CAPTURING THE IMPORTANCE OF NATURAL RESOURCES AND FUTURE ACTIVITIES IN ST. PAUL'S, NEWFOUNDLAND

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by

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ABSTRACT

Natural resource-use policies are mostly based on monetary values of goods and services. Rarely are non-market values, including aesthetics, heritage, and ecological integrity captured in non-monetary terms. This study employed the damage schedule approach to elicit the importance of natural resources in St. Paul's, a small outport community, enclave to Gros Morne National Park in Newfoundland, Canada.

The schedule of relative importance presented choice scenarios using a series of photographs of natural resources in the area. The use of photographs made the survey intriguing as well as assisted in accommodating literacy barriers. Four groups of respondents indicated which of the resources being compared was more important. A separate set of paired comparisons asked respondents to indicate which activity they felt was more beneficial to the area. Qualitative data was collected to determine rationale for resource selection and negative impacts that respondents associated with each activity.

Local residents and resource managers agreed that lobster, forest, and herring were the most important resources. Local residents and residents in surrounding communities agreed that oil development and exploration was the most beneficial activity to the area, closely followed by local research and management of fish stocks, the first choice of managers and tourists. Qualitative data revealed that while the interest groups had similar values, they had different reasons for valuing the same things. The forest was valued by local residents and residents in

surrounding communities for its subsistence use whereas managers and tourists valued it for its aesthetic, ecological, and recreational values. Some respondents in all groups said they had never heard of eelgrass and the saltmarsh. The results of this study provide a tool that captures the values of resource interest groups. Once these values are made explicit, they can more easily be incorporated into natural resource policies and decisions, used as a baseline to monitor changes in values, or to determine the focus of educational programming and monitor its success or effectiveness.

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INTRODUCTION

1.1 Why Values and Valuation?

Environmental policy-making and natural resource management are mostly concerned with trade-offs between ecosystem health and social and economic well-being. Economic valuation is an important tool that helps achieve this balance but it is not straightforward to employ. The difficulty in economic valuation lies in the fact that many resource values such as those related to ecosystem goods and services, e.g. aesthetics, heritage, and ecological integrity, do not have market prices (Alder *et al.,* 2006). Some may even consider economic valuation of such services to be inappropriate (Barber, 2004). Fishing in Newfoundland, for instance, is not just an economic activity; it encompasses non-market values including lifestyle, culture, and tradition that contribute to the significance of human history in Canada (Newell and Ommer, 1999). To many Newfoundland fishers, fishing is a way of life.

The concept of values is central to environmental economics, where much research is concerned with assigning monetary values to changes in the environment (Freeman, 2003; Ahmed *et al.,* 2007; Krishnamurthy, 2003; Nelson, 2009; Rudd, 2007). While there is a need for such valuation, there are aspects of the environment and ecosystems such as culture and aesthetics that are difficult or impossible to sum up into dollar amounts appropriately. Understanding values requires market and non-market valuation, as well as a thorough examination of underlying belief systems and perceptions. Unless these values are properly captured and taken into consideration in decision-making, natural resources will not be sustained and protected for future generations (Alessa *et al.*, 2003).

The term '*values*' is often referred to when discussing environmental problems such as overexploitation, pollution, and sustainable development. The formal definition of values (refer to Chapter 2: Literature Review) describes the worth, usefulness, or importance of something (Brown, 1993). While how much something is worth implies the attachment of a dollar value, the importance or usefulness of something implies that goods and services can have values that are not associated with market prices. These non-market values can include cultural, ecological, historical, subsistence, aesthetic, recreational, educational, and existence values (Gowdy, 1997). For example, a tree in a forest may hold a dollar value if it is part of a stand that is being cut for the forestry industry. However, a tree can also possess ecological, recreational, educational, spiritual, and other values that are not often reflected by current market prices. Although

economic values are often the basis of environmental protection, capturing the total value, including non-market values, is essential for the formulation of successful policies, whatever the specific goal may be (Gowdy, 1997).

Costanza (2000) suggests that only a fraction of ecosystem services are covered by market prices. It is therefore essential to try to capture other values that people place on natural resources, using non-market valuation methods. The uses of these methods are not strictly about eliciting values. Rather, bringing awareness about resource importance through non-market valuation may also facilitate open discussions on resource management, initiate collaboration between community and government, and encourage an exploration of new options for education, research, and management (Chuenpagdee *et al.*, 2004). Non-market valuation approaches are useful in determining if interest groups make the connection between the resources they value and impacts that activities could have on those resources. If non-market values for resources are high, ignoring them in natural resource policy making could lead to serious errors and resource decision miscalculations (Freeman, 2003).

1.2 Application of the Damage Schedule to St. Paul's Inlet

While the need to capture non-market values of natural resources is well recognized, many of the existing methods still rely on arbitrary and inappropriate monetary valuation schemes. Alternative methods are therefore required. The damage schedule is one such method that does not apply monetary values. It is

mostly dependent on the judgments of resource-dependent communities, managers and other interest groups regarding the importance of resources and the preferences for changes in the environment (Chuenpagdee *et al.*, 2001a). The damage schedule is based on Thurstone's Law of comparative judgement (1927), a model used to obtain measurements from pairwise comparisons. Using the damage schedule, participants are given a set of choices and are asked to select which of the choices is least or most preferred, or more or less important, depending on the context.

The damage schedule approach has been applied to assess various types of resources in a wide range of settings. The earlier empirical studies by Chuenpagdee et al. (2001 a and b) and Chuenpagdee et al. (2002) aimed at eliciting relative importance of coastal resources in Thailand and Mexico, respectively (addressed on p34-36). Recent applications in the US (Morgan and Chuenpagdee, 2003) and Canada (Fuller *et al.,* 2009) were related to the relative severity of ecosystem impacts of fishing gears. Arce-Ibarra (2007) employed the approach to capture the values of inland resources according to small, remote Mayan communities in Mexico. In this thesis, the damage schedule approach is applied to examine the importance of St. Paul's Inlet on the west coast of Newfoundland and its unique ecosystems.

The east end of St. Paul's Inlet lies within the boundary of Gros Morne National Park, which is a UNESCO world heritage site. At the other end of the Inlet, the Town of St. Paul's, an outport community of about 300 people (M.

Pittman, personal communication, 2009) is situated enclave to the park (see map on p45). The brackish pond and the saltmarsh of St. Paul's are considered one of the most important habitats for trout and salmon that migrate between freshwater and ocean habitats for reproduction and growth (Doody, 2008). The area is also well known as a habitat for migratory birds such as Arctic Terns and Willets. The past abundance of fish in the Inlet during most of the 1900s attracted people from all over the west coast of Newfoundland to take part in the fisheries. The people of St. Paul's, while not the first to occupy the Inlet, had fished for herring, along with lobster, in the area since their settlement in the1870s. Although fishing is no longer the central economic activity in St. Paul's, local people still take pride in their fishing heritage.

The proximity of St. Paul's to Gros Morne National Park provides an interesting backdrop for a study of the relationship between the natural environment, the community, and governments. The park designation process took place without proper consultation with the community members, and thus it did not receive support from St. Paul's people (Brooks, 1988). They basically opted to stay outside of the park boundary, and do not benefit from the recent tourism development in the area in comparison to some of the other park communities. Resource utilization and tourism development are likely to continue along with the co-existence of the people and the park, posing certain threats to the sustainability of the unique Inlet ecosystems. It is currently not known what aspects of the Inlet that the community values, if any, whether they have any

concern about the on-going developments, and whether other interest groups share similar values. The understanding of the values of St. Paul's Inlet and related resources, according to various interest groups, is one of the first steps in working toward sustainable development for the area.

By applying the damage schedule to examine the importance of St. Paul's Inlet, the thesis aims to answer the following questions:

- What do the various interest groups, including local residents, surrounding communities, managers and scientists, and tourists value about St. Paul's Inlet and why?
- What current or potential activities do they perceive as beneficial or a threat to the area?
- What do these findings mean to the future of St. Paul's Inlet?

1.3 Thesis Organization

Chapter two is a literature review of theoretical background on values and previous work in valuation. Although monetary valuation methods are a significant contribution to the field of values and valuation, this chapter will focus primarily on non-monetary methods. Several case studies are presented to illustrate the applications of these methods. Chapter three is a detailed description of St. Paul's including demographic, historical, governance, and ecological information. Chapter four is an account of the method used in this study including modifications made to the damage schedule reviewed in the literature. Details and examples of the questionnaire as well as a description of respondents and how the survey was conducted are also included in this

chapter. Chapter five is the analysis of the paired comparisons data using SPSS analysis and other validation tests. Chapter six is a discussion of the results, also with respect to other studies. The chapter also includes a section about the dissemination of the research findings and policy implications. Chapter seven concludes with a summary of the key findings, implications from this study, as well as possibilities for future research.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews the literature about the tools and approaches used in natural resource management to achieve such goals as sustainable development or environmental protection. First, natural resources are described in terms of the intrinsic values that they possess as well as the values that humans attach to them. Next, the need for resource valuation is situated in the context of the current global initiatives set to achieve particular goals of natural resource management such as Agenda 21 or the Millennium Ecosystem Assessment. Adoption of the goals set out by these initiatives in local resource management requires a thorough understanding of how people value resources. This chapter thus provides an overview of approaches that can be used to examine this aspect of natural resource management, focusing specifically on human dimensions research, participatory decision-making, and monetary and non-monetary valuation methods.

2.1 Natural Resources and their Values

From an anthropogenic perspective, natural entities such as water and air become resources when they have definitive values for humans, i.e., when humans use them to satisfy their needs (Zimmermann, 1964). Yet, others argue that natural resources exist independently of human wants and needs and are considered to have values simply because of their existence (Dearden and Mitchell, 2005). Despite the different perspectives on natural resources, commonly accepted overarching goal is to manage resources for sustainable uses of the current generation and conserve resources for future ones.

Natural resources can generally be categorized based on their renewal ability. Resources such as oil, coal, and minerals, which take millions of years to form, are in fixed supply and thus considered non-renewable (Dearden and Mitchell, 2005). Water, plants, and animals, on the other hand, are examples of resources that can be renewed naturally and mostly in a relatively short period of time. These renewable resources are sometimes referred to as flow resources as opposed to stock resources which are non-renewable. With the current level of uses and exploitation, the renewal ability of some natural resources is becoming increasingly limited, leading in some instances to severe degradation and eventual resource collapses. Good examples of this are ocean resources which have been thought of as vast and undiminishable throughout history. The last decade has provided conclusive evidence, however, that this view is far from the truth. In fact, over 70 percent of global marine fisheries are now at, or over, their

maximum levels of exploitation (Dearden and Mitchell, 2005; Hilborn *et al.,* 1995) making the world's ocean ecosystems vulnerable and in serious need of protection and conservation.

Often people may value the same resource but for different reasons. A biologist may value a tree for the ecosystem services it provides, whereas a painter may value the same tree for the artistic contribution it makes to a painting or a photograph. To the forest industry, trees hold market values, but others may value the forest for its cultural, environmental, aesthetic, recreational, spiritual, and subsistence values. The wide range of values according to diverse interest groups is what needs to be captured and incorporated in management policies and decisions (Gowdy, 1997). Management of such resources and ecosystems frequently disregards the diverse values that pertain to natural resources because of the complexity associated with multi-dimensional values (Gowdy, 1997).

While all ecosystems are complex, especially when humans are involved, coastal zones can be the most complex jurisdictional zone (Department of Fisheries and Oceans [DFO], 2008). Generally defined as the area where the ocean meets the land, the coastal zone constitutes 10 percent of the oceans area but contains 90 percent of all marine species (Draper, 2004). In recent decades, human dependence on coastal resources has increased with an expanding population migrating to the coasts. Pressure on coastal resource systems is so severe that their productivity and functioning have been altered,

and in some cases to the point of no recovery (Hilborn *et al.,* 1995). Coastal communities are at risk because the ecosystems they rely on are not able to accommodate increased and collective demands of growing populations and markets. More subtle effects of coastal zone degradation can be seen in the decline in quality of recreational areas, and of places that are spiritually and culturally important, or of places that could increase our knowledge of the natural world (Millennium Ecosystem Assessment, 2005).

2.2 Natural Resource Management and Global Initiatives

Resource management is defined by Decker *et al.* (1996) as the integration of ecological, economic, political, and socio-cultural insights into decision-making that ultimately establishes goals for natural resources and the actions necessary to achieve them. Resource managers have long believed they have the legal responsibility and power to make decisions that best reflect societal values without eliciting public opinions (Dearden and Mitchell, 2005; NRC, 1996; Chess and Purcell, 1999). Eliciting public opinions and perceptions, if it happens, usually comes after most of the work of reaching a decision has been completed in fear of resentment of those decisions. Allowing the public to have any decision-making role is sometimes seen as dangerous as it could easily take the form of anarchy where no one is accountable for management decisions (Dearden and Mitchell, 2005; NRC, 1996; Chess and Purcell, 1999).

Many environmental policies or decisions could be better informed and the information base could be more credible if interest groups, particularly local residents, were appropriately and effectively involved (Chess and Purcell, 1999). Resource and environmental decisions became more complex and the prevailing view was that such decisions were dependent on weighing conflicting goals and values (Decker *et al., 1*996; Ewart, 1996). Since communities are not homogenous, it is unrealistic to expect general consensus on issues that matter to them without proper consultation. The management process has evolved to include various types of inputs in decision-making, sometimes taking into account the values of interest groups.

