280,692.70
Groceries	\$108,626.31	\$45,004.20	\$153,630.51
Gas and Fuel	\$51,667.53	\$78,008.48	\$129,676.01
Recreation	\$10,705.14	\$6,695.83	\$17,400.97
TOTAL	\$406,162.85	\$246,963.60	\$653,126.45

Visitors also made expenditures on climbing guides, courses and gear in the Squamish area, and these needed to be included in the overall estimate of visitor spending (see Table 4-9). Spending of this nature was compared between visitors and residents. On average, visitors spent an additional \$10.71 per day on climbing-related goods and services. Collectively, overnight and day visitors account for 28,749 visitor use days at the climbing sites. For all visitors, expenditures on climbing-related goods and services result in approximately \$307,841 in additional direct expenditures, with about 60% of those expenditures on climbing gear and the other 40% on guided trips and courses. Residents, on the other hand, represented approximately 18% of the total visitor use days, with 6,122 site visits. At \$10.42 per day climbing for gear and climbing services, Squamish residents contributed an additional \$64,413 to total climbing-related expenditures.

Table 4-9 – Total visitor and resident spending from June to September 2004 on infrequent expenditure items

Spending Type	Total Spending		Total
	<i>Visitor</i>	<i>Resident</i>	
Gear in Squamish	\$186,678.68	\$60,720.95	\$247,399.63
Guides/Courses	\$121,162.50	\$3,692.86	\$124,855.36
TOTAL	\$307,841.18	\$64,413.81	\$372,254.99

The total spending within the Squamish region due to rock climbing opportunities was the sum of all trip expenditures and seasonal expenditures. The sum of all visitor expenditures in Squamish tallied \$960,968, representing all spending associated with rock climbing tourism and non-local recreation from June to the end of September 2004

4.10 Estimated Annual Spending

Considering that this study only examined the expenditures made during the study period, the total annual expenditures related to climbing would likely be significantly higher. Further speculation, as discussed in Section 4.7, suggests that climbing-related visitation would be significantly higher over the entire year, if the visitation in the shoulder seasons were included. With an estimated 14,577 additional visitor use days occurring in the off-season, expenditures in 2004 may have approached \$1,362,678.65 (see Table 4-10). This estimate does not include any spending by residents. It is only speculative and assumes that both the proportion of visitors (i.e., proportion of residents, overnight visitors and day visitors) and their spending patterns remain the same in the off-season as in the summer months. Realistically, this projected annual visitation likely overestimates the number of overnight visitors in the off-season. Rather, most

visitors are probably day visitors who can readily take advantage of the unpredictable periods of favourable weather.

Table 4-10 – Projected annual expenditures based on visitation estimates for the study and shoulder season periods

<i>Period</i>	<i># of Visitor Use Days</i>	<i>Estimated Expenditures (not including residents)</i>
Study Period	34,871	\$960,967.63
Shoulder Season Period	14,577	\$401,711.01
Annual Total	49,448	\$1,362,678.65

4.11 Total Economic Impact of Expenditures

The seasonal and annual estimates of visitor expenditures only approximate the total amount of spending by visitors, and do not represent a full estimate of the economic impact. The full estimate of economic impact must consider the entire distribution and flow of expenditures through the industries and businesses that support the activity (Murphy, 1989). A total economic impact must consider the ripple of business activity that occurs in the community because of the initial spending, and the immediate leakage out of the region to cover the costs of those goods being purchased by visitors that were not produced locally. The total impact, thus, is the aggregate of the entire chain of spending resulting from the initial expenditures, minus losses to non-local taxes and out-of-region production costs.

Using BC Stats estimates of tax rates, of the \$960,968 of visitor spending over the study period, approximately \$152,581 was lost in front-end taxes (see

Table 4-11). The remaining \$808,387 represents the direct economic impact, or the actual amount of the initial expenditures remaining locally.

