A Method to Assess the Potential Value of Railway Corridors as Recreation Trails:

A Case Study of Three Nova Scotia Rail-Trails

By

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in conformity with the requirements for the degree of
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EXECUTIVE SUMMARY

Introduction

The conversion of railway corridors to trails has gained considerable momentum during the 1990s. In Canada, trails in general, and rail-trails in particular, have been gaining popularity over the last decade exemplified by the official opening of the Trans Canada Trail on September 9, 2000. Rail corridors present an appealing location for recreational trails, as they possess several functional attributes: the land is partially prepared for trail uses; infrastructure built by railway companies provides historical interpretive opportunities and ensures connectivity of trails passing through or over rough terrain; and, the gentle curves and grades characteristic of railway corridors are ideal for locomotive activities such as walking, jogging and cross-country skiing. According to rail-trail and recreation economics literature, a multitude of benefits can ensue from the existence of trails in a community such as improved health, increased social interaction, and increased property values.

Although railway corridors are cited in the literature as an excellent location for recreation trails, and the benefits of having such recreation resources are attested, there exists a gap in the literature. No framework exists to assess a railway corridor's potential value as a recreation trail or to plan for trails that will provide maximum value to society. The purpose of this thesis is to fill the identified gap in the literature by answering the

question: how might a method to assess the potential value of railway corridors as recreation trails be structured?

Developing a method for assessing the potential value of railway corridors as rail-trails will provide those working in the planning or recreation professions with a tool to evaluate the pros and cons of supporting the development of a rail-trail. This master's research will hopefully be of some practical use to planners or trail organizations involved in influencing the direction of outdoor recreation and open space policies.

Research Process

Four steps were involved in answering the research question: (1) a literature review, (2) trial application of the method, (3) key-informant interviews and (4) re-evaluation of the method.

Three bodies of literature were examined to extract the information and concepts required to answer the research question: (1) recreation economics literature, (2) natural resource economics literature, and (3) general trail and rail-trail specific literature. From the literature review, a preliminary method was developed to assess the potential value of railway corridors as recreation trails. This involved both identifying relevant sources of value, establishing criteria to capture each source of value and devising a method to evaluate those criteria.

Step two in the research process involved pre-testing the preliminary method on three case study rail-trails in Nova Scotia: The Musquodobit Harbour Rail-Trail, the Centennial Trail and the Sable River Rail-Trail. Field observations for each trail were completed during June 2000.

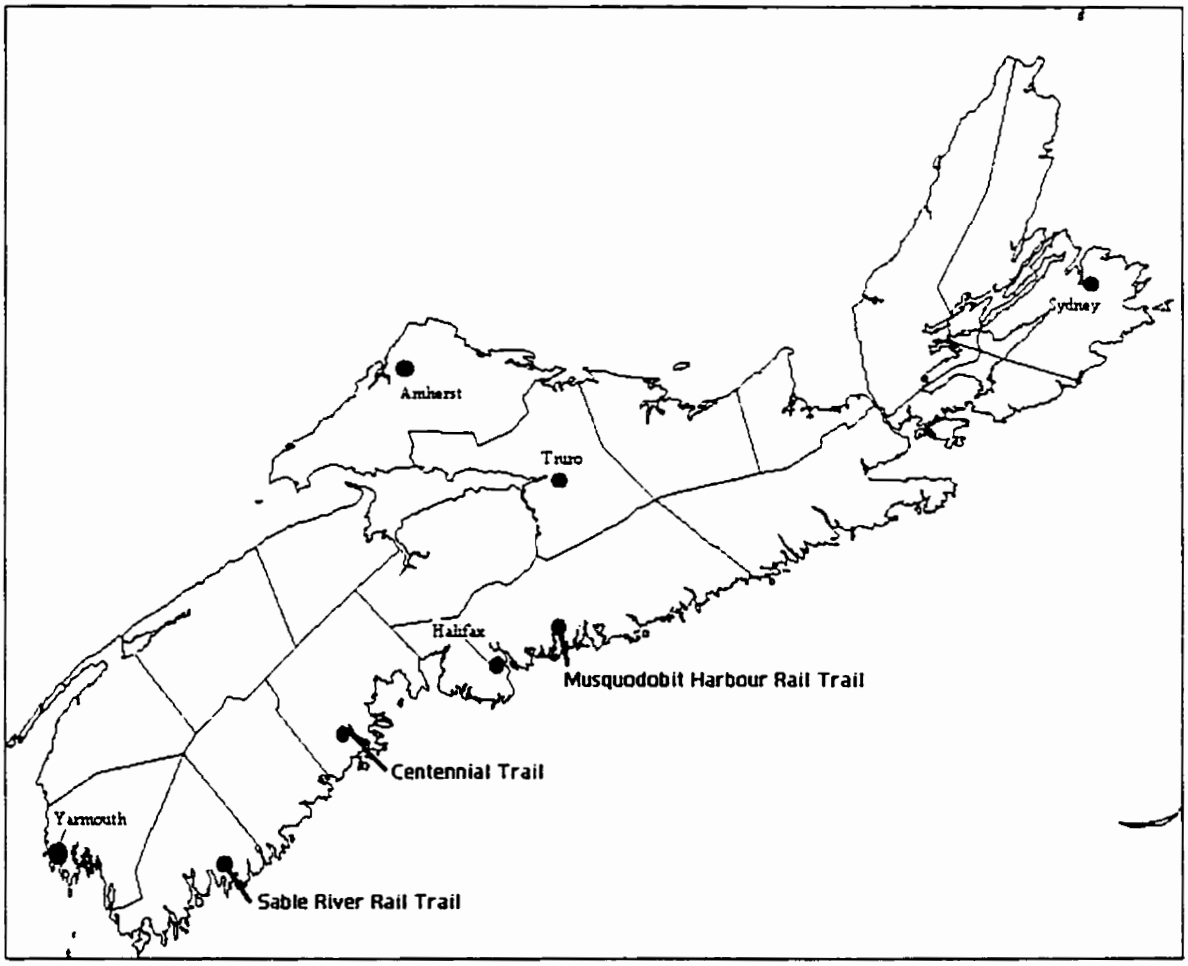

Figure A. Location of Case Study Trails
Source: Government of Nova Scotia, http://www.gov.ns.ca/snsmr/land/online/free.stm

The third step employed in the research process was key informant interviews. These were conducted once the results from pre-testing on the case study trails were available. Several "trail experts" were questioned about any concerns or issues they observed with the method developed given the results from pre-testing as well as their previous rail-trail evaluation experiences.

The final step in the research process was to synthesize the information gained from the literature review, trial application, and key informant interviews. An improved method to assess the potential value of railway corridors as recreation trails, a discussion

of methodological issues and considerations for those intending to employ the method, and topics for future research were identified in this final step.

Measuring Potential Value

Five sources for assessing potential value of railway corridors as recreation trails were identified through the literature review, pre-testing and key informant interviews: (1) user satisfaction, (2) location and catchment area, (3) non-use values, (4) connectivity, and (5) access to services. A brief explanation of how each contributes to the value of trails follows.

User Experience

The physical attributes of a trail have a great impact on a user's satisfaction with their leisure experience. Those trails that maximize the attributes deemed most desirable by trail users will likely have higher visit volume. Therefore, the magnitude of social and health benefits resulting from trails depends ultimately on whether people actually visit and make use of the resource.

Location and Catchment Area

This is also a key component of determining the potential number of visitors. Given the location of a railway corridor, it is possible to predict the number of visits that will likely occur, at least between several different locations, all other things being equal.

Non-use Values

Existence, option and bequest values can capture many of the benefits discussed in the literature such as environmental, social, heritage and health benefits. Additionally, this source of value can account for the value that non-trail users attribute to having a trail in their community.

Connectivity

The connectivity value is unique to railway corridors and rail-trails in that it is railway infrastructure, such as bridges, that result in the low cost of conversion and enhance the length of trails and connectedness of communities. This is also an appropriate source of value to account for several environmental and social benefits of green corridors.

Access to Services

The types of services provided on or near the trail could impact considerably on user satisfaction, which as mentioned above will impact the number of visitors to a trail.

Potential Value Compared

The following chart provides a comprehensive view of trail ranking results from the pre-testing. The overall trail ranking of a case study trail is the simply the sum total of the rank number for each of the four sources of value. All four sources of value tested in trial application are given equal weight in the overall score.

Table A Overall Trail Ranking by Trial Application

	Musquodobit Harbour	**Centennial**	**Sable River**
User Satisfaction	3	2	1
Location/Catchment	1	2	3
Existence/Use Value	1	2	3
Connectivity	1	2	1
Total Rank Score	**5**	**8**	**8**

In this situation, the Musquodobit Harbour Rail Trail is expected to have the highest value as it is ranked highest most often, resulting in a total rank score of five. Between the Centennial Trail and the Sable River Rail Trail, which will have a higher expected value is not obvious. Although the Centennial Trail ranks second in all

categories and the Sable River Rail Trail ranks third in two, the Sable River Rail Trail does rank first in the other two categories. The result of a mix of rankings for the four sources of value is a total rank score of eight for each trail.

The following table shows the overall trail ranking according to key informants. Each informant was asked to rank the three case study trails according to their own evaluation system.

Table B Overall Trail Ranking Reported by "Trail Experts"

	Musquodobit Harbour	**Centennial**	**Sable River**
Laura Barkhouse	-	-	-
Jessie DeBaie	1	2	-
Harold Hart	1	1	3
Michael Haynes	1	2	3
Don Howard	1	3	2
Joel Page	1	2	-
AVG RANK	**1**	**2**	**3**

Overall rank by the trail "experts" appears to be consistent with the results from pre-testing in Table A. This result indicates that criteria used in the method are valid and useful as they produced a ranking consistent with the reasoning and evaluation of experts working in the field. However, there are additional issues to consider when evaluating the potential value of railway corridors as recreation trails.

The ranking of trails produced using the method developed merely presents decision-makers with some guide to their potential value. As the overall trail rank charts (Tables A and B) above indicate, which trail ranks highest and lowest differs for each source of value. The rank order of railway corridors will not necessarily be identical for all five sources of value; therefore, some subjective judgement about which sources of value should receive the most weight in decision-making is required. It is the prerogative of the assessment body to give greater weight to those sources of value deemed most

important in deciding which railway corridors will provide the greatest value as recreation trails. It becomes a subjective judgement on the part of the valuation body to determine which rail-trail (or railway corridor) ranks highest overall.

Lessons Learned

Need for Further Research

Throughout the research process, and in particular through trial application, it became clear that the method developed, given time and monetary limitations, cannot provide a measure of the potential value of rail-trails to compare against other recreation projects. The ordinal rank number resulting from application of the method provides a meaningful comparison of potential value of projects intending to convert a railway corridor to a recreation trail, but the need to choose between alternative sites for rail-trail development does not occur often. The only organizations likely to make such decisions are trail development associations and rail-trail funding bodies.

A contingent valuation (CV) survey would have provided a more useful measure of actual dollar values to compare the potential value a rail-trail project against other recreation projects. The measure of consumer surplus resulting from such an approach would be a stand-alone figure to use in a variety of situations. However, not all sources of value identified for this thesis would be captured in such a dollar figure. The CV approach is used to calculate non-use values (existence, option and bequest), which includes social, health, heritage and environmental benefits of trails. This approach would not include in its scope the values attributable to user satisfaction, location and catchment area, or access to services, all of which were identified as important contributors to the value of a rail-trail.

There is a need for further research to develop a method that will produce a stand-alone figure that reflects all relevant sources of potential value of railway corridors as recreation trails. Without such a method, it is not possible to accurately capture all sources of potential value of railway corridors to compare rail-trail projects to other types of recreation projects. Having a method in place to assist in making this type of comparison is essential if recreation planners and funding agencies are to make informed decisions about which projects to support. It is my belief that such a method will benefit rail-trail development when funding is scarce.