Globally, there are a wide range of goals for natural resource management, depending on the ecosystem, the resources within it, and the types of uses and users. Global initiatives are constantly being introduced to achieve these goals through setting standards and the development of technical tools and practices. Sustainable development and environmental protection are two key goals with different initiatives for natural resource management that are promoted and adopted. These initiatives and goals are not always compatible, requiring therefore research on natural resource values.

2.2.1 *Sustainable development*

In 1987, the World Commission on the Environment and Development (WCED) brought forward the concept of "sustainable development" in their report

titled "Our Common Future", also referred to as the Brundtland Report. The report defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). The report was intended to address the growing concerns about the rapid deterioration of the human environment and natural resources and the consequences for economic and social development. Building on the Brundtland Commission of 1987, the United Nations Conference on Environment and Development, informally referred to as the Earth Summit, produced the Rio Declaration on Environment and Development in 1992 (Palmer, 1998). The Declaration consists of twenty-seven principles outlining sustainable development. The purpose of the Earth Summit was to establish international agreements respecting the interests of all of the world's people and to protect the integrity of global environment and development systems. The establishment of Agenda 21, a strategy for sustainable development in the 21st century, was also a product of the Earth Summit. The adoption of Agenda 21, a document that reflects a broad international commitment on development and environment co-operation (Palmer, 1998), provides foundation for the development of action plans to attain sustainability globally, nationally, and locally. Ten years later, in 2002, the Johannesburg Summit on Sustainable Development was held to document progress since the Rio Earth Summit and to identify quantifiable targets for successful implementation of Agenda 21. The concept of sustainability

is ambiguous and often takes on multiple definitions thus creating the need to understand values (Grainger, 2004).

2.2.2 *Environmental protection*

An interest in environmental protection surfaced internationally around the 1970s when the global community saw a need to protect the "life-sustaining processes of Earth's biosphere" (MEA, 2005). In 1972, the United Nations conference on the Human Environment occurred in Stockholm, Sweden. For the first time, scientific evidence of human impacts on the environment was presented to the world's most powerful and influential leaders. The Stockholm Conference, as it is often referred to, led to the creation of the United Nations Environmental Programme (UNEP).

Within the main focus on sustainable development, Agenda 21 contains another goal of natural resource management, which is environmental protection. Principle Four of Agenda 21, states: "in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it" (United Nations, 1992). The relationship between sustainable development and environmental protection is further specified in Section II of the Agenda which is dedicated entirely to the conservation and management of resources for development.

Developed out of Agenda 21 was the Millennium Ecosystem Assessment (MEA), a research programme that focuses on changes in the world's ecosystems over time. The programme started in 2001 and four years later the first report was produced. The initial findings of the 2005 report warned that the world is degrading its natural resources and the harmful consequences could grow significantly worse in the next 50 years (MEA, 2005). The MEA has identified environmental protection as a key response to eliminate or alleviate degradation through various channels.

2.3 Society and Natural Resources

Societal trends in the way we view the environment and natural resources have changed dramatically in the past thirty years. Environmental problems were once regarded as minor, technical, and politically controversial (Roseland, 2000), and often considered merely by-products of economic growth or social progress. Today, governments all over the world, recognize that environmental problems are very serious and require solutions, which are not solely technical and may not be available without significant economic and social change (Roseland, 2000). Multiple approaches, including human dimensions research, participatory decision-making, and valuation have been taken to achieve resource management decisions where various groups of people are involved.

2.3.1 *Human dimensions research in resource management*

Issues related to natural resource management are difficult to resolve in a way that is satisfactory to all parties. As stated by Sample (1990), the public has expressed its right to be informed and be included in the decision-making process regarding natural resource management. Stern *et al.* (1992) suggest that, among other things, attitudes and beliefs held by the public are a "human driving force" capable of influencing human activity and their associated environmental impacts. The recognition of these causes has brought forward many changes to natural resource management over the past 30 years (Decker *et al., 1*996).

Among the many changes in natural resource management, human dimensions research is one of the most notable. While natural resource management continues to incorporate factual scientific information, it also considers "economics, aesthetics, user attitudes and preferences, and the interest of citizens and other direct users of the resource" (Decker *et al.*, 1996, p. 28). Human dimensions research is defined by Ewart (1996, p. 6) as the "scientific exploration of the physical, biological, sociological, psychological, cultural, and economic aspects of natural resource utilization at the individual and community level".

Human dimensions research has been conducted in various natural resource sectors from fishing and forestry to wildlife and protected areas. Ditton (1996) examines human dimensions research in fisheries management, mostly in

recreational angling. He identifies two major human dimensions functions in fisheries: research and application. Human dimensions research in fisheries has been an ongoing practice for not only researchers but also for government agencies. Ditton (1996) continues to encourage human dimensions research in fisheries and credits its success to partnerships among managers and researchers. This case is an example of human dimensions research in fisheries, that was carried out in the form of a large-scale survey covering a wide geographical range of respondents.

Human dimensions research in forestry management has been looked at by, among others, Brunson (1996) and McFarlane and Boxall (2000). Brunson (1996), mostly concerned with silviculture and landscape management, described human dimensions research in forestry as acquiring knowledge about managed forests and public attitudes about forest practices to satisfy diverse societal needs of the forest and its services. In 1996 a study was undertaken by McFarlane and Boxall (2000) to examine forest values and attitudes toward forest management of campers and hunters in the Foothills Model Forest of Alberta. A large sample size (over 4000) was used to complete a survey of questions that covered various topics including forestry practices, protection of forests and species, and forest ecology. Kearney and Bradley (1998) looked at how forest interest groups conceptualize human dimensions of forest management. To do so, they conducted a survey with the additional use of cognitive mapping, this time with a small sample size of twenty-three, an

unusually small sample for this type of human dimensions research. The purpose of their study was to increase public interest in environmental management and the idea that a forest may be valued for more than its timber products (Kearney and Bradley, 1998). Three distinct human dimensions emerged including (1) traditional intangible benefits, (2) values and expectations, and (3) process issues in decision-making.

Closely related to issues in forestry is human dimensions research in wildlife management. A universally accepted definition of human dimensions does not exist in wildlife literature (Manfredo *et al.*, 1996). While definitions do exist, they are often conflicting. Rather than focusing on the management of wildlife, Manfredo *et al.* (1996) concentrated on the human component of management. Various studies by Bath, including those on wolf management in Croatia (Bath and Majic, 2001), and Savoie and Des Alpes Maritimes, France (Bath, 2002) demonstrated quantitative and some qualitative summaries of various interest groups attitudes toward the resource and current management practices. Both studies used large sample sizes that were representative of a large segment of society. Decker and Chase (1997) referred to people-wildlife conflicts as the most difficult to understand and manage and stated that wildlife management has grown to include a scientifically-based understanding of people as an essential part of the management formula.

Associated with the management of wildlife and related resources is the management of parks and protected areas. Protected areas, in their entirety, are

not only diverse in ecosystems that make up the boundary, but also in the size and power of interest groups. Alessa *et al.* (2003) explored human dimensions in terms of knowledge and actual behaviour at Pacific Rim National Park. Visitor attitudes and perceptions to ecosystem resilience and depreciative behaviour were measured using a questionnaire and structural interviews undertaken in situ. Visitor behaviour was discretely monitored, particularly their depreciative behaviours. Bath and Enck (2003) explored the nature of human-wildlife interactions within a national park setting and agreed that managers can benefit from including those who are close to or in park boundaries in the decision making process.

Human dimensions research takes many forms in natural resource management. Most researchers agree that public acceptance of, and support for, management decisions will likely be highest when the public believes that the management decisions are consistent with public perceptions of management (Ewart, 1996).

2.3.2 *Public participation in environmental policy*

Public participation as defined by Andavapru (2009) is a process where public concerns, needs, and values are incorporated into governmental policies or decisions. It involves two-way communication and interaction with the goal of better decisions that are supported by the public. Arnstein's Ladder of Citizen Participation (1969) is an organizational framework to describe the level of public

participation in the decision making process. The ladder has eight rungs corresponding to the extent of citizens' power in determining the end result. There are different processes and degrees to which interested parties can be involved. Public participation has become a vital process in dealing with environmental issues and is legally mandated in various forms. For example, in Canada, public participation is one of the fundamental principles of an environmental impact assessment (Hanna, 2005). Agenda 21 also recognizes the importance of public participation in environmental management by including it in Principle 10, which states:

> *Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.* (United Nations, 1992)

The literature about public participation in natural resource management and its various degrees is extensive. The cases selected for this literature review were either based on fisheries resources and coastal communities or the participation process itself.

Jentoft and McCay (1995) examined international projects on government-industry interactions in fisheries management in seven Nordic countries where the degree of resource user group involvement varied. The extremes were total government control to total fisherperson control with everything from consultation

to collaboration in between. They concluded that the effectiveness and forcefulness of users as participants in the decision making-process depended on how well they spoke as one voice. A general conclusion made was that how and to the degree to which user groups should be incorporated in the management process is a question of institutional design and place-based orientation.

Primmer and Kyllönen (2006) developed goals for interest group participation geared toward sustainable development definitions and policies in the context of Finland's National Forest Programme. In this case, the authors define public participation as the equal participation of interest groups in resource decision making. The authors analyzed the participation goals in sustainable development policies such as the WCED Brundtland Report (1987) (see section 2.2.1), in the context of Finland's National Forest Programme in order to determine how well the programme met those goals. The new forms of participation in Finland's National Forest Programme functioned as legitimating and raising awareness.

Reed (2008) reviewed the traces and developments of participatory approaches in various contexts and discussed the limitations of interest group participation. Similarly, Mikalsen and Jentoft (2003) addressed some of the limits to participation in Norwegian fisheries. Reed concluded that there was evidence that interest group participation can enhance the quality of environmental decisions because of the increased comprehensive inputs. However, the quality

of decisions is strongly dependent on the process used to make them. According to Reed (2008), public participation should be considered as early as possible in the decision making process and should systematically represent interest groups throughout the process. Mikalsen and Jentoft (2003) critiqued the Norwegian centralized consultation process and raised questions about who is entitled to participate in the process as it is currently based on a direct economic stake in the fishery. The concept behind expanding who should be involved in the consultation process stems from the idea that such decisions will affect everyone, especially in a country where the fishery is central to the economy.

While the literature on natural resource management is mostly in agreement that interest groups should be involved in the decision making process, the degree to which they are involved, as well as who, when, and how, is sometimes disputed. Elicitation of values through valuation, while not part of Arnstein's Ladder (1969), is still a form of public participation. It is an inclusive approach that can provide a good platform for fostering meaningful and engaging participation.

2.4 Valuation in Resource Management

The term *'values'* is often used in discussions of how to develop more sustainable relationships with humans and the environment. The term itself has many formal and colloquial definitions (discussed in 2.4.2) spanning across various disciplines. The study of values is an active, multifaceted, and

disputatious field (Satterfield and Kalof, 2005). Journal articles using 'environmental values' as a keyword are in the thousands where scholars seek to understand the subtle differences in improvements to methodological challenges and address the fundamentally important questions (Satterfield and Kalof, 2005):

- What is value?
- How should it be measured or assigned to the natural world?
- Are all values commensurate, amenable to measurement across a common scale and thus to comparison and tradeoffs?
- Can valued environmental goods or services be substituted by other goods and/or services?
- Is the market an appropriate and viable avenue for establishing?

The last decade has seen a significant increase in the research devoted to identifying the value of nature, specifically environmental goods, ecosystem services, and cherished places like parks and protected areas (Costanza *et al.,* 1997; Satterfield and Kalof, 2005). Contributions to this emerging body of literature come from natural, economic (Freeman, 2003), social, psychological and decision sciences (Dietz *et al.,* 2005; Satterfield and Kalof, 2005) as well as philosophy (Tisdell, 1997) and more specifically environmental ethics (Rolston, 1988). Some scholars seek methods that reflect axioms of principles and others assert the importance of relativistic or subjective approaches to eliciting and attributing value. Some scholars make distinctions between held values such as beliefs we adhere to while others focus on assigned values such as ranking,

dollar values, or numeric tags that express relative weight of one value to another. Still, there are others who are concerned with the proper or actual representation of values that are not only tangible but also intangible (Satterfield and Kalof, 2005; Rolston, 1988).

The concept of environmental values is central to environmental economics where much research is concerned with assigning value to changes in the environment, now referred to as environmental valuation. The concept of values is also related to the broad literature on altruism in evolutionary theory and social sciences (Dietz *et al.,* 2005). The empirical study of values in sociology, social psychology, and political science can be difficult to understand without some attention to how individual values relate to other important influences on individual behaviour such as beliefs, norms, and attitudes (Kafarowski, 2003; Stern 2000; Tisdell, 1997). The study and literature of values and these streams of research are not well integrated (Alessa *et al.,* 2003; Dietz *et al.,* 2005; Satterfield and Kalof, 2005). Personal values are often reflected in the decisions we make in our everyday lives. Although the use of the word value is multidimensional in itself, and while it may be central to economics, advances in this research field have led to an array of methods of valuation in both monetary and non-monetary processes.

2.4.1 *Values and decision-making:*

Studies of individual values are commonly related to (a) self-reported behaviours (e.g. do you recycle?), (b) behavioural intentions (e.g. would you be willing to recycle?), or (c) other measures that express environmental concern. Few studies examine actual behaviour and the link between self-reported behaviour or behavioural intentions and actual behaviour (Fishbein and Ajzen, 1975; Corral-Verdugo, 1997; Guagnano *et al., 1995*).