Table 4-11 –Direct economic impacts by industry for the study period

<i>Industry Sector</i>	<i>Initial Expenditures</i>	<i>Front-end Taxes</i>	<i>Direct Output</i>
Accommodation	\$71,726.26	\$7,129.59	\$64,596.67
Food and Beverage	\$280,692.70	\$20,855.47	\$259,837.24
Recreation	\$138,563.47	\$7,814.98	\$130,748.49
Retail Trade*	\$469,985.20	\$117,543.30	\$352,441.90
Total	\$960,967.63	\$152,581.24	\$808,386.39

*Retail trade includes climbing-gear, groceries, and gas and oil

For all of the tourist expenditure categories but retail goods, the indirect impacts were calculated by applying the appropriate multipliers (see Table 4-12). In the case of retail goods, an additional step was necessary because the money spent by tourists on goods purchases was actually distributed to a number of destinations. These expenditures were split between front-end taxes, the retail industry, wholesale industry, and the producers (Horne, 2003). Thus, of the \$469,985 of retail expenditures in Squamish, only \$133,476 was included as a direct impact to retailers. The remainder shifted to the wholesalers and the production sector.

Table 4-12 – Total economic impact of visitor spending for the study period

<i>Industry Sector</i>	<i>Direct</i>	<i>Indirect</i>	<i>Total</i>
Accommodation	\$64,596.67	\$29,714.47	\$94,311.13
Food and Beverage	\$259,837.24	\$132,516.99	\$392,354.23
Recreation	\$131,510.59	\$89,427.20	\$220,937.79
Retail Trade*	\$133,475.80	\$65,403.14	\$198,878.94
Wholesale Trade*		\$58,578.96	\$58,578.96
Production*		\$59,556.52	\$59,556.52
Total	\$588,658.19	\$435,197.28	\$1,024,617.57

*Retail, wholesale and production include climbing-gear, groceries, and gas and oil.

The total economic impact of visitor expenditures for the study period was estimated at \$1,024,618 (see Table 4-12). This estimate is based on actual spending estimates for the months of June to September, 2004. This amount likely was significantly higher for the entire year. Based on the projected estimates for annual spending (see Section 4.10) and using the same multipliers for each sector, the total economic impact of rock climbing for 2004 was approximately \$1,452,936 (see Table 4-13).

Table 4-13 - Total economic impact of visitor spending for 2004

<i>Industry Sector</i>	<i>Direct</i>	<i>Indirect</i>	<i>Total</i>
Accommodation	\$91,599.86	\$ 42,135.93	\$133,735.79
Food and Beverage	\$368,456.38	\$ 187,912.75	\$556,369.13
Recreation	\$186,485.65	\$126,810.24	\$313,295.89
Retail Trade	\$189,272.37	\$92,743.46	\$282,015.83
Wholesale Trade		\$83,066.58	\$83,066.58
Production		\$84,452.80	\$84,452.80
Total	\$835,814.25	\$532,668.97	\$1,452,936.02

CHAPTER FIVE: DISCUSSION

5.1 Current Conditions of Rock Climbing Tourism and Recreation

The cliffs and crags around Squamish are a highly popular destination for rock climbers, attracting a large number of rock-climbing visitors. Expenditures by these visitors represented a discernible source of newly generated income to the community of Squamish. Most spending tended to be on food and beverage, and on climbing-specific items. While secondary to food expenditures, spending on climbing equipment and guided climbing activities also represented a substantial proportion of visitor expenditures. In contrast, rock-climbing visitors in Squamish spent particularly little on other visitor services. Most visitors stayed in simple accommodations, favouring campgrounds to hotels, and spent very little on other recreational activities and tourist attractions in the area.

At the time of this study, most rock-climbing tourism and recreation was non-commercial. Only seven percent of visitors participated in commercial rock climbing activities such as courses and guided trips. Nonetheless, on average, guided climbing activities composed a substantial portion of overall expenditures. Considering the small percentage of individuals who actually paid for courses or guides, commercial climbing activities represent a potential area for economic growth.

The spending patterns of rock climbers in Squamish were comparable to climbers in other locations. Similar to our findings, an economic study on rock

climbing in the Obed Wild and Scenic River, Tennessee, also estimated that the greatest proportion of local expenses were on food and beverage purchases (Sims and Hodges, 2004). The study in Obed, TN estimated that visitors spent an average of \$46.70 (US) per trip, of which just over a third, or \$17.97 (US) (i.e., approximately \$22.25 CAD), was spent in the local county in which the climbing destinations were located. In comparison, visitors to Squamish spent a daily average of \$26.88 CAD for day visitors and \$40.42 CAD for overnight visitors locally on trip expenses and larger seasonal expenditures.