Trail Planning Tool

The method, as it has been developed, is particularly useful to rail-trail planning and development organizations. The completed railway corridor (or rail-trail) evaluation provides a ranked index of each trail attribute making up the five sources of value. Because the criteria are disaggregated to measure each source of value individually, it is possible to determine which aspects of the railway corridor or rail-trail are the most valuable currently, and which require the most work to increase their value. Rail-trail planning and development can then take this into account and allocate funds in a manner that will increase value most quickly.

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ACKNOWLEDGEMENTS

The research process has been both challenging and rewarding for me. Through researching and writing this thesis I accomplished more than I thought I was capable of. I would first like to thank Canadian Pacific Railways for their generous financial support, which allowed me to conduct research in Nova Scotia during the summer of 2000. My supervisor, Professor Andrejs Skaburskis, also deserves my appreciation and thanks for channelling my interest in recreation and trails to this specific topic, for contacting Bruce Nimmo of Canadian Pacific Railways on my behalf, and for providing guidance throughout the research and writing processes.

I had many other supporters within the faculty, staff and students at the School of Urban and Regional Planning who prompted me to work hard to finish my thesis for a May graduation date. Thank you all for helping to make my two years at Queen's University an enjoyable learning experience.

Finally, I would like to thank my family for their support and encouragement, without which I could not have completed this thesis.

ABSTRACT

The conversion of railway corridors to recreation trails has gained considerable momentum during the 1990s. Rail corridors present an appealing location for recreational trails, as they possess several functional attributes suited for locomotive activities such as gentle curves and grades. Additionally, according to rail-trail literature, a multitude of benefits can ensue from the existence of trails in a community including improved health and increased property values. The purpose of this thesis is to fill an identified gap in the literature by answering the question: how might a method to assess the potential value of railway corridors as recreation trails be structured?

Three bodies of literature were examined to extract the information and concepts required to answer the research question: (1) recreation economics literature, (2) natural resource economics literature, and, (3) general trail and rail-trail specific literature. From the literature review, a preliminary method was developed to assess the potential value of railway corridors as recreation trails. This involved both identifying relevant sources of value, establishing criteria to capture each source of value and devising a method to evaluate those criteria. The preliminary method was then pre-tested on three case study rail-trails in Nova Scotia: the Musquodobit Harbour Rail-Trail, the Centennial Trail and the Sable River Rail Trail. Results from pre-testing were used to develop an interview guide to initiate discussion with key informants. Six "trail experts" were questioned about any key issues or concerns they had with the preliminary method based on results from pre-testing and their own trail evaluation experiences. The final step in the research process involved synthesizing information gained from the literature review, results from

pre-testing, and key informant interviews to develop an improved method to assess the potential value of railway corridors as recreation trails.

From this research process, two key conclusions were reached. First, that it is not possible to use the rank value generated by the method developed to compare rail-trails to other recreation projects. However, using the method to assess railway corridors does result in a useful index of attributes that can be used by rail-trail associations and recreation planners to assist with trail planning and development. Second, additional research on measuring the potential value of railway corridors as recreation trails is necessary to develop method that results in a value figure that will allow for comparison of rail-trails against other recreation projects.

CHAPTER 1 INTRODUCTION

1.0 Introduction

Railroad abandonment began on a large scale in the mid-20th century with the advance of faster air travel and faster, less costly automobile transportation. Vast corridors of land fell into disuse until late 1970s when community and recreation groups began to convert the abandoned railway corridors into walking, hiking and cycling paths. The conversion of railway corridors to trails has gained considerable momentum during the 1990s. In Canada, trails in general and rail-trails in particular have been gaining popularity over the last decade which has culminated in the official opening of the Trans Canada Trail on September 9, 2000 (Trans Canada Trail Foundation, n.d.). This 16,000 kilometre multi-purpose trail is comprised of a mix of trial types, and in Nova Scotia alone approximately 50 percent of the Trans Canada Trail is former railway corridor converted to recreation trails (M. Haynes, personal communication, February 23, 2001). In the United States, the Rails-to-Trails Conservancy reports that since its inception in 1993 over 9,000 miles (14,000 kilometres) of rail-trail have been built across the country (Rails-to-Trails Conservancy, n.d.). The above statistics indicate that an enormous amount of public linear, open space has been made available in rural, suburban and urban communities over the past decade.

Rail corridors, which possess several functional attributes, present an appealing location for recreational trails. The land is partially prepared for trail uses: it has been cleared, levelled and is well drained (Turco et al., 1998). As well, infrastructure built by railway companies (e.g., bridges), provides historical interpretive opportunities and ensures connectivity of trails passing through or over rough terrain. Moreover, the gentle

curves and grades characteristic of railway corridors are ideal for locomotive activities such as walking, jogging and cross-country skiing (Illinois Department of Conservation et al., 1990). Rail corridors also connect communities for hundreds of kilometres in a continuous stretch of trail providing a continuous recreation network.

According to rail-trail and recreation economics literature, a multitude of benefits can ensue from the existence of trails in a community. Some types of benefits can be quantified, while others can only be described in qualitative terms. Similarly, some benefits represent net social gains that can be measured in dollar values, while others represent gains that are not "real" from a social welfare perspective.

Rail-trail development is an important issue for community planners, as the value of such recreation and open space resources must be evaluated against other recreation programs competing for the same scarce municipal or provincial funding. Also, there are issues of how to deal with adjacent landowners' concerns and incorporating this open space network into official plan policies. There are many societal consequences of rail-trail development, but this thesis focuses on only one component mentioned here: the potential value of railway corridors as recreation trails.

1.1 Purpose and Rationale

Although railway corridors are cited in the literature as an excellent location for recreation trails, and the benefits of having such recreation resources are expounded, there exists a gap in the literature. No framework exists to assess a railway corridor's potential value as a recreation trail or to plan for trails that will provide maximum value to society. There is much general trail and rail-trail literature that examines the environmental, health and social benefits of trails to society and individuals without any research, qualitative or

quantitative, to back up these stated benefits or determine their magnitude (Go for Green, n.d. [a]; Go for Green, n.d. [b]; Trails and Greenways Clearinghouse, n.d.; Cruce, 1997; Moore & Ross, 1998). However, several studies attempt to quantify the benefits of trails in dollar figures based on their effect on near-by property values (Moore et al., 1992; Seattle Engineering Department, Office for Planning, 1987), travel costs as a proxy of price (Siderelis & Moore, 1995), economic impacts on surrounding communities (Moore et al., 1992) or trail users' and non-users' willingness to pay for the resource (Lindsey & Knaap, 1999; Joyal, 1975). These studies are useful for assessing the value of existing rail-trail resources where trail users can be surveyed or before and after trail data can be analyzed. However, no studies were found that attempt to predict the potential value of railway corridors as recreation trails. The purpose of this thesis is to fill this identified gap in the literature by answering the question: how might a method to assess the potential value of railway corridors as recreation trails be structured?

1.2 Research Approach

Attempting to fill the identified gap in the literature by setting up a method for assessing the potential value of railway corridors as rail-trails will provide those working in the planning or recreation professions with a tool to evaluate the pros and cons of supporting the development of a rail-trail. Although this research has not been solicited by any agency or organization, this project falls under the heading of applied research, which Babbie (1989, 34) defines as research that produces specific facts and findings that will have policy implications. This master's research will be of some practical use to planners or trail organizations involved in influencing the direction of outdoor recreation and open space policies.

1.2.1 Research Design

This research project lends itself to qualitative research for three main reasons. First, the product of the research is a method, or tool, to evaluate the potential value of railway corridors as recreation trails; the product is not a set of statistical observations that can be measured and interpreted. Second, the research is exploratory. Third, the research approach is inductive in contrast to deductive reasoning, the latter of which is usually associated with more traditional logic models of quantitative research.

The research design was emergent. That is, the researcher did not enter the research process with preconceived ideas about what to include in a method to assess potential value. Rather, observations from the literature and discussions with key informants will help to guide the development of the method.

1.2.2 Research Process

Four steps were taken to answer the research question: (1) a literature review, (2) trial application of the method, (3) key-informant interviews and, (4) re-evaluation of the method. This section will discuss why these steps were included and what the limitations of the research might be given the research process followed.

The type of literature review used in this research is an *integrative research review*, which attempts to synthesize past research on a topic by providing overall conclusions based on previous studies that address related parts of the current research question (Cooper, 1984, 11). As stated above, there is a gap in the literature, which is a framework for assessing the potential value of railway corridors as recreation trails. Numerous studies have developed methods to quantify or qualify the benefits of existing trails, many of which require surveying trail users or analyzing before-trail and after-trail

development data. But no studies were found that discuss or attempt to calculate the *potential value* that railway corridors will generate as recreation trails based on their current attributes. Therefore, an integrative research review is a good way to synthesize previous work on measuring the value of existing trails and use this as a starting point for measuring potential value.

In particular, three bodies of literature are examined to extract the information and concepts required to answer the research question. Recreation economics literature and natural resource economics literature are examined to identify relevant methods, considerations and issues in measuring the value of outdoor recreation and natural resources. Both types of resources are applicable to the present study, as rail-trails possess attributes that may be considered valuable for both natural resource and recreation resource reasons (e.g., access to a lake). Therefore, the methods used and lessons learned from valuing both types of resources can be incorporated into a single method to more accurately assess the potential value of such dual category attributes. Examination of general trail and rail-trail specific literature, the third body of work considered, is obviously necessary to identify those characteristics specifically related to trails and rail-trails that should be integrated into the evaluation method.

From the literature review, a preliminary method was developed to assess the potential value of railway corridors as recreation trails. This involved both identifying relevant sources of value, establishing criteria to capture each source of value and then devising a method to evaluate those criteria. Pre-testing on three case study trails in Nova Scotia was preformed in order to assess how well the method could be used in the field.

The third step employed in the research process was key informant interviews. These were conducted once a preliminary evaluation method had been developed and

results from pre-testing on the case study trails were available. The interviews were quite brief (approximately 30 minutes each) and were conducted by telephone in the interests of saving time and money. The interviews followed a semi-structured format; the interviewer had a general guide for the issues and topics to explore with each recreation professional based on the literature review. One advantage of this method is that it allowed room in the discussion for issues not addressed by the interviewer to emerge (Patton, 1987, 111). A copy of the interview guide can be found in Appendix A. Based on the results from trial application and their own previous rail-trail evaluation experiences, trail "experts" shared their insights about key concerns or issues they found with the method developed.

The final step in the research process was to synthesize the information gained from the literature review, trial application, and key informant interviews. Incorporating all this information led to developing an improved method to assess the potential value of railway corridors as recreation trails and a discussion of methodological issues and considerations for those intending to employ the method. As well, topics for future research were identified.

1.2.3 Data Collection

Several methods for data collection were employed throughout the research process. For the literature review, relevant sources were identified using the ancestry approach and computer and paper keyword searches of indexes and abstracts (see Table 1). Just as in survey research or interviews, it was necessary to consider the population of study and sampling in literature review data collection. Cooper (1984, 37) distinguishes between two different populations for an integrative research review. The target

population consists of all literature related to measuring the value of recreation resources and rail-trails. In an ideal world, this is where the data would have come from. However, all this literature could not be located and read in the time available for the project. This means the data came from the accessible population, which is all the literature that was pragmatically obtainable (Cooper, 1984, 37).

One approach used to obtain the sample from the accessible population was the ancestry approach. This is analogous to the snowball sampling method for interviewing. Essentially, new resources are recruited, and the sample size increased, from the bibliography and reference sections of studies in the possession of the researcher (Cooper, 1984, 41).

A second approach for obtaining relevant studies and literature was keyword searches of paper and electronic indexes and abstracts. Table 1 below lists the relevant paper and electronic resources used to address the research question.

Table 1. Relevant Sources for Research

	Abstract	**Index**	**Paper**	**Electronic**
Sage Urban Abstracts	X		X	
Journal of Planning Literature		X	X	
EconLit		X		X
Engineering Index		X		X
Public Affairs International		X		X
SPORT Discus		X		X
Social Sciences Index		X		X
QCAT		X		X

Identification of key informants for interviews was based on the snowball method. Starting with the key contact, Michael Haynes of the Nova Scotia Trails Federation, the names and contact information of individuals he thought might have relevant information for the project were recruited. Once those key informants were interviewed, their advice

on whom to solicit for information was requested, and so on (Babbie, 1989, 268). This process was quite short and limited, however, due to time and money constraints: six key informant interviews were conducted and a summary of each interview is included in Appendix A.