Decisions involving natural resources raise issues about differing and conflicting points of view about the value of the resources, how they should be used, who pays for and benefits from their development, and what strategies are the most appropriate for resource use (Coughlan and Armour, 1992). The concept of values is often used to explain how we make decisions (Costanza, 1999; Kooiman *et al.,* 2005). The general argument is that environmental decisions often require people to make choices about things that may not have been previously considered. For example, the goods and services that flow from an ecosystem function are often taken for granted. Environmental issues are constantly emerging from new scientific research and new environmental movements that draw attention to problems not previously considered such as climate change.

2.4.2 *Use of the term 'value'*

'Value' is derived from the Latin word *valare,* which means to be strong, to be worthy (Dietz *et al.,* 2005). The following definitions can be found in the *New Shorter Oxford English Dictionary on Historical Principles*:

> *a. The worth, usefulness, or importance of a thing; relative merit or status according to the estimated desirability or utility of a thing. b. Estimate or opinion of, regard or liking for, a person or thing. c. The principles or moral standards of a person or social groups, the generally accepted or personally held judgement of what is valuable and important in life* (Brown, 1993, p. 3542-3543).

All three descriptions of the word 'value' are used in everyday conversation. It is suggested that some aspects of the biophysical environment such as landscapes, complex ecosystems, and endangered species, have intrinsic value: value that is independent of the values that humans assign to them (Rolston, 1988). However, many economists and other scholars believe this is not so and that values must always be assigned by humans (Zimmermann, 1964).

2.4.3 *Economic and monetary valuation*

The tradition of value in economics is dominated by the rational actor model of human behaviour (Jaeger *et al., 2001).* The model assumes that people make decisions by assessing what outcomes follow from various possible choices and examining the effect each outcome has on things the chooser desires (i.e. the effect that a choice has on the chooser's preferences). According to traditional economic theory, we make choices to maximize personal

satisfaction while considering the uncertainties and benefits of the costs associated with each action. Economics has offered ideas about how to assess what society values in order to provide guidance for collective decision-making (Alder *et al.*, 2006).

Market prices of goods and services are cardinal numbers and under some conditions it can be shown that prices reflect social value (Alder *et al.*, 2006). However, for many environmental goods and services, the ideal conditions in which prices are an accurate reflection of social values are not present and in fact, many goods and services that seem important, like ecosystem services such as pollination or soil fertility, have no market price at all (Alcamo *et al.*, 2003).

Various methods have been developed to provide estimates of value for things whose social value is not adequately captured by market prices. In past efforts to quantify ecosystem services, methods associated with economic or monetary assessments have been applied. There are numerous studies that employ the various methods of economic valuation. While it is impossible to refer to all of them, a few cases are illustrated here to demonstrate the use of particular methods. The examples highlighted in this literature review were selected based on the relevance of the resource, method, or community approach used in each case. The following methods are common applications of economic valuation used in the assessment of environmental goods and services:

Total Economic Value (TEV) is the attempt to convert the benefits and values of natural ecosystems into simple economic terms and has been used by economists for over 25 years (Gregory *et al.,* 2005). This method encompassed commercial values, non-market values, ecological functions, and non-use benefits. The total economic benefits are combined with total economic costs to derive the net economic value. Although TEV is inclusive of non-market values, it does not consider the impact of the removal of any benefits such as other investments, land and resource use change, or natural livestock or crop losses (Barber, 2004). Costanza *et al.* (1997) used this approach to estimate the economic value of 17 ecosystem services for 16 biomes. The estimated value is between US$16-54 trillion per year. Barber (2004) agreed with Constanza *et al.* (1997) that because of the uncertainties of nature, this can only be considered a minimum estimate. There are limitations to a calculation of this sort. For example, many ecosystem services have not been studied in close detail, current market prices are not accurate or are changing, and it does not consider any irreversible environmental impacts (Costanza *et al., 1*997).

Willingness to Pay (WTP) is usually determined through a survey format and assesses the value of a good by what a person is willing to pay, sacrifice, or exchange for it. WTP is the maximum monetary amount that an individual would pay to obtain a good (Carson, 2000; Freeman, 2003; Dietz *et al.,* 2005). Rudd (2007) determined the annual WTP for conservation programs targeting Atlantic Canadian aquatic species that are either listed on the Species at Risk Act

(SARA) or could potentially make the list. Implications from this study show that conservation initiatives have a cost and may bring about economic impacts.

Stated Preferences is the creation of a hypothetical market where respondents are asked to rank proposed alternatives to a given situation in order of preference or to select the most preferred alternative. This is sometimes referred to as *contingent ranking* or *choice experiment*. If one of the characteristics has a monetary value, it is possible to compute the respondent's WTP. Another variation of this method is to ask respondents how they could change the level of activity in response to a change in the environmental amenity. In fact, that is what Rudd (2007) did to calculate the WTP in his study of conservation programs for SARA species. This method can take on other various formations of hypothetical markets and alternatives. However, the stated preference method is specific to the question being asked and some respondents reject the idea of paying for something they consider to be rightfully theirs (Freeman, 2003).

Revealed Preferences is used to distinguish the best possible choice or option based on actual behaviour. The idea is that purchasing habits reveal preferences of consumers or resource users. For example, if a consumer has two choices of the same price or value, the selected option was chosen because it was preferred. It is implied that the first option is always chosen based on preference but if the second option is chosen it is because the first option is not affordable. This method is used in the form of referendum or household

production model (Freeman, 2003). Adamowicz and Graham Tomasi (1991) tested the choices of recreational hunters for consistency in rational choice based on travel costs. Their case concluded that there were few violations of rationality and even those were still fairly close to the rational choices.

Travel Cost is a method that is commonly used to find the recreational value of a landscape. Information on the expenditures incurred by visitors to that specific place is collected. The total cost to travel to and from the site is aggregated by the number of visitors, ultimately providing a surrogate market for what people are willing to pay to access the site. The travel cost method assumes there is always a cost to visit a place and does not consider multi-purpose visits or experience (Iamtrakul, 2005). Ahmed *et al.* (2007) used the travel cost method and contingent valuation to estimate the benefits of the Bolinao coral reefs in the Philippines. The coral reefs are recognized for their extensive conservation and recreational benefits that provide economic justification for their management. The travel cost method determined that visitors derive an average net economic value of US$229. Using these methods Ahmed *et al.* (2007) give economic value to this endangered resource in hopes that they are no longer treated as "free goods subject to abuse".

Hedonic Pricing incorporates the value of non-marketable ecosystem services into the price of marketable goods and services. Market values are incorporated to uncover the relative value to human welfare. To do this, one would start by estimating the value of the land and then estimate econometrically

the value that is contributed by the ecosystem service of interest to the value of that land (Krishnamurthy, 2003). Hedonic pricing is most often used in the estimates values associated with property. Nelson (2009) estimated hedonic pricing models of vacation rental houses located in the vicinity of a lake and four-season ski-golf resort in Deep Creek Lake Maryland. Taylor and Smith (2000) used hedonic pricing to estimate the value for access to coastal beaches for rental properties in North Carolina. Schultz and Waltert (2009) use hedonic pricing to estimate the value of landscape resources reflected by apartment prices in Switzerland.

Changes in Productivity, sometimes referred to as the *Production Function* method, measures the change in the supply of a particular ecosystem service and the change in the economic value of its production. Changes in the supply of resources may occur for several reasons including natural and human causes like fires, flooding, invasive species, climate change, etc. Initial levels of surplus compared with resultant levels allow for an estimation of the value of changes in the supply. This method is sometimes used to complement a cost-benefit analysis. It has been used to estimate the value of soil conservation, coastal wetlands, mangrove systems etc. (Krishnamurthy, 2003). Barbier (2000) used changes in productivity in his study in valuing the role of wetlands, specifically mangroves that support coastal and marine fisheries as their contribution to the fishery does not have a direct market value. Barbier (2000)

concludes that ecosystem services provided by wetlands and other complex ecosystems may be significant in protecting economic activity.

2.5 Non-Monetary Valuation

Existing evidence suggests that despite growing consensus regarding the need for greater public participation in environmental policy, there is a lack of tested methods to incorporate stakeholder values explicitly in decision-making (Gregory, 2000). Commonly, the design of resource-use policies is based on the monetary value of ecosystem goods and services, and more rarely with an eye to non-market values such as aesthetics, heritage, and ecological integrity. There is substantial demand for a practical technique for measuring the value of goods and services that do not have market value or are not traded in markets. Measuring value of these goods and services is often required for the analysis of policies that affect the environment. Some economic and monetary valuation methods for assessing non-market values have been criticized because participants often make arbitrary choices (Kahneman and Knetsch, 1992). The price of petroleum proves that nature does have economic value but how much it is worth or should be worth is often contrasted (Rolston, 1988). Some applications of economic valuation are expensive and time consuming. Very rarely do policy makers have the luxury of conducting original studies to determine these values (Pendleton *et al.*, 2007).

While quantifiable measures are often easier to assess, they do not always reflect the true value of resources. The value of Earth's natural capital is poorly understood and undervalued by markets, politicians, and the general public. Non-market values are nevertheless vital for conservation and sustainability. The market is not always a viable place for establishing values in the first place (Satterfield and Kalof, 2005). For example, monetary and economic valuation methods are applied to goods or services that are not traded on the market and therefore do not have a market value.

2.5.1 *Approaches to non-monetary valuation*

Approaches to non-market valuation are gaining in popularity in their use to capture the values or importance of natural resources. While some methods can still be linked to economic theory (see Peterson and Brown, 1998), their intentions are not necessarily to provide market values. Others have steered completely away from markets and conventional economic theory and focus on community judgements derived from directly comparing resources, damage losses, and other resource or environmental scenarios (see Chuenpagdee *et al.*, 2001 a and b; Arce-Ibarra, 2007; Quah *et al.*, 2006).

Peterson and Brown (1998) combine conventional economic theory and non-monetary valuation in a paired comparison survey where dollar amounts are used in the series of objects being compared. Each good is eventually compared to each dollar amount. An example might include a natural resource compared to

a dollar value and respondents would be asked which one is worth more or if they would be willing to accept that dollar amount for that resource. Results in both cases show dollar values of each of the objects in the survey according to a participant's selections. This method blends both market and non-market goods. The objective was to determine if respondents would have an easier time selecting between two objects when dollar amounts are used in choice scenarios. Peterson and Brown (1998) found that respondents were inconsistent in their choices.

Gregory and Keeney (1994) conducted a three-day stakeholder workshop described as a Public Values Forum to gather stakeholder objectives on a proposal for the development of a coal mine in a pristine tropical rain forest in Sabah, East Malaysia, on the northern tip of Borneo. Each participant was required to write everything down that they believed to be important for consideration in the environmental impact assessment. Individual objectives were categorized under five headings. Participants then prioritized each of the five objectives in terms of relative importance. In another case, Gregory and Wellman (2001) used a similar community evaluation approach in Tillamook Bay, Oregon to capture the values and concerns of community residents in the restoration of a local estuary.

Several psychophysical studies have been conducted where photographs were presented to respondents in a comparison method. Hull and Buhyoff (1986) developed a method to evaluate scenic beauty where they presented

photographic models of four loblolly pine stand management practices to obtain visual landscape preferences in Helsinki, Finland. The results show that Helsinki residents preferred the look and practice of managed forests. The preferences in this case were closely linked to the background characteristics of the respondents. Hull and Buhyoff (1986) were able to conclude that the current participatory approach was sufficient for identifying public values that could later be integrated into the resource decision-making process.

The *Environmental Damage Schedule* (Chuenpagdee *et al.*, 2001 a and b) is mostly dependent on the judgements of resource-dependent communities, managers, and other various interest groups with regards to the importance of resources and the preferences for changes in the environment. The choices are based on assessments of community judgments derived from easily obtained choices of relative values without requiring people to assess such scenarios in monetary terms. Participants are given a set of choices and are asked to select which of the choices is least or most preferred depending on the context. One of the original conceptualizations of a pre-determined damage schedule was by Rutherford *et al.* (1998). The authors addressed the functions of assessed values and the implications for the importance of accurate valuation of the considered assets. While such pre-determined schedules are hardly new, prior to Rutherford *et al.* (1998) they mostly applied to personal injury losses or workers compensation where, for example, workers are compensated for injuries that

took place on the job site. Previous applications of pre-determined damage schedules include tort reforms and environmental value schedules.

The first empirical testing of the damage schedule approach was conducted in two coastal areas in Thailand, Ban Bon Bay and Phangnga Bay where rich coastal resources were faced with problems of rapid population growth and economic activities causing conflict among resource users. The two case studies illustrated that the values of the resources can be revealed through the ranking of relative importance, and by measuring them, the damage schedules can assist managers in applying appropriate sanctions on specific resource damages and severity (Chuenpagdee *et al.*, 2001 a and b).

Another application of the damage schedule can be seen in Arce-Ibarra's (2007) study in Quintana Roo, Mexico where it was used to elicit the values that the Maya people place on various resources such as soils, bees, trees, etc. Three groups of people in the community including land owners, non-land owners, and women participated in this study. All three groups agreed that soils were the most important resource and fish was the least important. The results of this study were confirmed in community consultations.

Quah *et al.* (2006) applied the damage schedule method in urban Singapore to elicit the values of various environmental damages or losses through two paired comparison studies. A sample size of 100 respondents was used in each study. One study focused on the state of environmental quality for different resources where it was found that the four most important environmental

problems were degradation of coastal and marine environment, polluted air, ozone depletion, and an unhygienic environment relating to food and water. The second study asked respondents to make a choice between two alternative gains for example, a gain of SGD$4700 (i.e. Singapore dollars) or an air quality improvement from an unhealthy level to a good level, similar to Peterson and Brown's (1998) study. Severe air pollution was ranked as the most important environmental problem followed by severe food and water contamination.