Although comparable to climbers in other destinations, climbers in Squamish spent less than the average overnight tourist in the Vancouver Coast and Mountains tourism region (Tourism BC, 1998). The average overnight tourist in BC has been estimated to spend between \$54 to \$69 per day, depending on whether they are a resident or non-resident of BC respectively. Overnight climbing visitors spent less in most expenditure categories (see Table 5-1).

While the spending of rock climbers was below, or in the low-range of categorical estimates for the average BC tourist, the notable exception was expenditures on food and beverage. These expenditures were comparable with high-end estimates for average overnight tourists. For both day and overnight climbing visitors to Squamish, the greatest percentage of their expenses was on food and beverage items, particularly in restaurants and bars. Based on current visitor expenditure patterns, local business may want to explore the food and beverage market for its potential for further development.

Table 5-1 – Comparison of daily expenditures of average overnight BC tourists and overnight climbing visitors

<i>Industry Sector</i>	AVERAGE SQUAMISH CLIMBING VISITOR	AVERAGE BC TOURIST			
		<i>Non-BC Resident¹</i>		<i>BC Resident</i>	
		<i>Low</i>	<i>High</i>	<i>Low</i>	<i>High</i>
Food & Beverage	\$19.91	\$13.11	\$20.70	\$16.74	\$18.90
Accommodation	\$5.25	\$10.35	\$17.94	\$7.56	\$12.42
Transportation	\$3.78	\$4.83	\$11.04	\$4.86	\$11.34
Souvenirs	\$0.00	\$4.83	\$14.49	\$1.62	\$5.94
Outdoor Activities ²	\$4.21	\$2.76	\$6.21	\$1.08	\$4.86
Entertainment ³	\$0.78	\$4.14	\$8.97	\$4.32	\$6.48
Other ⁵	\$6.49	\$5.52	\$10.35	\$3.78	\$10.80
Total	\$40.42	\$45.54	\$89.70	\$39.96	\$70.74

¹ Based on Tourism BC (1998) estimates of daily expenditures, and distribution of expenditures for non-BC residents and BC residents

² Outdoor Activities includes expenses on guiding and courses

³ Entertainment includes expenses on attractions and cultural events

⁴ Other includes expenses on gear and unspecified expenses

In stark contrast, expenditures by rock-climbing visitors on accommodation are considerably lower than those of the average tourist in this area. Tourism BC (1998) estimated that the average visitor from outside BC spent in the range of \$10.35 to \$17.94 per day on accommodation in the Vancouver and Coastal Mountain region; visitors from within BC were estimated to spend in the range of \$7.56 to \$12.42. Rock climbing visitors to Squamish, on the other hand, spent an average of \$5.25 per day on accommodation.

This difference is clearly a result of the high percentage of rock climbers who chose to camp. Over 70% of overnight rock climbing visitors chose to camp, compared to two to six percent for the average BC tourist in the same area. The low expenditure on accommodation is also largely influenced by the propensity of rock climbing visitors to camp free of charge on public lands. Over 20% of overnight visitors did not pay for accommodation. Free camping at this scale

poses an important management issue, particularly for those organizations that must deal with the human waste, litter, and other negative impacts of these visitors.

5.2 Considerations for Maximizing Economic Impacts

Rock climbing, in combination with other outdoor-based recreational activities, is identified as an important component of the local economic development strategy in Squamish. Currently marketing itself as the “Outdoor Recreation Capital of Canada”, the District of Squamish is actively encouraging growth in outdoor-based tourism. Rock climbing has the potential to become a major part of Squamish’s identity, making the area an attraction to both climbers and non-climbers alike. This research suggests that although rock climbing currently is not a major contributor to Squamish’s economy, these activities draw significant numbers of visitors and present opportunities for future tourism development. Any efforts to increase economic benefits by local government and business would likely involve several approaches.

Increasing the number of rock climbing visitors is one obvious means of increasing the economic benefits to the community. Visitation could be increased by attracting more of the existing climbing market, and by identifying and attracting new markets to the area. Due to the generally low spending habits of the existing climbing segments, increasing overall visitation alone may not be the most effective way of increasing economic benefits. In fact, large increases in visitation could lead to lower climber satisfaction due to perceptions of crowding.

Rather, if the objective is to increase economic benefits for the region, efforts should be focused at increasing visitation by higher spending segments.