1.3 Format of the Thesis

This chapter of the thesis has laid out the rationale and purpose of assessing the potential value of railway corridors as recreation trails and has introduced the research approach undertaken to develop a qualitative method to assess this potential value. Chapter 2 will expand on how the method was developed by initiating step one in the research process, the literature review. It begins with a brief review of recreation economics, trail and natural resource economics literature pertaining to value measurement. Based on this discussion, the sources of value to be included in the method are identified. Chapter 3 discusses steps two to four of the research process. Criteria to measure each source of value identified in Chapter 2 are established and a method to use these criteria to measure potential value is developed. The method is then tested for relevance and usefulness through trial application and key informant interviews, the results of which are used to re-evaluate the method developed and make necessary modifications to better measure potential value. Chapter 4 concludes the thesis with a brief summary of the thesis findings and discussion of the advantages and drawbacks of using the method developed.

CHAPTER 2 IDENTIFYING SOURCES OF VALUE

2.0 Introduction

This chapter develops the terms of reference for evaluating the potential value of railway corridors as recreation trails. To develop a method to assess the potential value of railway corridors as recreation trails it is first necessary to identify those attributes, which contribute to the value of a rail-trail. Moreover, it is necessary to define the term *potential value* and explain why this is used in the analysis rather than the term *benefits*. This chapter begins with a discussion of *potential value* as a unit of analysis drawing upon both natural resources and recreation economics literatures. An analysis of recreation economics, natural resource economics and trail/rail-trail literature then follows, focusing on identifying and defining the sources of value that may be relevant for this study. This chapter concludes by specifying those sources of value that contribute to the *potential value* of railway corridors as recreation trails that will be included in the method developed in Chapter 3.

2.1 Terms of Reference: Potential Value vs. Benefits

The positive effects attributed to the existence of trails in a community are often stated in terms of personal or social benefits, such as environmental, health, heritage and so on. While there is little debate about the existence of these benefits they cannot be measured easily nor used in an informative way to assess or compare the magnitude of positive effects accruing from recreation resources. It is, therefore, useful and appropriate to try and place some economic value on recreation resources, which in many cases captures the social and personal benefits arising there from. Economic values provide a

way to capture various benefits and produce a standard measure to compare resources. As Walsh (1986, 213) points out:

> "Statements are frequently made to the general effect that outdoor recreation fills some profoundly felt need; that it has personal, unique, and highly variable values for individuals; that outdoor recreation defies any kind of measurement; or simply that it is priceless. But there are those who hold, as we do, that such values are directly reflected in economic values and that there is no irreconcilable conflict between the social values and the specific economic values."

The term *benefit* is used most often in the literature to discuss the positive effects of trail development, such as the improvement to an individual's health, or the increase in one's property value after construction of a near-by trail. The term *benefits* is used mainly in a descriptive sense:

> "Trails provide all the myriad personal and social benefits generated by participation in outdoor recreation, such as improved health and fitness, relaxation, challenge and adventure, family togetherness, and an increased awareness of nature" (Moore and Ross, 1998, 73).

Therefore, it is more correct here to use the term and concept of *value* to distinguish the measure of potential economic gain accruing from the conversion of railway corridors to recreation trails from the descriptive benefits to individuals.

It is quite a simple procedure to list the expected benefits a rail-trail might have for an individual or community. But for municipal planners and other funding bodies this list alone cannot justify funding the development of a rail-trail. The measurement of relevance for justifying rail-trail funding and development must be a *net gain to society*, whether society is defined as the municipality, region or province. By assessing the potential for economic value only those railway corridors that have high potential for net social gain will be justified in being constructed.

2.2 Identifying Sources of Value

There exists a substantial and growing literature on the benefits of recreation trails and greenways in our communities. From economic spin-offs to health benefits and bringing communities together, recreation specialists and economists have attempted to illustrate how trails and greenways enhance our lives. In the literature, these benefits are often simply stated as accruing to individuals or communities and the reader must assume they have been identified through substantial research using reliable and valid methods. The one class of benefits that researchers have attempted to quantify is economic benefits. Several studies explain how any one of three methods can be used to arrive at dollar values for describing the economic value of existing recreation resources:

- The contingent valuation approach (CV) measures the willingness to pay for a resource based on survey responses to hypothetical markets;
- The travel cost method (TCM) is based on the observed behaviour of out-of-pocket expenses of users of recreation resources; and,
- The unit day value approach, which is based on a range of willingness to pay values developed by recreation resource research agencies (Walsh, 1986, 195).

Nevertheless, it is neither obvious nor explicitly stated how the health, heritage, environmental and social impacts of trails and greenways have been measured, nor is there any indication that it is actually possible to calculate such values. This section of Chapter 2 examines the benefits of recreation trails and other recreation resources found in the literature that may be relevant to the research question, including: social/community, economic use and non-use, health, heritage and environmental benefits.

2.2.1 Non-use Economic Values: Existence, Option and Bequest Values

A considerable amount of economic value, independent of people's use of a natural or recreation resource, derives from simply knowing that a resource exists. Although there is some debate in the literature about terminology (Freeman, 1993; Blomquist and Whitehead, 1995; Loomis and Walsh, 1997; National Park Service, 1991), generally these values are known as *non-use values* and can be defined as follows:

- Existence value comes from knowing there is a guaranteed opportunity for future access to the resource and possibly from moral obligations of stewardship or responsibility to protect certain natural or recreation resources (Freeman, 1993, 141; National Park Service, 1991, 8-10).
- Bequest value is that which arises from the desire to bequeath certain natural and/or recreation resources to future generations (Freeman, 1993, 141; National Park Service, 1991, 8-10).
- Option value derives from preserving the opportunity for future access to the resource (National Park Service, 1991, 8-10).

Existence value can be quantified using the CV method, which provides a measure of the economic value of recreation opportunities and preserving natural resources (Loomis and Walsh, 1997, 159). Survey questions measure the maximum willingness to pay for preserving a natural resource even though the individual does not visit the site. In this method, hypothetical markets—including information about the quality and quantity of the resource and financing options—are used to ask people what they would be willing to pay contingent on the existence of the market (Blomquist and Whitehead, 1995, 576-578). It is noted that often the motivation behind respondents' survey answers is the desire to bequeath the resource to future generations, or a desire to preserve options for future use, capturing both bequest value and option value, as well.

Generally, a drawback of contingent valuation is that it is biased to yield high existence values for recreation natural resources. This is possibly due to the hypothetical

nature of the survey questions, as individuals do not actually have to pay what they report as their maximum willingness to pay (Walsh, 1986, 214; Blomquist and Whitehead, 1995, 583).

2.2.2 Economic Benefits

2.2.2.1 Property Values

There is general consensus in the literature that most people do not feel that property values decrease when they are located adjacent to, or nearby, a recreation resource and that many feel property values increase. In fact, several studies have reported that the majority of respondents believe that being near a trail or other recreation resource increases their property values (Iles and Wiele, 1993; Turco et al., 1992). For example, Walsh reports on a study that found the land surrounding a water reservoir would increase in value by about two million dollars by the time the project was completed. The increase in value was attributed mainly to the recreation opportunities arising from its completion (1986, 223).

Looking specifically at the impact of trails, Moore and Ross (1998, 74) indicate that one benefit of trails and greenways is their amenity, which leads to increased nearby property values, resulting in an increase in tax revenue to the local government. This statement is not substantiated by specific evidence or study, however, and they give no approximation of dollar values arising from this proximity to trails.

Other studies have detailed very extensive research methods to explain how homeowners' and real estate agents' perceptions about property values were elicited. Roger Moore, Alan Graefe, Richard Gitelson and Elizabeth Porter were commissioned by the US National Park Service to "...examine what effects rail-trails have on adjacent and

nearby property values..." (National Park Service, 1992, i). They found that most property owners and real estate agents reported that trails had no negative impact on property values, and it was mainly the suburban trail setting property owners who indicated they expected the trail to increase their property values (National Park Service, 1992, iii). Moreover, real estate agents responded that they thought property nearby, as opposed to adjacent to trails, would experience increased property values (National Park Service, 1992, iii). This was a survey conducted over a one-year period, but unfortunately, no estimates of how much the trails increased property values was given.

Further research does attempt to put a dollar value on the increase in property values, albeit an entirely subjective perception by survey respondents. In a 1994 study of the Northern Central Rail Trail in Maryland, USA, PFK Consulting found that two-thirds of survey respondents thought the trail had a positive impact on their property values (PFK Consulting, 1994, I-2). As was the case with the previous study, those properties nearby, but not abutting the trail were perceived to have the greatest increase in value. This study was able to put amounts of $500 by realtors and approximately $2,500 by property owners on the increase in individual property values due to the trail (PFK Consulting, 1994, IV-48).

In Seattle, the Office for Planning of the Engineering Department (1987) conducted a survey to determine the impact of the Burke-Gillman Trail on property values with much the same result as the previous two studies cited. The trail passes along an abandoned railroad right-of-way, through mainly residential neighbourhoods. Results of this study indicated that although homes within a two block radius were reported as easier to sell and received a price of 6 percent higher than average prices, homes immediately adjacent to the trail were not considered as easy to sell and received almost

nothing more than the average price of homes (City of Seattle, 1987, 2). Those properties adjacent to the trail had a perceived higher risk of noise and other nuisance from trail users.

The literature has shown that both residents' perceptions and actual home sales indicate increased property value is a benefit of locating near recreation resources, particularly trails and greenways in a suburban or more developed area.

2.2.2.2 Indirect Economic Impact

It is a well-argued and documented case that users of recreation resources will spend money in the vicinity of the facility when they visit. Spending on items such as food, lodging, fuel, and recreation equipment is the economic activity generated by the recreation use of resources (Moore and Ross, 1998, 71; Turco et al., 1998, 49; Cruce, 1997, 5; Iles & Wiele, 1993, 25; Walsh, 1986, 373). In most cases expenditure information is gained by surveying trail users on-site, or through the mail. A substantial amount of work has been done in this area for all types of recreation resources. Several US departments and agencies have produced tables estimating the average expenditures per person per day for a variety of activities, including camping, hiking and fishing (National Park Service, 1991, 8-6). These day unit values are based mainly on surveys that use contingent valuation to determine what people would be willing to pay to have such resources available to them.

There is debate in the literature, however, on two accounts. First, there is no consensus about what types of expenditures to include in assessing the economic benefits of recreation resources. The problem is whether to include only direct expenditures, which result from transactions related directly to the trail visit, or to include indirect expenditures, as well, which are those expenditures resulting from direct expenditures.

For example, a direct expenditure is the purchase of a meal in a restaurant adjacent to the recreation area. An indirect expenditure is the additional produce the restaurant owner purchases from a local farmer to make that meal.

The second debate in the literature is about defining the unit of analysis for estimating economic benefits. For example, from a provincial standpoint, expenditures made by residents visiting from other parts of the province do not increase the overall economic well-being of the province: if visitors spend money on food and recreation equipment in the vicinity of a trail, it is money unavailable to spend in their own community. There is no net economic benefit from the provincial point of view, just a different distribution of economic resources—somewhat like a transfer payment. Similarly, there is debate about whether to include money spent by local residents on goods and services directly related to the trail in economic analyses. There is likely no net benefit to the community by local expenditures because it is money local residents will not spend on other goods and services in their community. In sum, these are changes in the distribution of income, or transfers, not real gains in welfare (Walsh, 1986, 375).

This problem is treated in some studies by including only the money spent by out-of-state/out-of-province tourists in economic analysis of recreation trails. In Nova Scotia, results from an extensive on-site interview survey of several trails offered more than one estimate of the economic benefits based on the permanent residence of respondents (Gardner Pinfold Consulting Inc., 1999). Expenditures were reported for several categories of trail users: tourists from outside the province traveling more than 30-minutes drive; tourists from outside the province traveling less than a 30-minute drive, Nova Scotia tourists traveling more than 30-minutes drive and those living within a 30-minutes drive. (Gardner Pinfold Consulting Inc., 1999). Results indicated that non-Nova

Scotians traveling more than a 30-minute drive to the trail spent an average of $1,210 per party. Nova Scotians spent only $210 when driving more than 30 minutes to the trail, and those living within a 30-minute drive spent only $2.50 per party (Gardner Pinfold Consulting, Inc., 1999). The reported economic impact will obviously vary greatly depending on the permanent residence of the trail user.