A relative scale of importance and a damage schedule offer advantages in various aspects of environmental management including resource allocation, restoration efforts, and conservation initiatives. Its applications in coastal communities globally prove that it is a reliable method in eliciting the importance of natural resources without applying monetary values. Accurate assessment or elicitation of a community's values is crucial for successful environmental decision-making and through the use of the damage schedule method, this can be achieved.

CHAPTER 3

STUDY AREA

St. Paul's is located on the west coast of Newfoundland, Canada, and is an enclave to Gros Morne National Park. The area has been shaped by thousands of years of movements by continents and glaciers (Kearney, 1979). Various prehistoric Aboriginal groups occupied the Gros Morne area, particularly in St. Paul's as a resource gathering settlement. Archaeological excavation in St. Paul's has found evidence that the area was occupied from 5500 to 1000 years ago. Prehistoric cultures that inhabited the St. Paul's area include Maritime Archaic Indians, Groswater Palaeoeskimo, Dorset Palaeoeskimo, and Recent Indians (Parks Canada, 2009). The abundance of resources in St. Paul's has remained a constant for settlement and survival. Residents of St. Paul's are, and always have been, dependent on the surrounding resources, both marine and terrestrial. The evidence of their historical connections to the place can be found

today in the way they use the land and the sea, as described below. First, a brief history of St. Paul's and the settlement are provided, along with the account of the creation of Gros Morne National Park and its relationship to the town. The present day St. Paul's is next presented, with details about its people and resources.

3.1 History of St. Paul's

The town of St. Paul's is a relatively new community in comparison to other outport communities in Newfoundland. It is currently home to 295 people, some of whom are still involved in the traditional lobster fishery that was the base of its settlement in the 1870s. Elias Gifford, a fur trapper, is believed to be the first European settler of St. Paul's. He processed nearly 56 quintals (6300 lbs) of cod in 1874 (see Kukac *et al.*, 2009).

Generally, European people on the western coast of Newfoundland caught and processed cod in a family-oriented "truck" system where men would fish from small vessels and women and children processed or cured the catch. The fishery in St. Paul's worked based on the merchant system and was later replaced by cooperatives and again by processing plants and industrial harvesting technology.

Although cod was the main fishery in Western Newfoundland, the resource was often inconsistent in catch size forcing many to depend on the lobster fishery. The residents of St. Paul's have harvested and processed lobster

since their settlement in the 1870s. The cod fishery took a serious decline when gears changed, allowing for larger catch volume, and human populations grew creating a higher demand for cod and food resources. As a result, the lobster fishery grew and canning factories along the west coast increased dramatically. In 1887, Payzant and Frazer, a Nova Scotia firm, opened the first lobster cannery in St. Paul's; it was considered to be one of the most successful factories on the west coast of Newfoundland. By 1901, there were four lobster canneries in St. Paul's, nine in 1911, and twelve in 1921. Canning soon became a thing of the past and fishers began shipping live lobsters directly to US markets, particularly those in Gloucester, Massachusetts as it is still done today (see Kukac *et al.* 2009).

In addition to cod and lobster fisheries, fishers in St. Paul have also participated in herring, salmon, halibut, and capelin fisheries and to a limited extent, the seal fishery. In 1992, both salmon and cod came to a moratorium in Newfoundland. The herring fishery was once abundant in St. Paul's Inlet, attracting fishers from across the entire Northern Peninsula. Some local residents can recall the Inlet being populated with boats and described it as a *little city*. Residents speak of times when St. Paul's Inlet would be covered with herring eggs during spawning. In the 1940s, fishers from outside of St. Paul's began to seine for herring. Local fishers were concerned that seining would quickly wipe out the vibrant herring stock and began to seize the seines of other fishers. In 1977, the Herring Protection Committee was formed by local residents in St.

Paul's to prevent overfishing. Regulations were eventually changed so that only herring nets could be used in St. Paul's Inlet. Although the local Committee strived to save the herring stocks, their efforts were too late; the herring fishery soon ended.

Today, there are about twelve active fishermen and fisherwomen in St. Paul's, a 64 percent decrease since 1988, and although the lobster fishery is the most predominant, some also fish for halibut, turbot, and lump fish.

Recreational salmon fishing is still part of life for many people in St. Paul's both for personal consumption and as an income supplement through guiding. The Western Brook River, about 5km southwest of St. Paul's, was once a predominant recreational salmon fishing river for local residents. The river was closed in 1984 in hopes for a recovery of the run after Parks Canada scientists counted only eighteen salmon that year. Although stock numbers are increasing, the river remains closed today and Parks Canada continues to monitor fish stocks.

Fisheries resources were not the only reason to settle in St. Paul's and the surrounding area. In the past, the Newfoundland government looked to St. Paul's for oil resources. Oil exploration in St. Paul's began in 1894 but with only little success. In the 1950s, further oil exploration by John Fox began, however commercial quantities were never found. Fox's Road in St. Paul's is a reminder of past efforts in oil exploration. Today, many young people have left St. Paul's either permanently or as migrant workers to work in the oil sands in Alberta. The

hope of major oil discovery still lingers with local residents. Many see an oil industry as a means of keeping young people at home and as a way to support their families.

3.2 Gros Morne National Park and St. Paul's

In 1973, the Canadian federal and Newfoundland provincial governments signed an agreement for the creation of Gros Morne National Park. The demand for a national parks system was part of a general movement toward the rational management of natural resources and economic benefits. In fact, conservation was not the goal of protected areas and only played a small role in the Parks mandate at the time (Bella, 1987; McNamee 1993; Carter-Edwards 1998; Kafarowski, 2003). The intentions of park creation were to open the doors for a tourism industry, ultimately attracting people to lesser developed, less populated areas of Canada in order to generate economic opportunity and prosperity (Bella,1987). At the time, most of the Newfoundland economy was based on the fishery. When Newfoundland joined confederation in 1949, the fishery was already on the decline and poverty was becoming more wide spread. It was strongly believed that if attempts at development were not undertaken, high unemployment, poverty, and mass-migration would result (Overton 1978).

Gros Morne National Park is governed by Parks Canada, the federal body designated to manage Canada's federal protected areas. The initial Parks Canada mandate did not consider humans as part of the natural environment,

basically ignoring the communities that were already established in desired park areas. It was government policy to expropriate local residents and dissolve communities located within the boundaries of proposed national parks. Until the 1960s there was little resistance to expropriation for national parks. However, communities soon came to realize their dependence on their natural surroundings and began to fight back by protesting the park creation and their removal from the area (McNamee, 1993; Brookes, 1988). In August of 1973, on his visit to Gros Morne to sign the official documents for the park creation, Indian Affairs Minister Jean Chretien was met by a group of protesters from St. Paul's and Sally's Cove who were protesting against the placing of restrictions of property rights in communities inside the boundaries of the park. Mr. Chretien relaxed the policy and allowed for some of the communities to remain in the boundary (Brookes, 1988).

Although these communities remain enclave to the park, their lifestyle has changed. It took time for them to get used to the new regulations that came with the notion of a national protected area and to the influx of visitors to the park area. When park boundaries were made, land was no longer open access property and park regulations meant that hunting and cutting wood were restricted. Eventually, designated cutting areas were opened and a short rabbit-hunting season was allowed (Kearney, 1979).

In 1987, Gros Morne National Park became a UNESCO World Heritage Site because of its 'outstanding universal value' (UNESCO, 2008). Gros Morne

National Park is an example of 'superlative natural phenomena' showing major stages of Earth's geological history such as continental drift and glaciation (UNESCO, 2008). Given that tourism benefits are not well distributed and the effects of the Park on some people's lifestyle have been negative, resentment about the Park remains within some communities.

Boundary disputes and land-use conflicts have resulted in resentment toward park management and in some cases violations of park policies, such as cutting wood in undesignated areas, have occurred (Kafarowski, 2003). The trail map seen in Figure 3.1 shows the boundaries of the enclave communities in dark green and the park boundary in light green.

In addition to Parks Canada, other agencies play roles in the governance of St. Paul's. Because the Inlet is part of an ocean environment and contains ocean species, the Department of Fisheries and Oceans (DFO) also has some jurisdictional powers over St. Paul's Inlet. The RED Ochre Regional Economic Development Board is responsible for implementing strategic economic plans and facilitating linkages with federal, provincial, and municipal government departments and agencies in support of an economic strategic plan for St. Paul's. St. Paul's also has a local council comprised of a town clerk, mayor, deputy mayor, and five council members. The town clerk manages the town in all aspects from services and taxes to recreational planning and partnerships with other towns and agencies.

3.3 St. Paul's Today

The shift from a fisheries based economy to a serviced based economy is slowly happening in St. Paul's with local natural resources being the main attraction. The demographics of St. Paul's are changing and as resources become scarcer or new attractions are added, the population either shifts into other occupational sectors or they leave and find work in other provinces.

3.3.1 *Socio-Economics*

According to the town record, the population of St. Paul's was 295 in July, 2008. Formal census data shows a steady decline, for example of about 3 percent from 2001 to 2006 (Table 3.1). During that same period, the population of Newfoundland also declined by 1.5 percent (from 512,930 in 2001 to 505,470 in 2006). In 2005, the average personal per capita income in St. Paul's was $11,700 and the provincial average was $21,600. The self reliance ratio in 2005 for St. Paul's was 44 percent (money generated on their own accord through employment, etc.). The other 56 percent came from government sources such as Canadian Pension, Old Age Security, Employment Insurance, etc.

Figure 3.1. Map of Gros Morne National Park. Enclave communities can be seen in the darker green. The park boundary is represented with a lighter green.
Source: Parks Canada, 2009

Table 3.1
Population records for St. Paul's from 1986-2009.
Percent of males and females per year.

Year	Population	%Male	%Female
1986	495	50	50
1991	450	49	51
1996	380	51	49
2001	330	51	49
2006	320	52	48
2008	295	49	51

Source: *Communityaccounts.ca and M. Pittman, Town Clerk of St. Paul's.*

The 2006 Census reported that 47.8 percent of people 18-64 years or older in St. Paul's do not have a high school diploma which is almost double the provincial rate of 25.1 percent. However, 84.6 percent of people 25-34 have at least a high school diploma which is almost on par with the provincial rate of 85.4 percent and 89.1 percent for all of Canada. Therefore the older population groups (35-64) in St. Paul's have lower literacy levels.

The people of St. Paul's are employed in various sectors of the economy as shown in Table 3.2. The changes from 1996 to 2006, especially the huge decline in the primary sector, are remarkable in exemplifying St. Paul's as a coastal community that was once prominent in resources and capacity, but, like many others, is now suffering from the loss of its human and natural resources due to increasing pressure in resource exploitation and other development consequences.

3.3.2 *Resources of St. Paul's*

Coastal resources, particularly the fishery, have been vitally important to the people of St. Paul's. In St. Paul's there is a large inlet, St. Paul's Inlet, which is a unique, complex brackish system containing a large area of saltmarsh at its opening to the Atlantic Ocean. Growing at the bottom of the Inlet is eelgrass (*Zostera marina*), which is an important nursery habitat for many fish and shellfish species. Harbour Seals also occupy the Inlet, often basking in the sun on low-lying rocks. Although marine resources have played a major role in the settlement of St. Paul's, terrestrial resources have also been crucial to the community. In addition to the vast marine resources in St. Paul's are terrestrial resources such as the forest and an overwhelming moose population. The decline in the fishery has local residents leaning toward a tourism-based industry. The ecological significance of St. Paul's Inlet also provides economic significance for the town of St. Paul's, the surrounding enclave communities, and for Parks Canada.

Table 3.2
Sectors of employment for St. Paul's.
Number of residents in each sector.

Sector	1996	2006	2008
Health	0	0	1
Primary (ex. Fisher)	75	45	12
Sales and service	80	35	21
Management	10	10	1
Office	10	25	2
Construction	10	**	14
Processing/manufacturing	10	**	**
Other	**	10	10

**no data *Source: Communityaccounts.ca and M. Pittman, Town Clerk of St. Paul's*

Marine resources

St. Paul's Inlet

St. Paul's Inlet is a brackish system that has a long coastline where seawater is mixed and diluted by freshwater to form a body of water of intermediate salinity (Barnes, 1994). St. Paul's Inlet contains a number of hardy freshwater and marine species – those that can withstand both the degree of concentration and dilution because of the intimate connection of fresh and marine water systems (Barnes, 1994). There are no species that are solely brackish species in that they are all capable of inhabiting one environment or the other under the correct conditions (Barnes, 1994). The Inlet has sometimes been referred to as a *'paralic system'* to demonstrate that although the flora and fauna are not restricted to brackish systems, many of the species do not normally occur in the adjacent marine or freshwater habitats.

Saltmarsh

A unique ecosystem in St. Paul's is the saltmarsh, located on what is referred to as "Tickle Point" by the local community, covering approximately 8.5 sq. km in area. Although once thought to be a wasteland, saltmarshes are now known as one of the most biologically productive habitats on the planet (Doody, 2008). Saltmarshes generally have an abundance of insect species that utilize the marsh flora. Insects provide a food supply for some fish species but mostly for birds, often making saltmarshes a resting area for migratory waterfowl. The

flora system of a saltmarsh not only provides nourishment for bottom dwelling scavengers such as worms, fish, snails, crabs, and shrimps, but they also provide protective habitats for young marsh inhabitants to survive to adulthood (Barnes, 2004).