Tourism strategies should focus more on maximizing the amount spent locally by climbers. Currently, Squamish attracts many avid rock climbers whose principal reason for visiting Squamish is to rock climb. Few of these individuals have broader interests in the area. The average overnight climber in this research was very dedicated to the sport, yet spent relatively little on visitor services, particularly accommodation, shopping and other recreational activities. In order to increase economic impacts, Squamish should attempt to attract different tourism segments that are willing to spend more. One potential market lies in entry-level adventure-oriented travellers, who may be interested in rock climbing but are not yet specialists. Businesses and local tourism development should focus on identifying and attracting tourist markets that may have an interest in rock climbing and other outdoor-based tourism opportunities but have not yet identified Squamish as a tourist destination.

To increase and hold visitor spending in Squamish, the community should support locally-based climbing businesses and events, so that a greater proportion of tourist expenditures are captured locally. Support for locally-based development was echoed in the *Squamish Tourism Marketing Plan and Development Strategy 1997*. This document specified several strategies for developing rock climbing in the area, including the provision of additional infrastructure to support rock climbing businesses, initiation of a rock climbers' festival, and the creation of packages aimed at climbers (personal

communication, McCrae, December 1, 2005). Packages should be developed that appeal to the existing climbing market and new, targeted markets. In particular, rock climbing packages could target non-specialist adventure-oriented travellers.

5.3 Challenges to Increased Climbing-Based Tourism Development

While further development of rock climbing tourism and recreation represents an opportunity to increase economic benefits in Squamish, an increase in climbing tourism and recreation will pose a significant management challenge to the host community. Increased visitation will undoubtedly increase the risk of significant adverse social and environmental impacts on the community, the climbing sites, the visitors, and even the climbing-based tourism economy.

Development activities that draw more visitors will inevitably increase competition for the limited climbing resources. This may result in such problems as crowding, and conflict between different user groups (e.g. residents, commercial recreationists, non-commercial recreationists). These problems typically have a negative impact on visitor experience. Similarly, negative impacts on environmental quality can also decrease the satisfaction of visitors. In fact, substantial growth and development of rock climbing could unduly jeopardize visitors' abilities to achieve positive adventures in the area. Sustaining visitor satisfaction is critical to the success of developing rock-climbing based tourism.

Clearly, the successful development of rock climbing tourism in the community is distinctly linked to protecting the quality of the climbing experience. Important social and environmental issues will need to be addressed alongside any strategies for increasing economic benefits. This implies that tourism development should involve proactive measures to minimize or prevent such adverse impacts. Among other things, management actions may be necessary to minimize crowding, prevent conflict between different user groups, and address environmental degradation issues at the climbing sites. Future plans for rock climbing development should be framed around incorporating principles of sustainability, thus preventing over-exploitation and degradation of the host community and the climbing resources themselves.

5.4 Value of Rock Climbing Sites

Although this research does not explicitly explore the non-market value of the rock climbing sites, travel data suggests that the use value of these sites may be substantial. Overnight visitors travelled considerable distances for these climbing opportunities, with some individuals arriving from as far away as Australia. While day visitors travelled significantly less distance, the frequency of their trips was much higher. The popularity of climbing in Squamish is thus reflected not only by the number of visits these sites received but also by the distances individuals were willing to travel to climb there and the frequency of their visits.

Methods of valuation often use travel distance and time as proxies for a market value (Shaw and Jakus, 1996; Fix and Loomis, 1998). Using such

methods, research has shown the enormous value society often places upon specific outdoor recreational opportunities. For example, the mountain biking opportunities offered at Slickrock trail in Moab, California have been valued at between \$8,422,800 and \$8,770,300 (USD) using actual travel behaviours of visitors. Although this is not investigated as part of this study, further investigation could demonstrate the use value placed on the rock climbing opportunities in Squamish, using time and costs of travel as proxies for a market value.

Such information is particularly relevant currently in British Columbia, as the provincial government has shown greater interest in accounting for recreational values on the landscape. In particular, the BC Ministry of Agriculture and Lands is interested in incorporating these use values into Socio-economic and Environmental Assessments (SEEA) (Government of British Columbia, 2007). SEEA are currently used by planners and decision-makers when investigating trade-offs between land-use planning and policy alternatives such as the Sea-to-Sky LRMP. Policy development and land use planning should recognize that the use and non-use values associated with these climbing sites are potentially huge. These rock-climbing opportunities constitute a scarce recreational resource and any decision-making process should examine the complete suite of use and non-use values associated with the rock climbing sites in addition to economic impacts generated by rock climbing. A similar argument can be made for other recreation and tourism activities.