Other studies do not recognize these distinctions and simply include any expenditure related to the trail in their benefit analysis. In Maryland, PFK Consulting (1994) used a multiplier model provided by the USDA Forest Service, Land Management Planning Staff to estimate direct, indirect and induced economic benefits of the North Central Rail Trail. They found 61 percent of trail users spent an average of $203 per person in 1993 on goods for use on the Trail, resulting in expenditures of over $773,246 with a direct impact of over $88,662.28 in tax revenue for the State of Maryland (PFK Consulting, 1994, IV-44 & IV-45). In this case study, the reader must recognize that all types of trail users are lumped together with no distinctions between local trail users (property owners) and possible non-locals (trail users). The resulting dollar figures cannot be taken to represent net benefits to the community or state as it is unclear where dollars spent by survey respondents originate.

One additional indirect economic impact mentioned in several studies is job creation. In creating a rail-trail, employment may result from trail associations or other community groups receiving funding for trail planning, construction, or maintenance. Jobs created through trail operation will likely result from the commercial services that serve trail visitors (Iles & Wiele, 1993, 25; National Park Service, 1992, III-9; Go for Green, n.d. a). However, this class of benefit has also been cited as problematic to

identify and measure (Walsh, 1986, 374), and no study was found that included a method to measure employment created from trail development and maintenance or.

2.2.3 Health Benefits of Trails

As a society, North Americans are not getting enough physical activity. The Canadian Fitness and Lifestyle Research Institute (CFLRI) estimated that in 1997, just over one-third of Canadian children and youth met the guidelines for optimal growth and healthy development (Go for Green, n.d. b). In 1996, the US Surgeon General estimated that 60 percent of adult Americans were not regularly active, and another 25 percent were not active at all (Trails and Greenways Clearinghouse, n.d.). The repercussions of such lifestyle choices are numerous, including being costly to the health care system. The World Health Organization identifies physical inactivity as one of the four major risk factors of coronary heart disease and as a contributing factor for type II diabetes, hypertension, obesity, osteoporosis, anxiety and stress (Trails and Greenways Clearinghouse, n.d.). The Ontario Ministry of Health has stated that a more active population can yield potential economic benefits by reducing the cost of medical care and sick leave, absenteeism in the work place; health insurance claims and maintaining the independence of older adults, thereby reducing the cost of institutional care (Go for Green, n.d. b).

Trails provide an opportunity to combat these lifestyle ills. They are a place for people to relax and take part in physical activity at almost no monetary cost to the user, or the provider, when compared to traditional recreation facilities such as swimming pools and fitness centres (Iles & Wiele, 1993, 26; National Park Service, 1992, iii). Trails also appeal to a large proportion of the population as a variety of activities can be performed

in one space—walking, jogging, cycling, horseback riding, and skiing. Research conducted in Canada by the CFLRI (1996) reported that walking (84%); bicycling (44%) and jogging (24%) were the most popular physical activities for all age groups and for both sexes (Go for Green, n.d. a). These are all activities easily provided in the community by the construction and maintenance of a recreation trail.

Methods to measure the health benefits of trails include surveys of trail users to determine pre-trail and post-trail activity levels and perceptions of how trail use has affected trail users' lifestyles (Trails and Greenways Clearinghouse, n.d.). Kim Elliott (1998) cites a 1993 study by the RAND Corporation that found each additional mile walked or run by an individual would give an extra 21 minutes of life. This results in a saving to US society on average of $0.34 per mile travelled. The results of surveying trail users' pre and post trail activity habits could potentially lead to an estimate of economic value but again by multiplying the increase in activity time (converted to miles travelled) by the $0.34 dollar figure. However, this method of measuring health benefits of trails is not particularly useful for assessing the potential value of trails, as post-trail development use data is obviously not possible to procure for undeveloped railway corridors. Health benefits of rail-trails can be incorporated into a method to assess the potential value of railway corridors as recreation trails only indirectly through user satisfaction, location and catchment area and connectivity as discussed below in section 2.3.

2.2.4 Social Benefits of Trails

Clarke (1996, 25) contends that trails and greenways provide that elusive "quality of life" feature communities are striving for. Trails bring communities together in many ways. First, there is initial planning and development of a trail by interested residents and

community associations. Partnerships are formed among different associations and individuals, including the public and private sectors in planning and implementing the trail (Cruce, 1997, 5; Go for Green, n.d. a). This connection between community members and groups is continued in the long run to ensure proper trail maintenance. Additionally, rail-trails often cross more than one municipal boundary and may serve as a point of cooperation to bring together local and regional governments. Second, the completed trail serves as a meeting place for the community, particularly when it is a useful transportation corridor between other community facilities such as parks, shops, and services. In the case where a trail abuts residential property, it is even more likely to become integrated into the community as a place to socialize and connect the community (Moore and Ross, 1998, 74; Iles and Wiele, 1993, 27; Dunbar et al., 1992, 1.12).

This is a difficult benefit to measure. However, there is mention of how to value this benefit in the literature. When asking survey respondents whether a trail contributes to their property value, a positive response obviously indicates that the presence of a trail makes a community more attractive to live in (City of Seattle, 1987; National Park Service, 1992). Surveying prospective homebuyers about their decision-making process, and whether or not they include the presence of biking and walking trails in the community in their criteria about where to purchase is another method to measure the social benefits of trails. Finally, surveying residents about the order in which they prioritize a variety of recreation facilities including trails, gives one an indication of whether people value trails in their communities (Clarke, 1996).

Again, this class of benefit is similar to health benefits, as the value of social change is captured by any change in property values rather than as a social change value explicitly.

2.2.5 Heritage Benefits of Trails

Current informal trails and greenways tend to have been used in the past and have historic significance. Trails and greenways often follow historic transportation routes and often link, provide access to, and incorporate historic features such as battlefields, bridges, buildings and canals (Trails and Greenways Clearinghouse, n.d.). This is particularly true of railway corridors.

The day the last spike of the trans-Canada railway was driven into the Canadian Pacific line in British Columbia in 1885 was an important one for Canada. Rail transportation was the only way to ship goods and people across the country from east to west. Now that millions of kilometres of railway corridors are being abandoned by railway companies, it is an opportunity for communities to preserve and restore the historic buildings and corridors that brought the country together (Iles and Wiele, 1993, 27; Dunbar et al., 1992, 1.13). For example, historic rail yard buildings on Charlottetown's waterfront are being renovated to provide a location for shops and services in the central tourist area. Bridges, tunnels and other engineering marvels can be preserved and used not only as infrastructure for new recreation trails, but also for interpretive educational purposes (Marsh, 1994).

There is opportunity with the CV approach to capture the heritage value of a bridge, station, or other structure along the railway corridor (Iles and Wiele, 1993, 25). Non-use values include in their measurement the value of preserving and protecting such heritage structures for intrinsic, altruistic or bequeathal purposes. This is one class of benefit that may be measured and quantified in economic terms.

2.2.6 Environmental Benefits of Trails

It is argued in the literature that both humans and non-humans will feel environmental benefits of protecting and preserving trails and greenways. Preserving corridors of open space is considered a key to stabilizing our ecosystem and protecting environmental habitats for a variety of species (Cruce, 1997, 6; Moore and Ross, 1998, 75). Corridors are also a unique type of open space in that they provide migration routes and travel corridors for wildlife (Iles and Wiele, 1993, 26). Greenways provide an important link between "islands" of parkland and wildlife habitats that currently exist due to expansive and sprawling development at the edges of cities (Trails and Greenways Clearinghouse, n.d.). Moreover, this protection leads to interpretive opportunities for our children and communities about the wildlife that live there (Moore and Ross, 1998, 75). Rail-trails and greenways also provide the opportunity for eco-tourism by protecting critical habitat (Trails and Greenways Clearinghouse, n.d.).

From a human perspective, corridors help to mitigate water, air and noise pollution. Greenways are natural buffer zones protecting rivers and streams from potentially hazardous urban and agricultural run-off (Trails and Greenways Clearinghouse, n.d.; Go for Green, n.d. b). Air quality is improved due to increased plant species that "filter" our air. Also, using trails and greenways as alternative transportation routes assists in reducing pollution and greenhouse gases.

Environmental benefits of trails, such as those listed above, are likely to be captured in a CV survey measuring non-use existence and bequest values.

2.3 Choosing Relevant Sources of Value

Although many types of benefits experienced by both individuals and communities were discussed in the preceding section, not all will be identified here as a source of value for further study. In some cases, several classes of benefits are grouped together and captured in once source of value. In other cases, a particular class of benefit is not considered relevant for the present study. Which benefits get transformed into sources of value and how exactly that occurs is examined in detail in this section of the thesis.

2.3.1 Property Values

Based on the results from several studies as outlined above, trails in a more urban setting add value to property near the trail. However, this is a transaction between buyer and seller represents only a transfer from one party to another. A higher selling prices means the purchaser has less money to spend on other goods and services in the community and the net gain to society is zero. There may be the potential to have society benefit from higher property values if this leads to a higher property tax paid to the municipality. The transfer of income in this case might end in redistribution in some socially desirable way. However, for the purpose of this thesis, the possible social gains due to increased property values are considered a secondary source of value and are not a direct impact of conversion of a railway corridor to a recreation trail.

2.3.2 User Experience

Trail planning and design must reflect not only the physical needs of trail visitors, but also the social dimension of the leisure experience (Westphal and Lieber, 1986, 39).

The physical attributes of a trail have a great impact on a user's satisfaction with their leisure experience. Those trails that maximize the attributes deemed most desirable by trail users will likely have higher visit volume. Therefore, the magnitude of social and health benefits resulting from trails depends ultimately on whether people actually visit and make use of the resource. Westphal and Lieber (1986) in their work on user satisfaction have developed the *policy capture function* to describe the relationship between attributes, visitation and anticipated satisfaction, which is discussed further in the next section on methods found in the literature.

2.3.3 Location and Catchment Area

This is also a key component of determining the potential number of visitors, which will affect economic, health, and social benefits as discussed above. Given the location of a railway corridor, it is possible to predict the number of visits that will likely occur, at least between several different locations, all other things being equal. This may end up favouring urban trails over rural trails as a much greater population, thus potential trail users, will be located in the preferred area of a trail. A method to estimate the possible volume of trail visits is detailed in the next chapter of the thesis.

2.3.4 Non-use Values

Existence, option and bequest values can capture many of the benefits mentioned above such as environmental, social, heritage and health benefits. Additionally, this source of value can account for the value that non-trail users attribute to having a trail in their community. It is therefore possible to include the value that wider society places on the existence of a trail.

2.3.5 Connectivity

The connectivity value is unique to railway corridors and rail-trails in that it is railway infrastructure, such as bridges, that result in the low cost of conversion and enhance the length of trails and connectedness of communities. This is an appropriate source of value to account for the environmental benefits arising from the development of a continuous green corridor including protection of an ecosystem and migration corridor and provision of an alternative transportation route. Moreover, social benefits such as connection of communities, is captured in the connectivity value as well.

2.4 Review of Trail Evaluation Methods

In the preceding section, four categories were identified as key components of value in any method to evaluate and compare the potential value of railway corridors as recreation rail-trails: (1) user satisfaction, (2) non-use values, (3) location and catchment area and, (4) connectivity. Two of those sources of value—user satisfaction and non-use values—have some type of measurement method associated with them as discussed in the literature. However, the connectivity and location and catchment area sources of value do not have such methods developed in the literature, other than indirectly through the user satisfaction criteria. This section of the thesis examines the literature for methods developed to measure the value of user satisfaction and non-use sources of value.

Existence, option and bequest values are often measured in the literature using CV surveys. For the purpose of this thesis, however, CV is not an option to assess this source of value, as it requires a great amount of time and money to design, implement and interpret a survey.