The saltmarsh in St. Paul's is considered to be "*one of the most unusual and fascinating habitats*" in the Gros Morne area (Burzynski, 2000). Numerous birds and waterfowl use the saltmarsh as a resting area during their migration as it is abundant in nutrients and food supply. The area provides habitat and spawning grounds for popular fish species like brook trout and salmon (Neis, 2007). The high rate of decomposition gives off a smell of hydrogen sulphide, which is considered unpleasant. It is this decomposition process that provides enormous amounts of food to various aquatic species in and around the Tickle Point area. The saltmarsh in St. Paul's is used as a dumpsite of mostly construction debris and old appliances. Although dumping on the saltmarsh is illegal and the large waste piles are cleaned on a yearly basis, they continue to re-appear. Currently, there are no initiatives to address this problem.

Eelgrass

Growing at the bottom of St. Paul's Inlet is eelgrass (*Zostera marina*) or "goosegrass" as it is referred to by local residents. Eelgrass generally grows in shallow salty waters with muddy or sandy bottoms much like St. Paul's Inlet. Eelgrass helps to prevent erosion and maintain the stability of the ocean floor. It

is the base of the food chain, providing a rich source of nourishment. Eelgrass provides an important nursery habitat for many fish, shellfish, and other species such as cod and herring, and is an important food source for birds and waterfowl, presumably where it got its local name of goosegrass (Gosner, 1999).

Birds and Waterfowl

St. Paul's Inlet and saltmarsh attract many shore birds along their southward migration pattern usually commencing in July. Birds and waterfowl use the Inlet and saltmarsh for its food and rich nutrient content to sustain them over the long winter months. They mostly feed on small crustaceans, worms, and soft-bodied animals buried in the mud (Burzynski, 1999). Arctic Terns (*Sterna paradisaea*) are just one of many species that occupy the Inlet and saltmarsh as a home throughout the summer months. The Arctic Tern has the longest migration route of any bird in the entire world, migrating from the Arctic to Antarctica and back again each year. The willet, a large sandpiper, uses the saltmarsh as a breeding ground. This use is highly significant for biodiversity since scientists estimate that there are less than 750 nesting Willet pairs in the world (see Kukac *et al.,* 2009).

American Lobster

The American lobster (*Homarus americanus*) fishery is the base of the economy and main reason for permanent settlement in St. Paul's. Lobster thrives

in cold, shallow, rocky waters. Lobsters require a habitat that allows them to hide easily from ground feeding predators such as codfish, haddock, flounder, and other lobsters. The lobster was once part of a continuous fishing cycle that offered fishers a range of species to harvest at various times of the year. Currently, the American lobster is the only viable commercial fishery practised by fishers in St. Paul's who fish outside the Inlet in St. Paul's Bight or in the Gulf of St. Lawrence (see Kukac *et al.*, 2009).

Atlantic Herring

Atlantic herring (*Clupea harengus)* used to spawn among the eelgrass beds of St. Paul's Inlet. It was an important food source for salmon and lobster. St. Paul's Inlet was once abundant with herring but the fishery came to an end in the 1970s due to overfishing. The herring played an important role in the Inlet's food chain, providing a crucial food source to seals, cod, other large fish, and sea birds. Although herring strive in estuary habitats like St. Paul's Inlet and swim in large fast-moving schools for predator protection, overfishing was proved to be dominant in this case and, according to scientists and local residents, wiped out the entire stock.

Atlantic Salmon

Atlantic salmon (*Salmo salar)* are an anadromous fish that mostly feed and grow in salt water but return to freshwater to spawn. Salmon rely heavily on

estuary habitats for their life cycle. The past abundance of salmon in the area was one of the most important reasons for settlement along the western coast of Newfoundland. The Atlantic salmon were once part of the commercial fishery for St. Paul's fishers but has only been a recreational activity since its commercial moratorium in Newfoundland in 1992.

Terrestrial resources

Forest

Forest resources have long played a factor in survival and settlement in St. Paul's. Men from St. Paul's have always worked in the forestry industry. Some recall their days walking to Deer Lake to work in the woods as part of the pulpwood industry. Only a few men in St. Paul's are still active in the forestry industry, mostly in the actual logging process, and travel back and forth to the Corner Brook area. Many homes and sheds in St. Paul's were and still are built by hand using wood cut and planked from local forests by local residents. Fishers have relied on healthy forests for wood, traps, and boats. Most of the homes in St. Paul's are heated using wood stoves. Wood-cutting is a popular pastime as many cut and haul their own wood. More recently, the Town of St. Paul's proposed an expansion of their cutting blocks, an already disputable activity inside a national park, to the Department of Natural Resources. The district forester denied their request.

Moose

The population of moose (*Alces alces*) in the Gros Morne area is one of the highest population densities in the entire world (see Kukac *et al.,* 2009). This introduced species is an important winter staple for the residents of St. Paul's. In the fishing off-season, many fishers from St. Paul's use their local knowledge of the area and guide tourists into hunting grounds. Parks Canada has major concerns for local forests; as the moose population has rapidly increased, food supply, mostly balsam fir trees, has vastly decreased as it is the preferred tree species by moose.

Roadside Gardens

Roadside gardens are a common site throughout the Northern Peninsula and have been for decades. The rich, organic soil of the Western Brook Lowlands was likely an attraction for settlement. Gardens are planted in raised beds so the topsoil is dry and warmer than the soil in the ground, which is good for retaining heat. Residents of St. Paul's cultivate relatively small plots of land where they mostly plant hardy root crops such as potatoes, carrots, beets, and turnips (Omohundro, 2006).

Tourism Resources

Currently, a boat tour runs through St. Paul's Inlet showcasing the harbour seals that occupy the Inlet for its vast resources. Although the boat tour employs

one or two local people, Bonne Tours in Rocky Harbour owns the business. The Seal Island Boat Tour runs an average of two boat tours per day, seven days a week during the summer months travelling inland around St. Paul's. The tour allows for nature enthusiasts to have a close-up view of Harbour Seals resting on nearby rocks and shoal (Bontours.ca, n.d.). The Inlet has one of the largest populations of Arctic Tern nesting areas in North America. The boat tours also allow tourists to have frequent sightings of other wildlife including moose, caribou, black bears, bald eagles, and other sea birds.

Tourism is the most documented use of St. Paul's Inlet; however, the Inlet does have other, undocumented uses, including illegal activities such as poaching. The tourism industry provides direct employment for some local people allowing the ecological integrity to provide economic significance to the area. In fact, each year the Park attracts more than 150,000 visitors. Over 30,000 of those visitors make their way through St. Paul's travelling north to L'Anse aux Meadows (Vodden, 2005).

Many bird species are attracted to the saltmarsh as a place to recharge on migratory stops. Rare bird species including various Heron species, rare to Newfoundland, have been spotted in the saltmarsh attracting bird watchers from near and far. Local residents, both young and old, participate in a long standing tradition of duck hunting which was once practiced on a subsistence basis but is now more of a recreational pastime. The newest addition to St. Paul's is Gros Morne Resort. The resort is in the current process of expansion, gearing toward

350 rooms, a twenty-seven hole executive golf course, 110 Recreational Vehicle (RV) sites, and an indoor water park.

CHAPTER 4

METHODS

4.1 Paired Comparison Method

The damage schedule method is based on the *Law of Comparative Judgement* developed by L. L. Thurstone (1927). The model is used to obtain measurements from any process of pairwise comparison and represents how we perceive objects rather than being measurements of actual physical properties. Thurstone applied this model in his study of the perceived seriousness of crime. He used nineteen offences considered to be serious by judgment not by actual consequences and arranged each of them to be paired with each other at some point totalling 171 pairs. Thurstone concluded by saying that his study did not contribute any startling facts to the study of crime. Instead it showed that qualitative judgments could be captured in a quantitative measurement.

Paired comparison is a psychometric method used to order preferences among elements of a choice set. It provides an indication of the relative

importance of the items being compared to individuals taking part in the survey. It is used in cases where objects must be judged subjectively such as a taste test. The method of paired comparison presents two objects in a pair-wise fashion to a sample of respondents. Respondents are asked to select one member of each pair as being more important or more valuable than the other.

The model uses *n* to represent the number of objects being compared, *k* to represent the number of respondents, and *P* to represent the total number of possible pairs for comparison, where $P = n\,(n\text{-}1) / 2$. For example, in the case of three objects, *a, b,* and *c,* the three possible pairs for comparisons would be (a vs. b), (b vs. c), and (a vs. c). The total number of pairs for all respondents is represented by ($k \times P$). Each object has the same probability of being selected because they are all paired an equal number of times.

A consistent preference ranking would have one object, the most preferred, chosen at all possible times and the least preferred object never selected at all. This consistency is always expected when respondents are asked to rank the objects directly and all at one time. The method of paired comparisons allows, however, for inconsistencies in the respondents selection of preferences, particularly those occurring as circular triads, i.e., when *a* is preferred to *b, b* is preferred to *c,* but *c* is preferred to *a.* Circular triads often occur when individuals are asked to compare complex, multidimensional objects, where different aspects for different pairs may be focused. Circular triads may also occur simply because the respondent is indifferent to particular objects or it

can just be a simple mistake. While direct ordering of objects results in an ordinal scale, an interval scale is obtained using the paired comparison method. Thus, not only can the order of the preferences be seen but also the distance each preference has between one another is meaningful. In other words, paired comparisons is able to show not only what resources are more important but also how much *more* important each one is. Results from such surveys provide transparency, ease of implementation, and most of the benefits of monetary valuation without the disadvantages of arbitrary and variable assessments (Chuenpagdee *et al.*, 2001a).

4.2 The Questionnaire

One of the limitations of the paired comparison method is the number of pairs that should be included in the survey since the number of pairs increases significantly with the added number of objects. Therefore it was necessary to conduct informal key informant interviews to ensure that an array of resources and activities selected as the objects represented a broad range of values, such as cultural, economic, historical, environmental, subsistence, etc. In the questionnaire design process, several experts in various disciplines, including key local community members, were asked to describe a range of resources in St. Paul's and issues related to them. Results from these informal interviews were combined with other factual information obtained from previous field visits and an extensive literature review to formulate the initial lists of objects (i.e.

resources and activities) in the St. Paul's area. These lists were altered on numerous occasions in response to the outcomes of the pre-testing surveys. The wording of the questions was also changed after pretesting to ensure that participants were responding specifically to what was being asked.

Due to issues pertaining to low literacy levels, photographs accompanied each resource and activity in the questionnaire albums to help overcome this barrier (refer to page 47). The intentions of the photographs were to help respondents feel at ease while completing the survey and so that those with lower literacy levels were not excluded from participating. The photographs were carefully selected and tested for suggestive nature to ensure that the only purpose they served was to assist those with lower levels of literacy to better understand what was being asked.

Eight resources and eight activities were included in the paired comparison surveys (see Tables 4.1 and 4.2). Using eight items (section 2.6.6), a total of 28 pairs were included in each survey album (or booklet). Only one paired comparison appeared on each 8.5x11 page of the questionnaire photo album booklet. Three albums were made for the resource portion of the survey and another three for the activities to increase the randomness of the survey. One album was randomly selected from each set each time the survey was conducted. Random ordering of both pair sequences and the left-right (A-B) position of the choice was used to avoid order effects in each booklet. The booklets were colour coded to match corresponding recording sheets given to

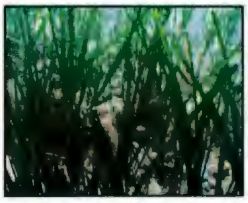
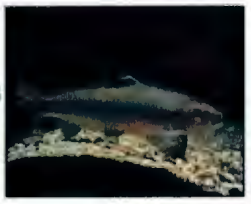
respondents in a survey package. Because this survey was simply interested in eliciting people's expression of their values, duplicates or trick questions were neither used nor necessary. Both the resource section and the activities section asked follow-up questions to each paired comparison. Respondents were asked why each resource was more important and what negative impacts they associated with each activity (see Appendix A for the complete questionnaire). The respondents were first asked to complete the paired comparisons for the resources before being given the second questionnaire booklet containing another 28 paired comparisons of the eight activity scenarios. All surveys were completed in this order. The final section of the questionnaire contained some basic demographic questions like age and gender as well as some questions about who should be involved in the management process and the respondent's interaction with the resources used in the survey.

Resources Booklet

An example of a paired comparison from a resource album can be seen in Figure 4.1. For the resource album, respondents were asked to select which *one* of the two resources was more important to them based on their knowledge of St. Paul's. Respondents had to select only one of the resources, and no ties were allowed. Respondents were then asked to provide some rationale as to why each resource was selected. As shown in Table 4.1, resources included in the survey covered a wide range of values such as cultural, economic, ecological, and

subsistence. For example, lobster has strong cultural values as it has been a way of life and it has always provided for the community since their settlement in the 1870s. The saltmarsh is a unique ecosystem to the area and provides numerous ecosystem services (see section 3.3.2). Wood from local forests is used by the community for heat and building supplies as well as providing ecosystem services. See section 3.3.2 for details of resources in St. Paul's.