CHAPTER SIX: CONCLUSION

The local government of Squamish has recognized the special opportunities that outdoor-based tourism, such as rock climbing, represents to their local economy (Smith, 2001). This recognition was reflected in the *Squamish Tourism Marketing Plan and Development Strategy 1997*, and the Squamish District's partnership with Tourism BC to participate in a tourism development process (personal communication, McCrae, December 1, 2005)¹⁰. The District of Squamish has already taken steps to encourage growth in outdoor-based tourism. These actions included the development of the Sea to Sky Adventure Centre, the establishment of the Smoke Bluffs Park, the Climbers' Festival, and an additional hostel (personal communication, McCrae, December 1, 2005). Clearly, the District has positioned itself to support growth in rock climbing.

Despite this recognition, no defensible work had been completed to substantiate the regional importance of climbing-based tourism. The results from this study show that while Squamish receives a substantial number of rock climbing visitors, the average daily expenditures of rock climbing tourists are generally less than those of the average tourist in this region. The current

¹⁰ Dan McCrae is the Business Development Lead with the Squamish Sustainability Corporation. The Squamish Sustainability Corporation (SSC) is a newly created, arms length, corporation put in place by the District of Squamish to administer the Adventure Centre, the Squamish Store, tourism expansion, business development and other special projects that foster sustainability for the Community.

tourism associated with rock-climbing is not highly lucrative to the host community.

Never the less, climbing tourists still make substantial expenditures on particular sectors, such as food and beverage, climbing gear, and to a lesser degree, commercial rock climbing activities. Any future development around rock climbing needs to be focused upon the particular market demands of these and other visitors. This research estimates the number of visits experienced at Squamish climbing sites, areas in the local market that could capitalize on the existing tourism, and highlights opportunities for attracting new visitors.

While rock climbing may not currently provide enormous economic gains for the local community, the potential for further development exists. This research provides evidence as to the substantial value that climbing opportunities represent if nurtured appropriately. The distances travelled by visitors and frequency of trips suggest that the climbing areas in Squamish are very important to many individuals and society in general. Further investigation could demonstrate the use value placed on the rock climbing opportunities in Squamish, using time and costs of travel as proxies for a market value.

APPENDICES

Appendix A: Intercept Survey Questionnaire

1. Have you already participated in this survey? Yes No

II. Are you a day visitor, overnight visitor, seasonal resident, or a full resident of the Squamish area?

- day visitor
- overnight visitor
- seasonal resident
- year-round resident

A) SEASONAL OR YEARROUND RESIDENT

1. How many people are you climbing with today? _____

2. By what means did you arrive at the climbing site today?

- Drove/Rode with friends
- Walked
- Dropped off/hitchhiked
- Rode bike
- Other _____

3. If you drove or rode with friends, how many people were in the vehicle? _____

4. How long have you lived in Squamish? _____ years

5. Do you work in Squamish? Yes No

6. Approximately how much do you spend on climbing-related gear annually? \$ _____

7. Approximately how much of your annual climbing gear expenditures are made in Squamish? \$ _____

8. Using a scale ranging from 1=Not at all important, 3=Neutral, and 5=Very important, please rate how important the following factors were in your decision to live in Squamish:

- Work Opportunities _____
- Ties to Family and Friends: _____
- Proximity to other cities _____
- Rock climbing opportunities _____
- Water-based recreational opportunities _____
- Other land-based recreational opportunities _____
- Size of community _____
- Natural setting of community _____
- Cost of Living _____

Survey #: A _____

9. Which type(s) of climbing do you participate in?

- Sport Climbing
- Mountaineering
- Traditional Climbing
- Ice Climbing
- Indoor Climbing
- Bouldering

10. How many days do you typically spend rock climbing in Squamish in a year? _____ day(s)

11. How many days do you typically spend climbing per year: outdoors? _____ day(s) in a gym? _____ day(s)

12. What time today will/did you: start climbing? _____ finish climbing? _____

13. Which areas around Squamish have you climbed at in the past month?

- Smoke Bluffs
- Chief - Grand Wall
- Murrin Provincial Park
- Chief - Apron/North
- The Papoose
- Backside Chief
- Shannon Falls
- Rogues Gallery
- The Malenite
- Chick/The Gym
- Seal Cove/Quartz Pillar
- Swift Creek Crag
- Comic Rocks
- Sport Temple
- Valley of Shuddai
- The Gorge
- Rehab Project
- The Squaw