In a study of Chicago area trail users, five trail attributes were identified as being most important to trail users' satisfaction, regardless of type of use (Allton and Lieber, 1983). These attributes are categorized as follows: vegetation changes, time on trail, time from home, trail surface and trail terrain. In a second study, Westphal and Lieber (1986) used these five trail attributes to survey trail users about their preferences. Trail users were given descriptions of several hypothetical trails, each with a different combination of the five attributes. Survey responses indicated that each user group (bicyclists, joggers, day-hikers, and cross-country skiers) preferred a unique combination of trail characteristics and Westphal and Lieber were able to identify the ideal trail type for each group (1986, 43). These attributes were used to develop a policy capture function, which assisted in identifying the magnitude of satisfaction change with attribute change (Westphal and Lieber, 1986). The magnitude of change in satisfaction would differ for each type of user, as the different groups have slightly different preferences for trail design (Westphal and Lieber, 1986, 43). These values provide the input for developing a method to assess a railway corridor's potential value as a recreation trail.

2.5 Summary

This chapter has explored literature relevant to identifying sources of value to assess the potential value of railway corridors as recreation trails. From this discussion, five sources of value were identified, four of which will be used in Chapter 3 to develop a method to assess potential value. These sources of value as discussed above, are considered to capture most of the social and individual benefits attributed to trails.

CHAPTER 3 DEVELOPING A METHOD

3.0 Introduction

This chapter details the process of developing a qualitative method that can be used to assess the potential value of railway corridors as recreation trails. The method developed can be used to rank one railway corridor against another and any numbers generated in the course of evaluation are ordinal data only. That is, the rank value is not a stand-alone indicator of value. It is useful only in the context of comparing several rail-trails or railway corridors in order of potential value. Weighting the various sources of value included in this method is a subjective decision to be made by those involved in the decision to convert a railway corridor to a recreation trail.

This chapter is divided into three sections. It opens with a more detailed discussion of the research process. Next, a method to assess potential value is developed drawing on information and insight gained from the literature review, trial application of the preliminary method and key informant interviews. The chapter concludes with further consideration and discussion on measuring potential value.

3.1 The Three Step Research Process

Step 1: Literature Review

Results of the literature review have identified five sources of value contributing to the overall value of railway corridors as recreation trails, four of which were considered relevant to include in the method: user satisfaction, non-use values, location and catchment area, and connectivity. It is now necessary to establish four sets of criteria that can be used to assess these sources of value for a railway corridor.

Step 2: Trial Application

The purpose of step two is to conduct a preliminary evaluation of the method to assess the potential value of railway corridors as recreation trails which was developed through the literature review. This is accomplished by applying the criterion to measure sources of value to several case study rail-trails in Nova Scotia: the Sable River Rail Trail, the Musquodobit Harbour Rail Trail and the Centennial Trail (see Figure 1 below). The result is a ranking of the three trails in order of *potential value* according to the four relevant sources of value identified in step one.

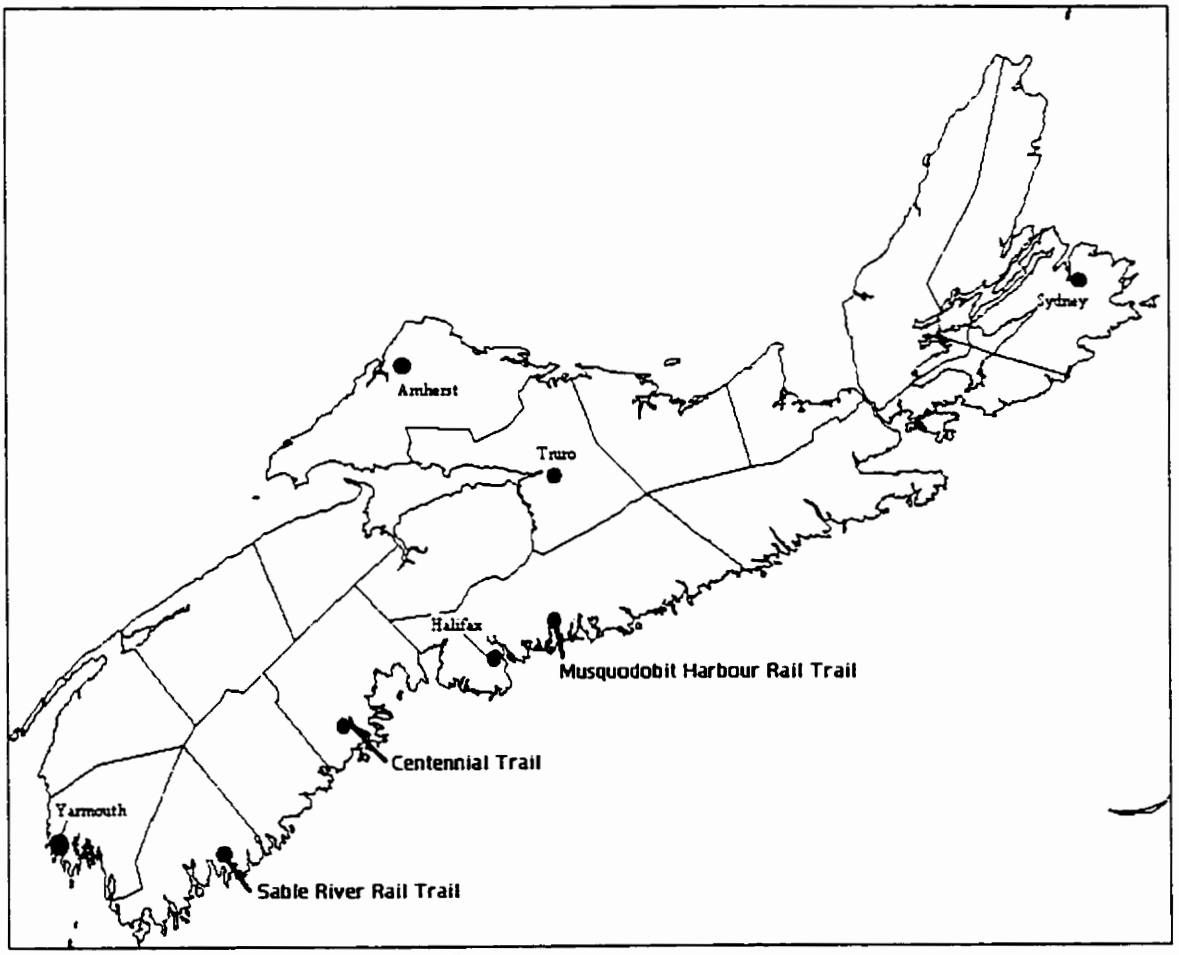

Figure 1. Location of Case Study Trails
Source: Government of Nova Scotia, http://www.gov.ns.ca/snsmr/land/online/free.stm

Trial application also aids in examining how well the method works in the field and its relevance in light of actually visiting the case study rail-trails. During trial application, the various criteria to assess potential value are evaluated as to their appropriateness and usefulness leading to suggestions for improvements to the method. The ranking of trails also serves as a discussion point for interviews with key informants regarding the validity of the method developed.

The Case Study Trails

Three rail-trails in Nova Scotia were chosen as case study trails for the project. The choice of trails reflects diversity of settings—from urban to isolated rural—and levels of development—from refitted railway bridges and outhouses to nothing more than the removal of tracks by CN. The intention is to test trails with obviously different locational attributes. This difference in locational attributes should show up in the ranking as measured by the criteria, which will give insight into how well the criteria work. A site visit to each trail was conducted in June 2000. A brief description of each case study trails follows.

Table 2. Summary Table of Case Study Trails

	Musquodobit Harbour Rail Trail	**Centennial Trail**	**Sable River Rail Trail**
Location	Halifax Regional Municipality	Town of Bridgewater	Sable River
Length	14.5 km	8 km	26 km
Key Features	• Re-fitted railway bridges • Washroom and picnic facilities • Trans-Canada trail segment	• Links residential, commercial and industrial parts of town • Trans-Canada trail segment	• Several unimproved rail bridges
Ownership	Musquodobit Trailways Association	Coalition of local trail associations	Informal use

The Musquodobit Harbour Rail Trail

Figure 2. Steel Truss Bridge on Musquodobit Harbour Rail-Trail
Source. T.Baker

The Musquodobit Harbour Rail Trail is located approximately 25 minutes' drive from Metro Halifax/Dartmouth. Conversion to a recreation trail by the Musquodobit Trailways Association was completed in October 1998. The trail covers 14.5km between the communities of Musquodobit Harbour and Gibralter Rock. Several former railway bridges along the trail have been refitted for pedestrian traffic, including a steel truss bridge located only about 100m from the Musquodobit Harbour trailhead. The trail is a part of the Trans-Canada Trail initiative and was a stopping point for Relay 2000.

Figure 3. Centennial Trail, Bridge Over LaHave River
Source: T.Baker

The Centennial Trail

The Centennial Trail is made up of approximately 8km of abandoned railway line on the outskirts and passing through the Town of Bridgewater. It links outlying residential and industrial areas with the downtown riverfront main street. It is being developed by a coalition of several community trail associations and is part of the Trans-Canada Trail initiative.

The Sable River Rail Trail

The Sable River Rail Trail is an informal trail not maintained by any group, but it has been used for recreation since the railway line was abandoned in 1983. This trail is part of the Liverpool to Yarmouth CN railway line, which was the first in Nova Scotia to be abandoned and designated for recreational purposes. The trail is approximately 26km long, starting in Sable River and connecting with the community of Summerville Beach. No community group maintains this stretch of railway bed and the bridges that cross the Tidney River, Mitchell Creek and Broad River are not fitted for pedestrian traffic and remain unimproved.

Figure 4. Sable River Rail-Trail
Source: T. Baker

Step 3: Key Informant Interviews

In step one, five sources of value for rail-trails were identified, four of which were deemed relevant for this project. A set of criteria for measuring each of the four sources of value was then developed into a method to assess the potential value of railway corridors as recreation trails. This step in the research process compares trail evaluation criteria identified during interviews with trail experts against the initial sources of value and criteria developed. The results of this comparison help to show whether the initial sources of value are appropriate measures of trail potential and whether important criteria to measure trail value were overlooked.

The Interviews

Six interviews were conducted with "trail experts" working in various positions in the rail-trail field in Nova Scotia. Of the six interviewees, three held volunteer positions and three held paid positions.

Six interviews were conducted after contacting twelve individuals over a two-week period in July 2000. Five of the six interviews took place via telephone, mainly because interviewees were located across the province and it was not possible for the interviewer to travel long distances. Several interviewees were identified through preliminary discussions with Michael Haynes, Executive Director of the Nova Scotia Trails Federation. The first group of informants suggested additional contacts, which were followed up on.

The interview process was unstructured and the discussion strayed from a strict question answer format to a more informal discussion, which often revealed answers to interview questions without me specifically asking them. A copy of the interview guide is available in Appendix A. Many informants offered further contact names and several asked for a completed copy of this thesis. As discussed in the next section, several of the criteria used resulted in different trail rankings and other important criteria as suggested by informants were not included in the initial evaluation method. A summary of each of the interviews is available in Appendix A.

3.2 A Method to Assess the Potential Value of Trails

The three steps of the research process are synthesized here in the development of a qualitative method to assess the potential value of railway corridors as recreation trails. The next section brings together the literature review, the trial application on three cases

study trails and the key informant interviews by discussing criteria and method according to each source of value.

3.2.1 Predicting User Satisfaction: Five Attributes

In a study of Chicago area trail users, five trail attributes were identified as being most important to trail users' satisfaction, regardless of type of use (Allton and Lieber, 1983). These attributes are categorized as follows:

Table 3. Five Trail Attributes

Trail Feature	Characteristics
1. Trail Surface	a. Dirt b. Gravel, woodchips or sawdust c. Paved
2. Trail Terrain	a. Relatively flat b. 1 hill per ½ kilometre c. 3 hills per ½ kilometre
3. Time on Trail	a. Less than 1 hour b. 1 to 2 hours c. 2 to 4 hours
4. Vegetation Changes	a. 0-3 changes per ½ kilometre b. 4-6 changes per ½ kilometre c. 7 or more changes per ½ kilometre
5. Time from Home	a. 9 minutes away (or less) b. 18 minutes away c. 36 minutes away

Source: Adapted from Westphal and Lieber, 1986, 41.