Table 4.1
Resources of St. Paul's Used in the Survey

	Birds and Waterfowl		Saltmarsh
	Atlantic Herring (*Clupea harengus)*		Moose (*Alces alces)*
	Eelgrass/Goosegrass (*Zostera marina)*		Atlantic Salmon
	Forest		American Lobster (*Homarus*

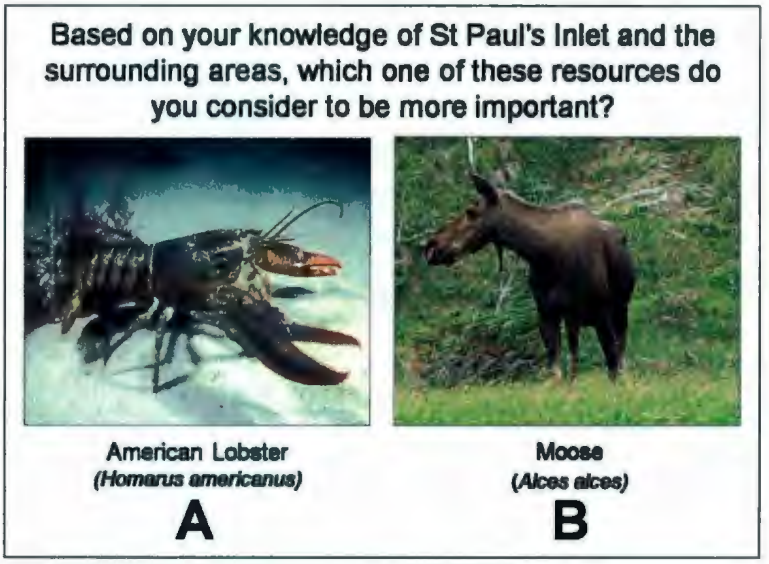


Figure 4.1. Sample paired comparison from a resource album

Activities Booklet

In order to determine if respondents were aware of the impacts on resources in the area that certain activities might cause, respondents were asked to complete a second set of paired comparisons. In this set, they were asked to select which of the two activities they felt was more beneficial to the St. Paul's area. Table 4.2 is a list of the eight activities used in the survey with their accompanying photographs. An example of a paired comparison from an activity album is shown in Figure 4.2. Similar to the resource album, respondents were asked if and what negative impacts they associated with each activity. The activities included in this survey were selected based on the information gathered from key informants. Some of the activities, such as oil exploration, have happened in the past and are currently being discussed, others such as the resort expansion, are well under way. The reforestation program was included

based on the direct observation of a publicly denied request for an expanded wood cutting block (personal observation, 2008). Currently there are dumping sites on the saltmarsh and although they are removed yearly at the expense of the town, they continue to re-appear. Other activities that were used in the survey are hypothetical but realistic. For example, while some activities do not presently occur, they are entirely possible to achieve. For example, there are currently no interpretive signs on the walking trail but it is something that is conceivable and could be easily implemented. Yet, in order to ensure that there was no expectation of development from the respondents, it was made clear on the survey instructions that this research was not connected to the implementation of these activities.

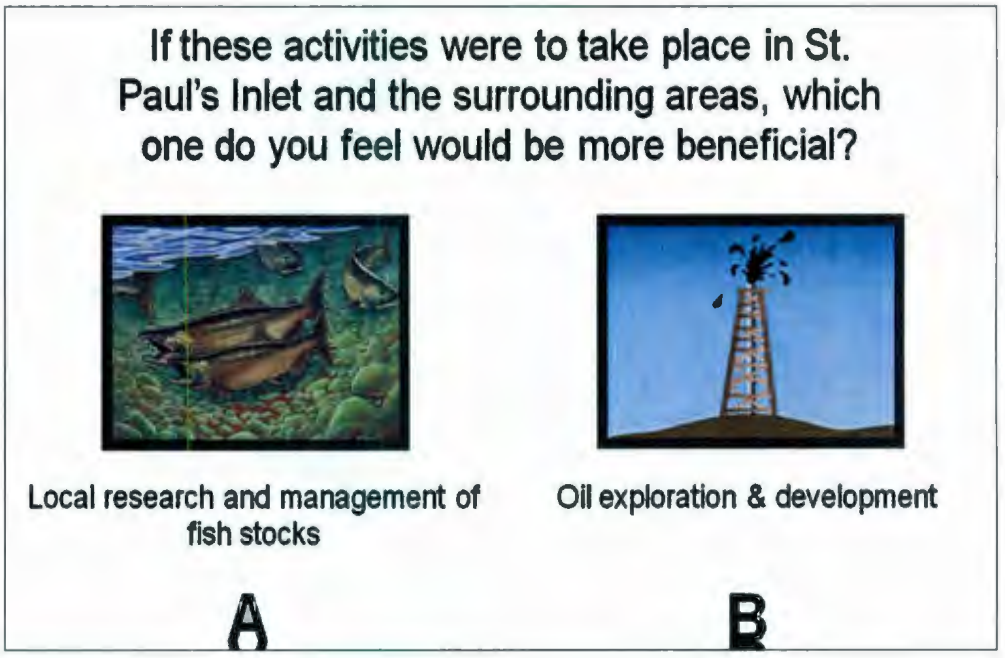
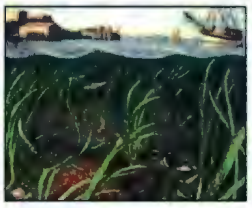
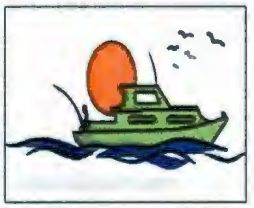


Figure 4.2: Sample paired comparison from an activity album

Table 4.2
Activity scenarios for St. Paul's

	Resort and golf course expansion and operation		Local research and management of fish stocks
	Oil exploration & development		Re-forestation program
	Clean up of dumping sites in saltmarsh		Interpretive signage on walking trail
	Protection program for Eelgrass/Goosegrass beds		Additional boat tour operations

Other information

A map of the study area (see Appendix A as it was part of the questionnaire package) was provided to each respondent along with detailed instructions and a cover letter explaining the objectives of the study. The instructions clearly stated that there were no right or wrong answers, no trick questions or duplicates. No specific information was provided to suggest a connection between resources and the impacts or benefits of each activity. In accordance to ethics policies, the instructions also stated that participation was

completely voluntary and that responses would be kept strictly confidential and anonymous. Participants were free to withdraw at anytime without having to provide any explanation. No personal information such as name or address was collected. The recording booklet had two colour coded sheets that corresponded with specific resource and activity albums. The coloured sheets had two columns marked A and B. Each row was assigned a number from 1 to 28 – the number of pairs, and therefore pages, in each album. Respondents would check either A or B as their selection for each of the 28 pairs.

Each of the coloured recording pages was followed by another page for collecting qualitative information. Respondents were asked to freely describe why the resource was important or what negative impacts were associated with each activity. At the bottom of the page, respondents were given an opportunity to add any resources or activities they felt should have been included in the questionnaire. After the activity paired comparisons were completed, a series of demographic and resource management questions were asked. Demographic questions included gender, profession, place of residence, age, and level of engagement with the resources referred to in the survey. The resource management questions aimed at getting the opinions of the respondents about who should be involved in making resource management decisions or policies and what factors should be considered for management policies. A recording booklet can be seen in Appendix A as part of the complete questionnaire package.

4.3 Conducting the Questionnaire

Field research took place in May to September, 2008, with the entire period spent living in the community of St. Paul's. The first two months were used to gain an acquaintance with the people and the area and to develop and re-test the questionnaire. It was beneficial to live in the community since it enabled participation in community events such as Fun Weekend and the moose supper, and thus made it easier to gain access to information and to obtain collaboration for the research. The questionnaire was implemented during the last three months with four target groups of respondents: local residents, residents in surrounding communities, managers, and tourists. Local residents were those who resided in St. Paul's at the time of the study. Residents in surrounding communities were those who may also have local and historical knowledge of St. Paul's and may have lived there at some point but at the time of the survey resided in communities in the surrounding region from Trout River to Daniel's Harbour (See Figure 4.3 for a map of surrounding area resident interest group boundaries). For the purpose of this study, those with scientific knowledge of some or all of the resources in the area, those who were directly involved with economic and community development of the area, or those directly involved in the management and decision making process of Parks Canada or other government or institutional groups such as the Department of Environment and Conservation were included in a respondent group referred to as *Managers*. Tourists were those who were visiting the area and not originally from there. The

purpose of having four groups was to enable a comparison between interest groups to see whether they have the same values. It was considered essential to not only know what resources and activities were important or beneficial to each group, but also whether there was any disparity among them.

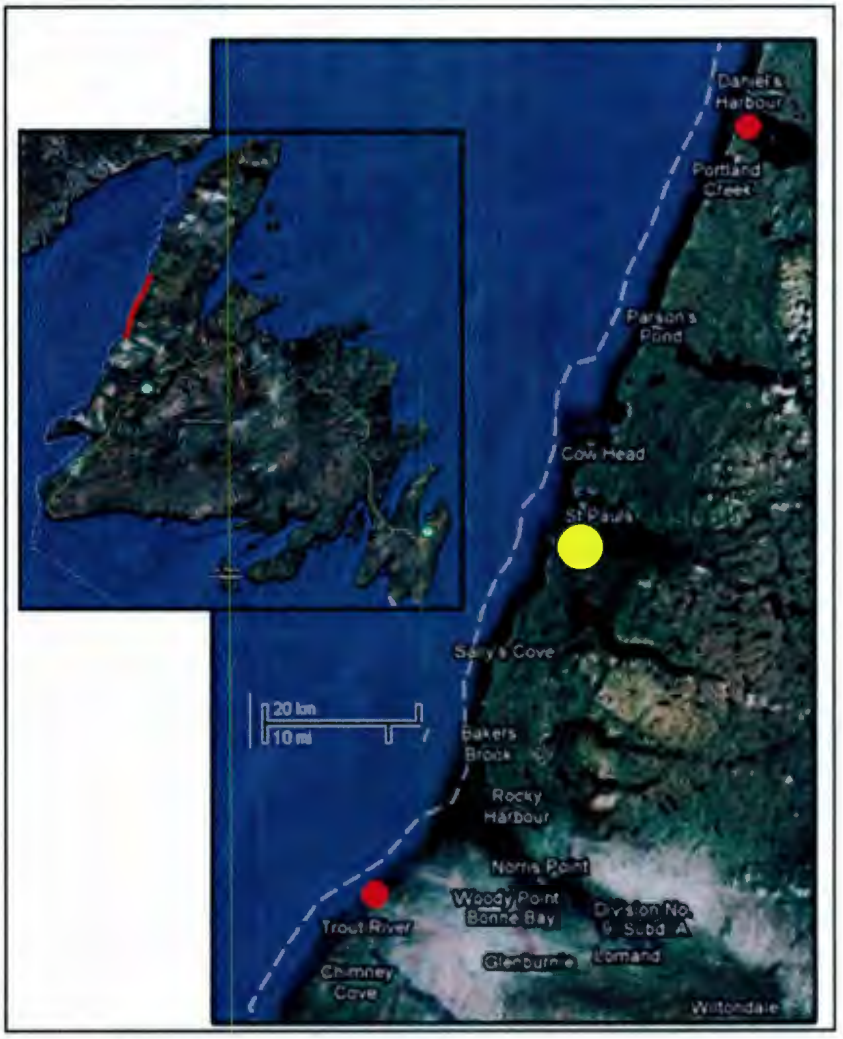


Figure 4.3: Map of boundary limits of respondents from the area resident interest group (shown in red). The yellow dot represents St. Paul's. *Map by J.Kukac. Source: Google Maps, 2009.*

Some managers were pre-identified using a list of experts compiled through preliminary conversations with key informants. The list was further generated using the snowball approach. Some local residents were also identified in a key informant meeting, specifically those involved in the fishery (past and present). Other local residents were directly approached in St. Paul's to complete the questionnaire. Residents from surrounding communities were approached to participate during visits to other communities. Tourists were intercepted at popular park attractions in the area including the Seal Island Boat Tour at the St. Paul's Wharf. The questionnaires mostly took place in the resident's home or manager's offices. Most of the managers contacted were from local areas and if not for their professional position, they would not be considered as managers but rather local residents or residents from surrounding areas.

Prior to the start of participation, respondents were asked if they would prefer to complete the questionnaire on their own and return it when they were done or have it administered through an interview format where their answers were recorded for them. With literacy being an issue, many chose the interview format. Others felt they would have better answers if the questionnaire was conducted more like a conversation and could speak freely about their choices without worrying about writing down all the details. Some enjoyed the opportunity to engage in conversation about the resources in the area. Local residents were extremely open to conversations about St. Paul's, the resources in the area, and the management of the resources in past and present. On average, the

questionnaire took between 20 to 30 minutes to complete, although, on occasion, took up to two hours. Questionnaires that were dropped off were completed at the respondent's own pace and either mailed back or picked up. There was no time limit for any of the respondents to complete the questionnaire. A purposive quota sampling method was used to obtain about 25 respondents in each of the four groups.

4.4 Data Entry and Analysis

After each questionnaire was completed, the data were tallied onto score sheets as seen in Figure 4.4. Because respondents were not required to respond to all demographic and management questions in section three, questionnaires with item non-response in that section were still included in the paired comparison analysis. Individual responses were aggregated and then normalized according to Dunn-Rankin (1983) variance stable rank sum method where scale values are proportional to the sum of the ranks assigned by the respondents to each of the resources or activities. This method provides the minimum and maximum possible rank totals for a given number of respondents and objects, which in this case were normalized to zero and 100 respectively. Resources were then ranked according to these values from 1 to 8, 1 being the highest rank, implying that it was the most important resource or beneficial activity.