14. Will you be climbing at any other areas today? Yes No

15. What is the grade of the most difficult climb you have successfully led? _____ never led

16. What is your gender? male female

17. What is your age? 10-19 20-29 30-39 40-49 50-59 60+

18. What is your personal annual income?

- Less than \$20,000
- \$20,000 - \$39,999
- \$40,000 - \$59,999
- \$60,000 - \$79,999
- \$80,000 +

B) DAY OR OVERNIGHT VISITOR

- How long are you staying in Squamish? _____ days
- How many people are in your travel party? _____
- How many people in your party are climbing? _____
- By what means did you arrive at the climbing site today?
 Drove/Rode with friends Walked
 Dropped off/hitchhiked Rode bike
 Other _____
- If you drove or rode with friends, how many people were in the vehicle? _____
- How far did you travel from home for this climbing trip? (Note: Downtown Vancouver is 70 km away from Squamish) _____ km
- Where are you staying while in Squamish? () not staying
 hotel/motel crown land camping
 hostel with a friend/relative
 provincial campground home
 private campground other _____

8. What is your travel party's estimated daily spending in Squamish on:

	Actual	Intended
Accommodation:	\$ _____	\$ _____
Restaurants and Bars:	\$ _____	\$ _____
Groceries:	\$ _____	\$ _____
Gas and Oil:	\$ _____	\$ _____
Recreation and Entertainment Fees:	\$ _____	\$ _____

9. Using a scale ranging from 1=Not at all important, 3=Neutral, and 5=Very important, please rate how important the following factors were in your decision to visit Squamish:

- Nature viewing _____
- Shopping and dining _____
- Rock climbing _____
- Other outdoor recreational opportunities _____
- Historical attractions _____
- Visiting family and friends _____

10. Which type(s) of climbing do you participate in?

- Sport Climbing
- Mountaineering

Survey #: B. _____

- Traditional Climbing
 - Ice Climbing
 - Indoor Climbing
 - Bouldering
- Have you climbed in Squamish before? Yes No
 - If yes, how many days do you typically spend climbing in Squamish in a year? _____ day(s)
 - How many days do you typically spend climbing a year outdoors? _____ day(s) in a gym? _____ day(s)
 - What time today will did you start climbing? _____ finish climbing? _____
 - Which areas around Squamish have you climbed at in the past month?
 Smoke Bluffs Chief - Grand Wall
 Murrin Provincial Park Chief - Apron/North
 The Popoos Bockside Chief
 Shannon Falls Rogues Gallery
 The Malanute Chick/The Gym
 Seal Cove/Quartz Pillar Swift Creek Crag
 Conic Rocks Sport Temple
 Valley of Shaddai The Gorge
 Rehub Project The Squaw
 - Will you be climbing at any other areas today? Yes No
 - What is the grade of the most difficult climb you have successfully led?
 _____ never led
 - What is your gender? male female
 - What is your age?
 10-19 20-29 30-39
 40-49 50-59 60+
 - What is your personal annual income?
 Less than \$20,000 \$60,000 - \$79,999
 \$20,000 - \$39,999 \$80,000 +
 \$40,000 - \$59,999

Appendix B: Internet Survey Questionnaire

The Internet survey instrument has been permanently archived at the following web address:

<http://rockclimbing.rem.sfu.ca/>

In order to access the survey, please enter **any text** into the User ID field and press "Click to Login". No password is necessary.

Appendix C: Site Name Abbreviations

Climbing Site	
CA	Stawamus Chief – Apron (at parking lot)
CA-Road	Stawamus Chief – Apron (at parking lot)
CB	Stawamus Chief – Boulders
CG	Stawamus Chief – Grand Wall and Backside
CH	Chek
CR	Comic Rocks
GO	Gorge
MA	Malamute
MU	Murrin Provincial Park
PA	Papoose
RG	Rogues Gallery
SB	Smoke Bluffs
SC	Seal Cove
SF	Shannon Falls
SQ	The Squaw
VS	Valley of Shaddai

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