In a second study, Westphal and Lieber (1986) used these five trail attributes to survey trail users about their preferences. Trail users were given descriptions of several hypothetical trails, each with a different combination of the five attributes. Survey responses indicated that each user group (bicyclists, joggers, day-hikers, and cross-country skiers) preferred a unique combination of trail characteristics. Westphal and Lieber were able to identify an ideal trail type for each group based on the survey as outlined in Table 4 below.

Table 4. Preferred Trail Types

	Trail Surface	Trail Terrain	Time On Trail	Vegetation Changes	Time From Home
Bicyclists	Paved	2 hills per ½ km	3 hours	7 or more per ½ km	9 minutes
Cross-country Skiing	Dirt	3 hills per ½ km	3 hours	7 or more per ½ km	9 minutes
Day-hiking	Dirt	1 hill per ½ km	1 hour	5 or more per ½ km	9 minutes
Jogging	Wood	0 hills per ½ km	1 hour	5 or more per ½ km	9 minutes
Equal Users	Dirt	2 hills per ½ km	3 hours	7 or more per ½ km	9 minutes

Source: Adapted from Westphal and Lieber, 1986, 43

Westphal and Lieber also measured the magnitude of change in user satisfaction that a change in any one of these attributes would effect. As illustrated in Table 5 below, the magnitude of change in satisfaction for each type of user differs for the same change in attribute because each user group has slightly different preferences for trail design (Westphal and Lieber, 1986, 43). For example, changing the trail surface from dirt to gravel effects a change in user satisfaction by 5 points for cyclists, but only 2 points for joggers. These values provide the input for a method to assess a railway corridor's potential value as a recreation trail.

Table 5. Magnitude of Trail Attribute Change on User Satisfaction

		Magnitude of Change			
Trail Attributes	Difference from Ideal Type	Bicycling	Skiing	Day-hiking	Jogging
Trail Surface—change from dirt to woodchips or gravel	-	05	04	02	02
Trail Surface—change from dirt to paved	-	34	13	18	11
Trail Surface—change from gravel or woodchips to paved	-	29	09	16	09
Type of Terrain (hills per ½ kilometre)	1 hill	01	09	03	06
Time on Trail (hours)	½ hour	02	01	02	02
Vegetation Changes (per ½ kilometre)	3 changes	00	14	11	01
Distance from Home (minutes)	9 minutes	10	08	09	21

Source: Adapted from Westphal and Lieber, 1986, 42

Trial Application

The following method was used to evaluate potential user satisfaction of a railway corridor converted to a recreation trail based on the ideal trail types and magnitude of change identified by Westphal and Lieber (1986) and presented in Tables 4 and 5 above.

1. *Determine if there will be one major user group or if all user groups will share the trail will share the trail equally (this information can be found by looking at statistics from near-by existing trails or discussions with recreation professionals working in the area).*
2. *Use Table 4 to identify the ideal trail characteristics for the major user group or the equal share user situation.*

All three case study trails were observed to have equal types of users, therefore, the ideal trail attributes listed in column one of Table 6 are those of the equal user situation as identified in Table 4.

3. *Visit potential railway corridors and record how well each possible trail site fits the ideal trail attributes.*

All trails were traversed in June 2000 and the actual characteristics of each attribute recorded. Table 6 lists each trail, its ideal attributes as identified for the equal use situation and the actual observed attributes from site visits.

Table 6 User Satisfaction: Ideal vs. Observed Trail Attributes for Case Study Trails

Ideal Attribute Equal User Situation	**Observed Trail Attribute**		
	Musquodobit Harbour	**Sable River**	**Centennial**
Trail Surface (dirt)	Gravel	Gravel	Gravel
Trail Terrain (2 hills)	0	0	0
Time on Trail (3 hours/1hour)	1.5/1	3/1	0.75/1
Vegetation Changes (7+ per ½ km)	4-6	4-6	7+
Time From Home (% pop. within 9 minutes)	Unavailable	Unavailable	Unavailable

The *time on trail* attribute for the equal user situation required slight alteration to include both the 3-hour ideal for skiers and cyclists and the 1-hour ideal for joggers and hikers. It considers two numbers, both the longer time requirements of skiers and bikers

and the shorter time requirements of hikers and joggers. Thus two numbers appear in the time on trail column for each rail-trail.

The feasibility of using the *time from home* attribute in valuing user satisfaction is questionable. It was not possible to procure population density information at a small enough scale to do these calculations for any of the three case study trails. It may be difficult to obtain population density information for such a small-scale area. In the particular case of these three trails, it is not clear how including information for time from home would affect the results of the user satisfaction ranking.

4. *Compare ideal and observed attributes using the values in Table 5 to score each potential site. If the observed attributes are identical to the ideal attributes, a score of zero is recorded.*

After visiting the trails and attempting to apply the criteria developed from the literature review, it was clear that Table 5 required modification to reflect the magnitude of change in user satisfaction for the equal user situation. The magnitude of change for the equal user situation was calculated by taking the average of the magnitude of change value for the four types of users listed in Table 5. The modified measure of change is as follows:

Table 7. Equal Uses: Magnitude of Trail Attribute Change on User Satisfaction

Trail Attribute	**Difference from Ideal**	***Magnitude Of Change***
Trail Surface—change from dirt to woodchips or gravel	-	***03***
Trail Surface—change from dirt to paved	-	***19***
Trail Surface—change from gravel or woodchips to paved	-	***16***
Type of Terrain (hills per ½ kilometre)	1 hill	***05***
Time on Trail (hours)	½ hour	***02***
Vegetation Changes (per ½ kilometre)	3 changes	***07***
Distance from Home (minutes)	9 minutes	***12***

The method to determine the *time from home* attribute also required further refinement when it came to actually applying the measurement criteria. According to Allton and Lieber (1983) there are three scales for this attribute: (1) 9 minutes or less away, (2) 10-18 minutes away, and (3) 19-36 minutes away. The trail with the highest population proportion within 9 minutes of the trail scores 0, that with the highest population proportion within 10-18 minutes scores –12 and that with the highest population proportion within 19-36 minutes scores -24. This ranking should be calculated from all formal trailheads.

Table 8. Potential User Satisfaction of Musquodobit Harbour Rail-Trail

Attribute		Size of Change (Table 7)	Magnitude of Change (Table 7)	Total Magnitude (Size x Magnitude)
Ideal	**Actual**			
Dirt	Gravel	-	03	-3
2 hills	0 hills	1 hill	05	-10
3/1 hours	1.5/1 hours	½ hour	02	-6/0
7+/ ½ km	4-6/ ½ km	3 changes	07	-7
9 minutes	Unavailable	9 minutes	12	Unavailable
Total	**Difference**			**-26**

Table 9. Potential User Satisfaction of Sable River Rail-Trail

Attribute		Size of Change (Table 7)	Magnitude of Change (Table 7)	Total Magnitude (Size x Magnitude)
Ideal	**Actual**			
Dirt	Gravel	-	03	-3
2 hills	0 hills	1 hill	05	-10
3/1 hours	3/1 hours	½ hour	02	0/0
7+/ ½ km	4-6/ ½ km	3 changes	07	-7
9 minutes	Unavailable	9 minutes	12	Unavailable
Total	**Difference**			**-20**

Table 10. Potential User Satisfaction of Centennial Trail

Attribute		Size of Change (Table 7)	Magnitude of Change (Table 7)	Total Magnitude (Size x Magnitude)
Ideal	**Actual**			
Dirt	Gravel	-	03	-3
2 hills	0 hills	1 hill	05	-10
3/1 hours	0.75/1 hours	½ hour	02	-8/0
7+/ ½ km	7+/ ½ km	3 changes	07	0
9 minutes	Unavailable	9 minutes	12	Unavailable
Total	**Difference**			**-21**

5. *Use this score to rank potential trail sites against each other. All other factors being equal, the nearer to zero the score, the greater the predicted user satisfaction as the potential site is nearer to meeting the ideal characteristics.*

Table 11. Comparing User Satisfaction

	Musquodobit Harbour	**Sable River**	**Centennial**
Total Difference	-26	-20	-21
Rank	**3**	**1**	**2**

The total difference row indicates the score of each case study trail in terms of value derived from user satisfaction. As the Sable River Rail Trail scores nearest to zero, it is the trail that most closely resembles the preferred trail type as identified in Table 4 and is ranked first. Second is the Centennial Trail, separated from Sable River by only one point, and the third ranked trail is the Musquodobit Harbour Rail Trail.

Key Informant Interviews

The criteria and method discussed above attempts to measure potential user satisfaction. This includes the five trail attributes identified by Westphal and Lieber: terrain, surface, vegetation, time on trail, and time from home. From the interview summaries, it is clear that the first three attributes are a consideration in almost all trail experts' evaluation of a trail. Varied scenery, terrain and natural features are common responses to what makes a good trail. However, the results of ranking the case study trails differ between case study evaluation and the trail expert opinions. Four trail experts ranked the Musquodobit Trail first because of its physical attributes. In case study evaluation, the Musquodobit Trail fared no better than the other trails on surface, terrain and vegetation criteria and ended up ranked third when time on trail was included in the overall user satisfaction ranking.

The *time on trail* attribute contributes to the Musquodobit trail's third place ranking because it is rather short for cycling and cross-country skiing activities, whereas the other two trails offer longer routes for these uses.

Furthermore, measuring vegetation by the number of changes per half kilometre is not specific enough to recognize the differences between the Sable River Rail-Trail and the Musquodobit Harbour Rail-Trail. That is, a change from wooded area to open swamp back to wooded area and again to swamp on the Sable River Rail-Trail constitutes three vegetation changes. In the case of the Musquodobit Harbour Rail-Trail, those three changes may be from deciduous woods to lake to granite outcroppings to swamp. Although this also represents three changes, all offer a unique change in scenery.

In attempting to make sense of this difference between trial application and trail "expert" ranking, the concept of "scenery" is emphasized. A more appropriate measure to include in the user satisfaction matrix might be the type of scenery viewed by the user, not just the number of vegetation changes. In research on visual preferences of Acadia National Park users Steinitz (1990) discovered that the composition of a scene or view greatly affected users' visual satisfaction with their park experience. Steinitz used linear regression methods to develop a model that tested 38 measures describing scenery and views along the Loop Road in Acadia National Park (1990, 223). From this analysis, the following factors (in decreasing order of importance) were found to affect users' satisfaction with visual landscape in the park:

1. No views of developed or urbanized landscape or evidence of crowded use.
2. A sense of mystery (i.e., curves in trail, edge zones between forest and open land or water).
3. Development considered generic to the locality and/or development with "historical" character.
4. Water.
5. No tourist-oriented development.

6. Long distance views.
7. A "folded" landscape (typically mountains and islands).
8. A diverse and well-maintained vegetation distribution.

Most of the visual preference characteristics noted above are applicable to the visual integrity of rail-trails, but only numbers two and eight are captured by the existing measure of user satisfaction through the *change in vegetation* attribute. It is possible to incorporate the remainder of these characteristics into the user satisfaction matrix (Table 5 above) by replacing the *change in vegetation* attribute with more appropriate measures of visual satisfaction. A method to assess potential visual satisfaction based on these eight characteristics is developed below.

Each of the eight characteristics received a weight of predictivness of visual satisfaction in the Loop Road study, which informs the scoring of each for this method (Steinitz, 1990, 224). The absence of developed or urbanized landscape was about twice as important to visual satisfaction as the next highest characteristic. Therefore, it has a magnitude of 2 in Table 12. Mystery was the next highest characteristic with a weight of about 0.5 times that of the next highest characteristic. Therefore, it receives a score of 1 in Table 12. The next six characteristics are weighted within approximately one point of each other; therefore all score ½ in Table 12.