Resource	Moose	Birds and Waterfowl	Eelgrass	Saltmarsh	Forest	Atlantic Salmon	Atlantic Herring	American Lobster
Moose								X
Birds and Waterfowl	X				X		X	X
Eelgrass	X	X		X	X	X	X	X
Saltmarsh	X	X			X		X	X
Forest	X						X	X
Atlantic Salmon	X	X		X			X	X
Atlantic Herring	X				X			X
American Lobster								
Total	6	3	0	2	4	1	5	7

Figure 4.4: Survey Score Sheet. An X in the corresponding *Moose* column and the *Forest* row would represent that in that pair, the moose was considered to be more important than the forest. The total number of X's in each column is the number of times a resource was considered to be more important than another resource. These values were then aggregated, normalized, and eventually given a rank value of 1 to 8. This is an example of a score sheet that does not have any circular triads. If for example, there was duplicated total values (ex. Moose = 4 and Forest = 4), there was at least one circular triad.

The level of agreement among various respondent groups was measured using the Kendall *Tau* rank correlation coefficient (*T*), a non-parametric statistical test suitable for paired comparison. It measures the degree of correspondence between two rankings and assesses the significance of this correspondence. Kendall *T* ranges from 1 to -1 where 1 indicates a perfect agreement and -1 indicates a perfect disagreement (Kendall & Gibbons, 1990; Chuenpagdee *et al.*, 2001). The statistical analysis was done using Statistical Package for Social Sciences (SPSS).

4.5 Qualitative Data Analysis

Qualitative data collected during the study were categorized by respondent groups using predetermined categories from the literature review and preliminary conversations with key informants. Additional categories were added if new themes emerged during the analysis. The categories included ecological, economic, subsistence, etc. If, for example, a respondent in the local community of St. Paul's said that lobster was more important than moose *because* lobster is a source of income and it is the reason why people settled in St. Paul's, then it was considered that the lobster had economic value as well as cultural and historical value. In this case, the key words *economic, cultural, and historical* would be entered to indicate the respondent's rationale for their selection of lobster. Resource values are perceived as multi-dimensional and thus it was possible to attribute a variety of reasons to each resource as to why they were important. A similar analysis was performed with the activities portion to see what negative impacts respondents associated with each activity. Content analysis software was not used because very little text was analyzed in comparison to an interview or more open-ended questions.

CHAPTER 5

ANALYSIS AND RESULTS

Based on Kendall's *Tau* rank correlation analysis, certain interest groups had agreement among their rankings of resources and activities (to be discussed in detail in sections 5.2 and 5.3). However, it was not always the case that scale rankings were the same, even if there was agreement. There was also agreement within each of the interest groups in that male and female responses also had significant correlations. While there was agreement of the importance of resources and beneficial activities among interest groups, the rationale for resource selections and impacts associated with each activity were different.

5.1 Demographic Make-up of Respondents

Table 5.1 shows the demographic make-up of respondents. While there was a target to be reached for the number of people in each respondent group, there were no specific requirements for the number of male or female

respondents or a specific number of respondents in each age category. Although there was no strict guideline, the author generally strived to achieve gender balance in the composition of respondents as gender could play a role in respondents' values. (Stern *et al.*, 1993).

Table 5.1
Demographic Distribution of Survey Respondents.
Number of respondents in each age and gender category

	Age					Gender		
Group	18-24	25-30	31-45	46-64	65+	Male	Female	Total
Local Residents	3	0	6	12	4	14	11	25
Area Residents	7	2	6	10	0	10	15	25
Managers	3	3	6	12	1	14	11	25
Tourists	5	3	8	8	1	12	13	25
Total	**18**	**8**	**26**	**42**	**6**	**50**	**50**	**100**

5.2 Rankings of Resource Importance

Table 5.2 shows the scale values and rankings for the resources in accordance to the responses obtained from each interest group. According to the Kendall's *Tau* rank correlation analysis as seen in Table 5.3, significant agreement was found between local residents and area residents (0.546), local residents and managers (0.571), as well as between tourists and area residents (0.618) in their overall selection of resources. For example, local residents and area residents statistically agreed about the level of importance of moose,

waterfowl, saltmarsh and eelgrass, but they differed about the importance of herring and salmon. Local residents and managers were in agreement with very similar scale values in regards to the American Lobster, the forest and the Atlantic Herring, considering them as the three most important resources, in that order.

Table 5.2
Dunn-Rankin variance stable rank sum scale values and rank values for resources

Resources	Local Residents		Area-Residents		Managers		Tourists	
	Scale	Rank	Scale	Rank	Scale	Rank	Scale	Rank
Moose	46	4	53	4	28	8	47	5
Eelgrass	23	8	24	8	43	6	46	6
Forest	71	2	67	1	69	2	65	1
Lobster	79	1	65	2	75	1	61	3
Herring	59	3	51	5	59	3	33	8
Waterfowl	42	5	41	6	31	7	35	7
Saltmarsh	42	5	41	6	48	4	53	4
Salmon	38	7	57	3	47	5	61	2
Number of respondents	25		25		25		25	

The one major difference in the rankings for these two groups was for moose, which was considered as the next (fourth) most important resource by the local residents, but was ranked lowest (eighth) by the managers. Area residents and tourists considered the forest the most important resource to the St. Paul's area. However, tourists ranked the Atlantic salmon as their second most preferred resource, and residents in surrounding communities ranked the

lobster as their second most preferred resource. None of the four groups had any strong interest in the saltmarsh, which was ranked fourth by managers and tourists, fifth by local residents, and sixth by residents in surrounding communities. Eelgrass received the lowest over all rankings, which was ranked eighth by local and area residents and sixth by managers and tourists. Salmon received the most varied rankings among the interest groups. Local residents ranked it seventh, tourists ranked it second, while managers and residents in surrounding areas both ranked it in the mid-range.

Table 5.3
Kendall correlation coefficient *T* rankings of resource importance and beneficial activity preference for St. Paul's

	Local Residents	Area-Residents	Managers	Tourists
Resources				
Local Residents	1.000			
Area-Residents	0.546*	1.000		
Managers	0.571*	0.400	1.000	
Tourists	0.214	0.618*	0.357	1.000
Activities				
Local Residents	1.000			
Area-Residents	0.786**	1.000		
Managers	0.286	0.500*	1.000	
Tourists	0.286	0.500*	0.857**	1.000

* Significant at the 0.05 level **Significant at the 0.01 level

5.3 Rankings of Beneficial Activities

As shown in Table 5.4, local residents and residents in surrounding communities agreed that oil development and exploration was the most

beneficial activity to St. Paul's and surrounding areas, with local research ranking second. While managers and tourists agreed on the high ranking of local research (as the most important, in both cases), they ranked oil development fifth on the scale of relative importance. Managers felt that an eelgrass protection program would also benefit the area and ranked it as their second preference even though eelgrass ranked sixth in their resource preferences.

The correlation coefficients in the activity portion of the questionnaire were generally higher than those in the resource portion. In the ranking of activities, the correlation between local residents and residents in surrounding communities was significant as well as the correlation between area residents and tourists (see Table 5.3). Significant agreements were also found between managers and area-residents (at $p = 0.05$), and between managers and tourists (at $p = 0.01$).

Table 5.4
Dunn-Rankin variance stable rank sum scale values and rank values for activities

Activities	Local Residents		Area-Residents		Managers		Tourists	
	Scale	Rank	Scale	Rank	Scale	Rank	Scale	Rank
Oil	71	1	69	1	39	5	42	5
Boat Tours	31	7	21	8	22	8	31	7
Reforestation	61	3	63	4	57	4	59	4
Dump Site	58	4	64	3	59	3	67	2
Eelgrass	36	6	53	5	65	2	61	3
Signage	30	8	27	7	35	6	41	6
Local Research	66	2	67	2	81	1	73	1
Resort	50	5	35	6	33	7	25	8
Number of respondents	25		25		25		25	

5.4 Circular Triads

A maximum of 20 circular triads are possible in choosing among eight items (David, 1988; Chuenpagdee *et al.*, 2001; Champ *et al.*, 2003). 11 percent of respondents had zero triads in both the resource and the activity comparisons. 42 percent of respondents were truly consistent in their preferences in the activity comparisons dictated by having zero circular triads, whereas 22 percent showed full consistency by containing zero circular triads in their responses about the resources. Generally, managers and tourists were more consistent in their preferences. However, managers were mostly consistent in their responses in either resources *or* activities but not both. Local residents and residents in surrounding communities were mostly inconsistent.

5.5 Level of Resource Interaction

The third section of the questionnaire asked respondents about the level of interaction they had with the resources included in the survey. The assumption was that people with high levels of interaction with certain resources would have more favourable values for them. This was not always the case. For example, most local residents indicated that they had daily interactions with moose and waterfowl but in their consideration of those resources, moose was ranked fourth while waterfowl was fifth out of the eight resources used in the survey. Most local residents indicated occasional interactions with eelgrass and the saltmarsh as well as lobster and herring. In these cases, eelgrass ranked as the least

important, the saltmarsh tied with waterfowl at fifth, and yet lobster ranked as the most important resource with herring ranking third. Furthermore, the majority of local residents had daily interactions with the forest and it was considered to be the second most important resource. All interest groups indicated either occasionally or never interacting with eelgrass or the saltmarsh. While no clear relationship was observed between the level of interaction and the strength of value, it was expected that some resources would only have occasional interactions from certain interest groups but would still rank highly. For example, fisheries resources such as herring and lobster are seasonal fisheries only caught during certain periods of time and only by a few local residents. A complete table of the results of the level of interaction between respondent groups and the resources used in the study is shown in Appendix B.

5.6 Indicated Management Preferences

On the question about who should be involved in the resource management process, which was also located in the last part of the questionnaire (Appendix A), all groups indicated a high level of support for local area authorities, such as the mayor or town clerk and local community members to be involved in the decision making process (Table 5.4). Conversely, low support for tourist involvement was noted in the results. Local residents indicated low support for the RED Ochre Regional Board to be involved. While managers, similarly to local residents, only gave marginal support to the RED Board, they

gave their highest support to Parks Canada regardless of their management affiliations.

Table 5.5
Level of Support for Involvement in the
Resource Management Decision Making Process
H= High M= Medium L= Low

	Local Residents	Area-Residents	Managers	Tourists
Local Authority	H	H	H	H
RED Board	L	H	M	H
Parks Canada	M	H	H	H
DFO	M	M	H	H
Academics	M	M	H	M
Tourists	L	L	L	L
Surrounding Communities	M	M	M	M
Local Community Members	H	M	H	H

***Across the top are the respondent groups and down the left side are the choices for who should be involved in the management decision making process.*

Area residents were the only group to indicate medium support for local residents to be involved in the decision making process. All groups, except area-residents, indicated higher support for local community residents to be involved. While the degree to which these groups should participate or be involved in the management decision-making process is unknown, there are some fairly indicative agreements as to who should be involved.

5.7 Agreement among Respondents and within Interest Groups

The final element of the questionnaire was related to demographic information, including age and gender. The Kendall's *tau* correlation coefficient revealed no significant differences between male and female respondents. Male and female resource selections had a significant correlation (0.714) and the activity selections were even stronger (0.857). All of the interest groups had significant correlations between male and female respondents within each group for resources and activities at the p=0.05 confidence level except for tourists. However, tourists had the highest correlation among male and female respondents for activities (0.9), which coincides with the overall higher correlations for activities. Age also played no role in selecting resources or activities. All but one of the age correlations were significant at the p=0.01 confidence level and the other was significant at the p=0.05 confidence level therefore giving little reason to re-group or test groups separately.

5.8 Rationale for Resource Selection

In addition to selecting the most important resource from the paired comparison, respondents were asked why each resource was important. In the activities portion of the survey, respondents were asked to identify what negative impacts or concerns, if any, they would associate with the activities in the survey. Appendices C and D show the entire list of rationales for resource selection and negative impacts associated with each activity. Overall, herring held the widest

range of values, including historical, cultural, environmental, subsistence, recreational, and future values to some respondents. Birds and waterfowl were considered to have cultural, recreational, economic, and future values. Respondents who valued saltmarsh did so for its environmental values as well as economic and future values. The importance of moose was related to tourism, recreational, and subsistence values. Eelgrass and Atlantic salmon were similar in what respondents considered to be valuable, i.e., for their subsistence, historical and future values. Eelgrass was, however, considered also for its environmental value, while recreational value was added to Atlantic salmon. Finally, the forest was valued for its environmental, recreational, and subsistence values, while lobster was considered for its historical, cultural, and economic values.

Qualitative data shows that local residents and residents in surrounding communities saw an oil industry as a means of supporting a dwindling economy, and although many of them recognized the cultural importance of the lobster, some did not recognize the potential negative impacts oil could have on the surrounding habitats. Furthermore, some respondents who did recognize potential harmful impacts from oil development and exploration ranked it as number one expressing the belief that the benefits of an oil industry would outweigh the negative impacts.

CHAPTER 6

DISCUSSION

6.1 Use of Photographs

To overcome some of the literacy challenges encountered in St. Paul's photographs and clipart graphics were used to complement the text in the questionnaire. Despite issues of ambiguity (Couper *et al.*, 2004), the photographs and clipart proved to help clarify the question and create a relaxed environment where the respondent felt more comfortable. Once respondents were shown the resource and activity booklets and saw the photographs, many of them were willing and interested to participate. Other feedback, mostly from managers, was that the photographs made the questionnaire different and more intriguing than previous studies they had participated in. The photographs and clipart were carefully selected and tested thoroughly as recommended by Couper *et al.* (2004). For example, the original photograph of the moose showed a large male moose with a full antler rack. As it turns out, it is an unlikely moose to be hunted

since female moose are normally targeted for hunting due to the better quality of meat. Therefore, those respondents who hunt, or know about hunting, the male moose with the large antler rack may have detracted them from selecting a moose that does not have the same value as one with 'good' meat that will feed a family for a winter. This information was only learned immediately after the first test of the photographs. The photograph of the moose was neutral to other interest groups such as tourists, since most of them do not hunt and probably do not care what moose they see just as long as they see one. This is an indication that different people of varying backgrounds and expertise have different sets of values put on the same resources, and therefore it is particularly important to carefully consider the diverse values in environmental decision-making, even in seemingly minor objects such as pictures. Nevertheless, as supported by Arce-Ibarra (2007), the use of pictures in the paired comparison was suitable in a study where low literacy rates or language barriers are issues, as was the case of the Mayan community in Arce-Ibarra's study.