Because vegetation changes were counted per ½ kilometre in the Westphal and Lieber (1986) study, the same measure holds in the method developed here. This distance is assumed to be the length of trail that requires visual change in order to be visual stimulating for users. Table 12 outlines the method developed here to measure visual satisfaction:

Table 12. Measuring Visual Satisfaction

Visual Characteristic	Points per Occurrence Per ½ kilometre
Views of development/urbanization	- 2
Curve in trail/edge scenery	1
Generic or "historic" development	½
Water	½
Tourist oriented development	- ½
Long distance view	½
Mountains or islands	½
One or more changes in vegetation	½

Source: Adapted from Steinitz, 1990, 223-224.

User Satisfaction Revised

Based on the preceding discussion of issues brought up through trial application of the method to assess potential value, the chart to measure user satisfaction has been modified and is presented in Table 13 below.

Table 13. Effects of Trail Attribute Change on User Satisfaction--Revised

Trail Attributes	Difference From Ideal Type	Bicycling	Skiing	Day Hiking	Jogging	*Equal Uses*
Trail Surface—change from dirt to woodchips or gravel	-	05	04	02	02	*03*
Trail Surface—change from dirt to paved	-	34	13	18	11	*19*
Trail Surface—change from gravel or woodchips to paved	-	29	09	16	09	*16*
Type of Terrain (hills per ½ kilometre)	1 hill	01	09	03	06	*05*
Time on Trail (hours)	½ hour	02	01	02	02	*02*
Visual Satisfaction	*Scored using Table 12*					
Distance from Home (minutes)	9 minutes	10	08	09	21	*12*

Source: Adapted from Westphal and Lieber, 1986, 42

The method to evaluate potential user satisfaction of a railway corridor converted to a recreation trail was also updated to reflect these changes:

1. *Determine if there will be one major user group or if all user groups will share the trail equally (can be found by looking at statistics from near-by existing trails or discussions with recreation professionals working the area).*
2. *Use Table 4 to identify the ideal trail characteristics for the major user group or the equal user situation.*
3. *Visit potential railway corridors and record how well each possible trail site fits the ideal trail attributes.*

4. *Compare ideal and observed attributes using the values in Tables 12 and 13 to score each potential site. If the observed attributes are identical to the ideal attributes, a score of zero is recorded.*
5. *Total scores for all five attributes for each site.*

Use the score from step five to rank potential trail sites against each other. All other factors being equal, the nearer to zero the score, the greater the predicted user satisfaction as the potential site is nearer to meeting the ideal characteristics.

However, it is not enough to assess the railway corridor as it exists without making some judgement about the possibility to improve the potential of user satisfaction. The trail surface and time on trail variables are fairly simple to alter. It is not difficult to bring in the necessary material and equipment to pave a trail, and it may be possible to construct several trailheads so that trail users can exit the trail at a distance most suitable for their visit. It is also possible to improve the trail terrain and vegetation change attributes at some expense by planting and clearing trail edges or doing substantial cut and fill to create hills. After initial valuation of potential trail sites, a trail assessment body should consider possible improvements and the trails re-scored in their post-improvement state to ensure a more accurate evaluation of the railway corridors' potential as recreation trails.

It is not possible to change the location of a trail; therefore, this variable should be given considerable weight in evaluating the potential of a railway corridor. A method to deal with the locational attribute is detailed later in this section of the thesis.

3.2.2 Trail Location & Catchment Area

Potential volume of visits is a logical indicator of a railway corridor's potential value as a trail. If a trail has no visitors, it is obviously not highly regarded by the community and has no value to society. A one-hour drive catchment area was considered

a reasonable area as adapted from land use planning standards for regional park locations (Leung, 1999).

A method to assess the possible volume of visits to the trail is as follows:

1. *Draw the railway corridor with potential trailhead locations on a dot density map of the area.*
2. *Draw a circle around each trailhead, with each circle representing one-hours' driving time. The radius of each circle from each trailhead may differ, depending on speed limits posted on roads falling within each circle.*
3. *Calculate the population falling within each of the circles and sum the total population for each trail.*
4. *Holding all other factors equal, the trail with the greatest number of people living within one-hours' drive a trailhead will have the most visitors.*

Desktop-mapping software would make this process quite quick and efficient, but it is not necessary if a high quality dot-density map is available.

Trial Application

Potential volume of visits was measured using a population density map of Nova Scotia. All developed trailheads for each case study trail were identified on the map and the numbers of people living within one hour's drive (approximately 100km) of those trailheads were identified as potential visitors. Trails were then ranked from one to three based on the population falling within its catchment area. Results are as follows:

Table 14. Trail Location and Catchment Area Ranking

	Musquodobit Harbour	**Sable River**	**Bridgewater**
Population in 100km	159,000	32,500	35,000
Rank	**1**	**3**	**2**

In this instance, the Musquodobit Rail Trail has the highest value indicating the greatest potential number of visitors, followed by the Bridgewater's Centennial Trail and the Sable River Rail Trail respectively.

Key Informant Interviews

A trail's location and catchment area was not an explicit criterion suggested by any of the trail experts. However, Laura Barkhouse expressed concern over attempting to rank trails that she considered completely different experiences: urban versus rural. Any trail ranking computed by using the potential number of visitors to a trail will likely favour the urban trail. Both types of trail offer a legitimate recreation experience and, it may be argued, this is measured by the physical trail attributes within the user satisfaction source of value and any unique features of the trail are captured in the existence, option and bequest values ranking. Having the trail location and catchment area ranking potentially favour the more urban trail is not necessarily a problem, as this is just one of many indicators of potential value. Rural trails may be favoured by some other attribute included in the method to assess potential value, such as scenery. It is the combination of all sources of value that lead to a final ranking.

3.2.3 Qualitative Assessment of Existence, Option and Bequest Values

Although it was not possible to carry out extensive contingent valuation survey research to quantify existence, option and bequest values of potential rail-trails, it may be possible to make some rank order judgement about their possible values.

To elaborate, it stands to reason that the non-use values of an endangered natural resource, a unique recreation opportunity, or a significant cultural heritage structure will likely be higher than those of a standard recreation area or a stand of common hardwoods. Therefore, a railway corridor converted to a recreation trail that offers any of the unique characteristics noted above will be of higher value than one that passes through standard territory with no heritage structures.

This method involves assigning a railway corridor one point for each unique recreation feature, endangered species (plant or animal) or cultural artefact it possesses. Determining what constitutes environmental, recreational or cultural "significance" may require interviewing local recreation professionals, environmentalists and historians to identify salient features of the railway corridor. However, highly sensitive sites will likely be identified by local media coverage. Once all points are distributed, railway corridors can be ranked in order of probable non-use value.

Trial Application

This was quite a difficult value to measure. It required discussion with local recreation departments and evaluation of the trail association literature to identify the number of unique cultural, recreation and natural assets each trail possessed.

Table 15. Existence, Option and Bequest Value Ranking

	Musquodobit Harbour	**Sable River**	**Centennial**
Natural Resources	• White Lake area designated as Wilderness Protected Area by NS Dept of Natural Resources	• Tidney River area designated Wilderness Protected Area by NS Dept of Natural Resources	
Cultural/Historic Significance	• Steel truss bridge		• Rail bridge designated a historic landmark by Town
Unique Recreation Opportunities	• Bayer Lake sand beach • Canoeing in chain of lakes in White Lake protected area • Adjoining rugged hiking trail to Jessie's Diner look-off point	• Trail connection to Wilkins Lake sandy beach	• Adjacent to shopping facilities
Total Points	5	2	2
Ranking	**1**	**2**	**2**

Again, we see that the value derived from the preservation of natural, recreational or cultural resources for future generations or possible future use differs for each rail-trail.

Key Informant Interviews

Unique trail features such as historic and cultural sites, natural features, and recreation opportunities were brought up during several interviews. It appears these sources of value are captured well by the above method. Both Michael Haynes and Joel Page brought up the issue of interpretive signage in their interviews. This is a point to consider when developing a trail. The user may not reap the value of unique resources unless clear interpretive signage is erected pointing out the feature.

3.2.4 Connectivity Identified and Measured

Connectivity was identified as being a source of value as it captures several of the social and environmental benefits accruing from the conversion of a railway corridor to a recreation trail. However, in developing a method to assess this source of value, only the social aspects of connectivity have been addressed.

Trial Application

A method to assess this attribute was not developed until the trail visits which would give insight into this is manifested in a rail-trail. What was developed is as follows: count the number of developed trailheads in different towns/communities giving access to the rail-trail. Rank the rail-trail with the greatest number of developed access points highest, and so on down to the lowest ranked trail with the least number of developed trailheads.

Using the method outlined the following ranking of the three case study trails emerges:

Table 16. Connectivity Ranking

	Musquodobit Harbour	Sable River	Centennial
# Trailheads	2	2	1
Rank	**1**	**1**	**2**

Key Informant Interviews

As outlined above, connectivity was proposed to measure the links rail trails made between communities. However, during the interviews, three trail experts included the connection to backcountry trails in the high ranking of the Musquodobit trail. Clearly, there is also value in connecting different systems of trails whether this means connecting more than one community or just more than one type of trail experience. For example, in Bridgewater, the Centennial Trail links up with several parks in the town increasing the number of recreation options for the user. Moreover, the potential connectivity of trails should also be included in this evaluation. This means investigating the surrounding communities to determine whether or not a trail association is working to develop the adjacent section of railway corridor, which will eventually link the two communities. The Musquodobit trail will eventually be linked with trails passing through West Chezzetcook, Lawrencetown and Cole Harbour, right into downtown Dartmouth adding significant numbers of people to the potential user list.

3.2.5 Additional Potential Value Issues Identified

Access to Services

Three trail experts indicated the types of services provided on or near the trail could impact considerably on user satisfaction. Using this as a criterion to assess the potential value of railway corridors as recreation trails would likely favour urban areas, as obviously more services will exist near the trail location. However, the purpose of the

exercise is to assess the railway corridor as it stands and as with all other sources of value, suggestions to increase the potential value of the railway corridor can include construction of washrooms and picnic areas. Table 11 can be used to assess the available services surrounding the site (within one kilometre—approximately 15 minutes or easy walking distance—of any planned trailhead).

Table 17. Measuring Accessible Services

	Site A	**Site B**	**Site C**
Washrooms (Wheelchair Accessible)			
Parking			
Garbage Disposal			
Picnic Tables/Benches			
Sports Equipment Rental			
Food Services			
Total Points			
Rank			

1. *Assign one point for each primary service found in the surrounding area (washrooms, parking and garbage disposal).*
2. *Assign one-half point for each secondary service found in the surrounding area (picnic area, sports equipment rental and food services).*
3. *Total the points for each site.*
4. *The site with the highest point total is that with the greatest concentration of surrounding services and has the most potential for increasing the value of user satisfaction.*

Primary services are those that will likely be used by all types of trail users, whether they are planning to spend 15 minutes or one day on the trail. Therefore, more trail users value these services and they worth a higher point value. The secondary services are those considered useful for day-trippers, but not short-term users, therefore, they valued by fewer users and are worth less.

Community Involvement

Four of the six trail experts brought up community involvement as a source of value resulting from rail-trail development. They considered this important because it has

implications for future trail maintenance and long-term planning by the community trail association (both likely to impact user satisfaction and possibly connectivity). There is potential to put an indirect economic (dollar) value on the number of volunteer hours that go into a rail-trail project based on the local wage rate. Although this is a possible measure of value for existing rail trails, it is not really a consideration in assessing the *potential* value of railway corridors as recreation trails. There is no way to predict the amount of volunteer labour that will be involved with a rail to trail project prior to trail development.

Tourism Potential

Although tourism potential was mentioned on two occasions in the key informant interviews, the criteria used to assess this source of value are found elsewhere in the method. For example, the trail location takes into account how near to major urban centres a trail is found; and, the criteria for existence, option and bequest values considers those unique features that may attract tourists.

Alternative Transportation Route

Only one of the key informants mentioned this and it is covered in the connectivity source of value. Connectivity considers links with other communities by a variety of users.

Preservation of a Corridor

Michael Haynes suggested there is potential economic value in preserving a green corridor for future use as an industrial pathway for a gas pipeline, fibre optic cables, or other similar uses. However, this project is concerned with the potential value of a railway corridor converted to recreation uses. Therefore, the value of a green corridor is not considered in this thesis.

3.3 Conclusions: Comparing Potential Value

The preceding section of this thesis has provided a qualitative method to assess five sources of potential value for railway corridors as recreation trails: user satisfaction, catchment area, non-use values, connectivity and access to services. The result of implementing this assessment should be five matrices with each railway corridor ranked from most to least potential value for each source of value. The following chart provides a comprehensive trail ranking which give all four sources of value tested in trial application equal weight in the total rank value.

Table 18. Overall Trail Ranking by Trial Application

	Musquodobit Harbour	**Centennial**	**Sable River**
User Satisfaction	3	2	1
Location/Catchment	1	2	3
Existence/Use Value	1	2	3
Connectivity	1	2	1
Total Rank Value	**5**	**8**	**8**

In this situation, the Musquodobit Harbour Rail Trail would be most highly valued as it has the highest overall ranking (five). Between the Centennial Trail and the Sable River Rail Trail the ranking is not as obvious. Although the Centennial Trail ranks second in all categories and the Sable River Rail Trail ranks third in two, the Sable River Rail Trail does rank first in the other two categories. Each trail has a total rank value of eight.

The following table shows the overall trail ranking according to key informants. Each informant was asked to rank the three case study trails according to their own evaluation system.

Table 19. Overall Trail Ranking Reported by "Trail Experts"

	Musquodobit Harbour	Centennial	Sable River
Laura Barkhouse	-	-	-
Jessie DeBaie	1	2	-
Harold Hart	1	1	3
Michael Haynes	1	2	3
Don Howard	1	3	2
Joel Page	1	2	-
AVG RANK	**1**	**2**	**3**

Overall rank by the trail "experts" appears to be consistent with the ranking in Table 18 based on trial application using four of the five sources of value identified in this chapter. This result indicates that criteria used in the method are valid and useful as they produced a result consistent with the reasoning and evaluation of experts working in the field. However, as noted above in the previous section there are additional issues to consider when evaluating the potential value of railway corridors as recreation trails and the initial method developed required some modification to better reflect and measure sources of value.

As was indicated in the introduction to this chapter, the ranking of trails merely presents decision-makers with some guide to their potential value. As the overall trail rank charts (Tables 18 and 19) above indicate, the highest and lowest ranked trails differ for each source of value. The rank order of railway corridors will not necessarily be identical for all five sources of value, therefore, some subjective judgement about which source of value should receive the most weight in decision-making is required. It is the prerogative of the assessment body to give greater weight to those sources of value deemed most important in deciding which railway corridors will provide the greatest value as recreation trails. It becomes a subjective judgement on the part of the valuation body to determine which rail-trail (or railway corridor) ranks highest overall. Therefore, it

is necessary to decide which sources of value are more important and will have greater influence on overall rail-trail value.

CHAPTER 4 CONCLUSIONS

4.0 Thesis Summary

The purpose of this thesis is to answer the question: how might a method to assess the potential value of railway corridors as recreation trails be structured? A four-step research process was employed to do so. First a literature review helped to clarify the term potential value and identify sources of value for rail-trails. Next, criteria to measure each source of value were developed, based in part on the literature review. The second and third steps involved pre-testing the method developed through trial application on three case study trails in Nova Scotia and key informant interviews. The fourth and final step was re-evaluation of the method based on pre-testing and modifying the method to make it more relevant and useful. Results of the study indicate that there are five sources of value relevant to measure the potential value of railway corridors as recreation trails:

1. User Satisfaction
2. Non-use Values
3. Location and Catchment Area
4. Connectivity
5. Access to Services

Using the method developed allows an assessment body to develop an ordinal rank number to compare and judge between railway corridors the one that has the most potential value. Because the criteria to measure potential value are broken down by source of value, it is also possible to identify which sources of value rank the highest and the lowest for each railway corridor. An assessment body must, therefore, use its own judgement to determine whether each source of value should have equal weight in the overall railway corridor ranking and assessment process.

4.1 Lessons Learned

4.1.1 Drawbacks: Need for Further Research

Throughout the research process, and in particular through trial application, it became clear that the method developed, given time and monetary limitations, cannot provide a measure of the potential value of rail-trails to compare against other recreation projects. The ordinal rank number resulting from application of the method provides a meaningful comparison of potential value of projects intending to convert a railway corridor to a recreation trail, but the need to choose between alternative sites for rail-trail development does not occur often. The only organizations likely to make such decisions are trail development associations and rail-trail funding bodies.

A CV survey would have provided a more useful measure of actual dollar values to compare the potential value a rail-trail project against other recreation projects. The measure of consumer surplus resulting from such an approach would be a stand-alone figure to use in a variety of situations. However, not all sources of value identified for this thesis would be captured in such a dollar figure. As discussed in Chapter 2, the CV approach is used to calculate non-use values (existence, option and bequest), which includes social, health, heritage and environmental benefits of trails. This approach would not include in its scope the values attributable to user satisfaction, location and catchment area, or access to services, all of which were identified as important contributors to the value of a rail-trail.

There is a need for further research to develop a method that will produce a stand-alone figure that reflects all relevant sources of potential value of railway corridors as recreation trails. Without such a method, it is not possible to accurately capture all

sources of potential value of railway corridors to compare rail-trail projects to other types of recreation projects. Having a method in place to assist in making this type of comparison is essential if recreation planners and funding agencies are to make informed decisions about which projects to support. Such a method will likely benefit rail-trail development when funding is scarce.

4.1.2 Advantages: Trail Planning Tool

The method, as it has been developed, is particularly useful to rail-trail planning and development organizations. The completed railway corridor (or rail-trail) evaluation provides a ranked index of each trail attribute making up the five sources of value. Because the criteria are disaggregated to measure each source of value individually, it is possible to determine which aspects of the railway corridor or rail-trail are the most valuable currently, and which require the most work to increase their value. Rail-trail planning and development can then take this into account and allocate funds in a manner that will increase value most quickly.

4.2 Conclusions

Although this thesis has developed a method to assess the potential value of railway corridors as recreation trails, the results of the method do not prove useful in the manner originally intended. It is not possible to use the number to compare rail-trails to other recreation projects. However, the results do provide a useful index of trail attributes to assist with trail planning and development. There is more work to be done on measuring the potential value of railway corridors as recreation trails to develop a method that will allow for comparison of rail-trails against other recreation projects.

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APPENDIX A

A.1 Interview Guide

All interviews followed the same format. I would first introduce myself and ask if the individual was willing to speak with me for about 20 minutes about my project. Next I gave a brief summary of my project then asked the following questions:

1. Whether the individual was familiar with the three case study trails and to rank those three trails according to their own standards of "value."
2. Why the individual ranked the trails in that way, that is, what criteria they used to do so.
3. If there were any other criteria they would use to judge a "good" trail that was not used in ranking the three trails.
4. About funding priorities in the trail development process.

Finally, I would ask if there was anything else the individual wanted to add to the discussion and thank them for their time.

A.2 Interview Summaries

Laura Barkhouse
Lunenberg-Queen's Trail Coordinator
902.627.2076

1. Not willing to rank trails. Feels that each trail offers a unique experience (urban vs. rural) and it would be like comparing apples and oranges.
2. The valuable characteristics of the Musquodobit Harbour Rail Trail include a wilderness type experience and a varied landscape, which is not common in rail trails. The Centennial Trail is valuable because it offers an urban experience, which includes a wide variety of services along the trail.
3. Another source of value is community involvement or stewardship. This is especially important when considering long-term trail maintenance. Without community support the trail will not be maintained at a high level and user experience will suffer.
4. A key to the trail development process is having in place a paid trail coordinator who can ensure the development of a long-term trail development plan which is required by most funding agencies.

Jessie DeBaie
Musquodobit Trailways Association Coordinator
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1. Musquodobit Harbour Rail Trail, Centennial Trail, unfamiliar with Sable River Rail Trail.
2. Musquodobit Harbour Trail has more community support than the Centennial Trail, which is evidenced by more vandalism and garbage found on the Centennial Trail. Also, the Musquodobit Harbour Trail provides more variety of experience as it links to "wilderness" trails; combines history and culture with a link to the Railway Museum, and has the potential to connect communities all the way from Musquodobit Harbour to downtown Dartmouth as those communities finish construction of their trails.
3. Additional criteria by which to judge a trail include tread surface and amenities such as washrooms and picnic areas.
4. No answer.

Harold Hart, President
Shelburne County Trails Association
902.875-4498

1. Musquodobit and Centennial Trails both rank higher than Sable River Trail.
2. These trails rank higher due to the scenic value related to the water vistas on each. The bridges on each trail provide the user with great visual interest.
3. No other criteria given.
4. Refitting bridges was the first priority for the Sable River Trail. Repairing the tread surface where it was damaged by vehicles followed this.

Michael Haynes, Executive Director
Nova Scotia Trails Federation
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haynesmc@sportns.ns.ca

1. Musquodoit Harbour Rail Trail, Centennial Trail, Sable River Trail
2. Musquodobit ranks highest because it offers a variety of trail options including the backcountry loop off the main rail trail; has a variety of amenities including washrooms and picnic areas; and, has an interesting and varied terrain.
3. Connectivity is important. For example, in the Valley region of Nova Scotia, there is almost no crown land available for recreation uses. A greenway built along an abandoned railway corridor fills this gap for a variety of recreation users. Interpretive signage is also important. It adds interest and education value to the user's trail experience. For example, the Centennial Trail passes within 50m of the Carding Mill Museum, but there is nothing on the trail to indicate where the museum is located, so visitors may just pass by without receiving the cultural

benefits. Tourism potential is something to consider when valuing a railway corridor, as we know that tourism brings economic value to surrounding communities. There is also potential economic value in preserving long distance corridors for future railway use or other industrial uses such as power lines, fibre optic lines or gas pipelines.

4. Bridges; interpretive signage; trailhead facilities; marketing; and, clearing brush are all priorities in order. A trail coordinator fits in there somewhere near the top, as well. With all the legislation and permits required for trail development and construction it is necessary to have someone keeping track of what's been done, what needs to be done and how to move forward. In Nova Scotia, those trails with a coordinator have moved forward more quickly and correctly than those without.

Don Howard
Nova Scotia Department of Natural Resources, Parks and Protected Areas
Nova Scotia Trails Destination Funding Committee
902.662.3030

1. Musquodobit Harbour Rail Trail; Sable River Trail; Centennial Trail
2. Musquodobit ranks highest because of the variety of habitats and scenery along the trail. As well, access to the back-county loop is valuable. Sable River Trail ranks higher than Centennial Trail because it is more of a wilderness experience and the right-of-way is less open and more scenic. Centennial does have the LaHave River Bridge, but it does not have as many different views as Musquodobit.
3. The likelihood of seeing wildlife is an important criterion. Criteria the funding committee looks at includes: proximity to Metro for tourism potential; the number of structures and the distance of the trail which affects the probability of getting things done in budget and future maintenance issues; and, the in-kind services the community is willing to provide (volunteers are a major portion of this).
4. Before DNR and the trail association sign a Management Agreement, there must be demonstrated community support for the project, both by adjacent landowners and all types of user groups. A paid trail coordinator makes a big difference in getting this done as they act as a liaison between myself at DNR/Funding Committee and all interested parties. The funding committee has money allocated for both Trans-Canada Trail initiatives and backcountry wilderness and coastal trails.

Joel Page
St. Margaret's Bay Trail Coordinator
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1. Musquodobit Harbour Rail Trail; Centennial Trail; unfamiliar with Sable River Trail
2. Musquodobit ranks higher because of the high level of community support and involvement. The Centennial Trail was more a project of the municipality.
3. Other important criteria to consider include a usable surface, historic features with appropriate interpretive signage, natural areas and, "utility" value...railway corridors have long been used as an alternative means of transportation between communities.
4. As mentioned above, surface material is the main priority for funding. Next would come interpretive signage, then bridges, depending how much work is required. Services are not much of a funding priority in more urban settings, as the existing community can provide them.