6.2 Rankings and Discussion of Resource Importance

St. Paul's residents had fairly low rankings for habitat resources whereas their rankings for resources that use those habitats were high. For example, the saltmarsh, eelgrass, and waterfowl were the lowest ranked resources by local residents, while lobster, herring, and the forest were ranked the highest. While the forest can be noted for its habitat value, it was considered important to local

residents for the wood it provided. It is possible that local residents did not make the connection between resources and their habitats or they simply did not have an extensive knowledge about them. Knowing that resources such as eelgrass and the saltmarsh that have extreme ecological importance did not rank high among respondents is an opportunity to create awareness of the services they provide through outreach initiatives.

Generally, the resource results show some level of agreement among all groups. While certain groups have a higher level of agreement, the differences among all groups are marginal (Table 5.3). The highest level of agreement in the rankings of resource importance was found between tourists and residents in surrounding communities. Possible explanations may be that the other communities are very tourism oriented and cater to the needs of those visiting the park area. Resources like the forest and salmon were noted by both groups to have strong recreational values, and it is possible that the surrounding communities favour tourism resources more than the residents of St. Paul's as most of them derive economic benefits from the park and tourism. St. Paul's has only recently begun looking at tourism possibilities in their community and is in the primary stages of development. The agreement, or lack thereof, between tourists and the residents of St. Paul's was the lowest agreement between any interest groups. Tourists did not recognize the importance of some of the resources to the people of St. Paul's. For example, herring to the residents of St. Paul's not only tells a story of the mismanagement of resources and the

consequences of overfishing, but more importantly, it demonstrates efforts of the people of St. Paul's in resource protection. Some tourists said that because the herring fishery no longer exists in St. Paul's, that it was not important. Local residents ranked herring third, after lobster and the forest, while tourists ranked it eighth. The herring appears to hold similar meaning for the people of St. Paul's as cod does to the people of Newfoundland. Herring is an important resource to the people of St. Paul's because of its historical connection to the community. However, the history of the herring fishery is not known to tourists, and it should be made more known to the public so that other interest groups also build an appreciation for those resources being valued locally by the residents of the place. Salmon, while mostly noted for its recreational values, had the most varied rankings among the interest groups. Local residents, who ranked salmon as seventh, lost access to their primary salmon fishing river when Parks Canada closed Western Brook (river) in 1984 to any recreational fishing in order to increase the number of salmon in the river. While there are talks of re-opening the river, it seems as though salmon is perceived as more of a lost cause by the people of St. Paul's.

Local residents and managers had the second highest agreement in the resource section of the survey. This is a surprising result as local residents have not always had amicable relations with those in the management group especially Parks Canada and the DFO. The creation of Gros Morne National Park has left a rather cautious relationship between Parks Canada and St. Paul's

after restrictions were set on resource use during the park's creation. Many of the people in St. Paul's are involved in the fishery or depend on it in one way or another, and they often voice their discontent of quotas and seasonal restrictions set by the DFO. Managers recognized that although some of the resources in the questionnaire may not be important for tourism development, they were important to the people of St. Paul's and to the unique ecosystem in the area. For example, managers recognized the economic value of the lobster to the Town of St. Paul's. Where managers and local residents most significantly disagreed was on the importance of moose as a resource. Local residents ranked moose fourth. Many insisted that it was a local food staple and the meat from one moose could feed a family for an entire winter. Other local residents simply enjoyed the recreational aspect of the moose through hunting, and some fishermen, in the off season, work as outfitters, taking tourists deep into the woods for a rugged hunting experience. Managers ranked the moose eighth: the least important of all the resources in the study. In the qualitative data it was evident that while some managers did recognize its subsistence value to local residents and the aesthetic appeal to tourists, they were mostly concerned about the detrimental ecological effects that the increasing moose population is having on the forest ecosystem. One manager went as far as saying that "moose have the ability to turn the forest into permanent grassland".

One of the main reasons for selecting St. Paul's as a study site was for the unique brackish and saltmarsh ecosystem, similar to Alessa *et al.* (2003)

selection of Pacific Rim National Park. However, none of the respondent groups ranked the saltmarsh as the most important resource. In fact its highest rank was fourth from managers and tourists. Local residents ranked the saltmarsh fifth out of eight and residents in surrounding communities ranked it sixth. An even lower ranking was found for eelgrass, ranking sixth for managers and tourists and eighth for local residents and residents in surrounding communities. Lobster, the forest, and herring were considered to be the most important resources to St. Paul's by local residents, managers, and residents in surrounding communities. From these results, it seems apparent that respondents in all groups made little or no connection between resources and habitats. In other words, they do not see habitats as resources. A number of respondents, in all groups, asked "what is eelgrass" or "where is the saltmarsh". Many said that they did not know enough about either eelgrass or the saltmarsh to say that it was more important than something else. Some respondents, including managers and local residents, admitted that they were only hearing about eelgrass and the saltmarsh for the first time. Identifying knowledge gaps can be considered a secondary, yet an important outcome of this study. As supported by Palmer (1998), knowledge and understanding of the ecosystem services provided by the saltmarsh and eelgrass could encourage the appreciation and promotion of such resources. Furthermore, respondents would be able to make more informed decisions about those resources. While the saltmarsh and eelgrass were not considered to be of major

importance to any respondent group, identifying knowledge gaps is just as crucial as determining what and why each resource was important.

6.3 Ranking of Beneficial Activities to the St. Paul's Area

Although many respondents in all groups identified negative environmental risks associated with an oil industry, the impacts were downplayed. The positive outcomes such as jobs and other economic opportunities that would be created and the idea of young people staying in the community while still being able to support their families outweighed the negatives. It was clear that the underlying value of oil was not an attachment to oil itself but was in fact some perceived notion of *industry*. Many people from St. Paul's and the surrounding communities are all too familiar with the oil boom in places such as Fort McMurray, Alberta, and had the same hopes for their community.

While some managers could see the economic benefits associated with an oil industry, most saw an array of social and capacity issues as well as severe ecological impacts that would potentially follow the development of such an industry. For example, a large influx of people to the immediate area would require increased housing and infrastructure. Other managers and some tourists felt that the very idea of an oil industry inside a national protected area was completely incongruent with the Parks mandate. Managers and tourists ranked oil exploration and development fifth, after re-forestation, although many

recognized the benefits that the local community would receive from the job creation. Some managers felt that the exploration of a resource like oil would elevate the stress on other local natural resources.

Managers and tourists ranked local research and management of fish stocks as the most beneficial activity to St. Paul's. This was ranked second for local residents and residents in surrounding communities. Only a few local residents were less optimistic about local research because they felt that research done in the past did not have tangible benefits to the local community. A few others expressed the opinion that it would be a waste of time and money because there are no fish left in St. Paul's Inlet and younger generations are not interested in the fishery. While some local residents expressed negative feelings about local research and management of fish stocks, others felt that local input into the research and management would assist in preserving the cultural importance of the fishery. Regardless of the few participants who made negative associations to local research and management, local residents and residents in surrounding communities did perceive it as being beneficial to the area. Managers felt that some sort of local management could only make a positive contribution to the fishery and the community.

Additional boat tour operations, resort and golf course expansion, and interpretive signage on the walking trail were among the lowest ranking activities among all respondent groups. These activities are all very tourism based; in other words they can provide economic benefits, yet they were not regarded as

highly beneficial by all of the groups. Many local residents only saw the economic benefits in attracting tourists to the area but some thought that these additions to the community were not intended for the purpose of local people enjoying them. A few respondents in all groups commented on the fact that a number of boat tours already exist in the Park area and any additional bout tours would have to provide a different experience. On two separate occasions, respondents from the manager group referred to the idea of additional boat tours as typical of dwindling outport communities; instead of someone creating a business that would complement the boat tour like a restaurant where both parties would profit, they would create a competing boat tour and neither would profit. The idea of interpretative signage on the St. Paul's walking trail was based on educational opportunities for local residents to learn about the saltmarsh and its ecosystem services. However, some local residents looked at it strictly from a tourism aspect and felt that signage would not generate income. Some tourists and managers agreed with this but some also saw an opportunity for education not only for local residents but for tourists as well.

While the resource album and activity albums were separate from each other, the activities are easily connected to the resources in the study. The negative impacts associated with most of the activities could easily be linked with the damage and loss of the featured resources. Similarly, the activities with mostly positive impacts like eelgrass protection, local research and management

of fish stocks, cleaning up dumpsites on the saltmarsh, and interpretive signage were also associated with respected resources.

6.4 Circular Triads

Perhaps respondents in the local area had a more vested interest in the resources and found the selection more difficult. The triads among local residents could also be attributed to their lower levels of literacy. All of the data were used, regardless of the number of triads. The inconsistencies are data in itself in that they show which resource or activity pairs were similar in terms of their importance or values to the respondents. Many local residents tended to take more time to indicate their responses for those resources with a higher frequency of circular triads, as they seemed to be weighing out the importance of each one. Some would go as far as imagining what life would be like if new regulations eliminated their use of a resource or if the resource had disappeared altogether due to unforeseen circumstances and what impact that would have on their lifestyle. Although some may argue that circular triads are a negative aspect of paired comparison surveys, it has been found in many cases, including this study, that a large proportion of them are related to close calls and therefore provide an interesting detail to the study (Peterson & Brown, 1998; Chuenpagdee *et al.,* 2001 a and b; Quah *et al.,* 2006). The choices presented in the study involved multifaceted resources and activities that may have been difficult for some respondents to make consistent selections. Unlike a direct ranking

questionnaire that only allows for logical ordinal ranking, paired comparisons allow instances when the choice being depicted is simply too close to call sometimes resulting in an inconsistent, but nonetheless meaningful response. For example, the forest and the lobster were often a difficult selection for local residents and residents in surrounding communities because of the values associated to each resource. Often, respondents in these groups had to weigh out the uses and importance of each resource in order to make a decision.

6.5 Interest Groups and Participants

It was important to identify the values of various interest groups in this study. The creation of Gros Morne National Park has left some park residents feeling uneasy about management decisions. It is often felt that managers do not have the best interest of local communities at hand. In order to determine if there were differences among what respondents value, it was necessary to have multiple interest groups rather than focusing only on local residents. For example, some managers said the lobster was the most important resource to the St. Paul's area because it was how local residents earned a living and made a strong contribution to the St. Paul's economy. According to these results, there is potential for the local community and managers to work together based on this shared view of natural resources in St. Paul's.

Given that this study used the non-parametric (distribution-free) analysis, the generalization of larger populations was not the aim. The sample size used in

this study was relatively small, similar to previous applications of the damage schedule methods (Chuenpagdee *et al.*, 2003; Quah *et al.*, 2006; Arce-Ibarra, 2007) in order to compare the values across various interest groups. The purposive quota sampling method aimed at getting around 25 respondents in each of the four groups was a reasonable size for this kind of study according to Chuenpagdee *et al.* (2003). A demographic comparison shows that each group is generally equal in the age and gender categories making fair comparisons among the groups.

6.6 Rationale for Resource Selection and Activity Impacts

One important observation to this study is that most of the implications from the results could have been possible without the use of qualitative data, something not easily collected in close-ended, large-scale questionnaires. Although many respondents who chose to complete the questionnaire on their own wrote valid comments, conducting a questionnaire with a respondent in the comfort of their own home, sometimes with a cup of tea and with no time pressure, led to far more reflective and intuitive qualitative feedback. Although at first hand many of the respondents were uneasy at the thought of a questionnaire, especially local residents, it was so simple to comprehend that respondents were quick to share anecdotes about the resources and activities from the past and present. The qualitative portion of the questionnaire allowed respondents to elaborate on their resource selections as to

what values they attached to each resource, making it thus possible to answer the research question, "do all interest groups value the same things for the same reasons?" While many groups do indeed value the same resources, the underlying reasons for those values are different.

6.7 Implications for the Sustainability of St. Paul's

The lobster was ranked as the most important resource in St. Paul's to the local community because of its economic value. Similarly, local residents also indicated that oil development and exploration was slightly more beneficial to the community than local research and management of fish stocks due to its economic value. Although some resources and activities were important for economic reasons, an economic valuation method would have missed the other values that people may have but could not express due to the nature of such methods. Many respondents, including those who preferred oil over other activities, associated an oil industry as having negative environmental impacts such as leaks and spills, destroying valuable fish and wildlife habitat. Perhaps if respondents were aware that eelgrass and the saltmarsh were important fish habitats, they may have ranked them higher in their importance. Oil development may also have been given a second thought considering that even those who thought it was beneficial to the area recognized that fisheries resources could be damaged. Managers, tourists, and even some local residents and residents in surrounding areas, however, did not share the optimism of oil development. To

these respondents, extraction of oil is not a sustainable industry and the area currently does not have the capacity for it. While there is still certain attachment to the fishery in terms of culture and heritage, the depleted state of fisheries resources would not provide the same income and quality of life it once did for the people of St. Paul's. If industry is what is important to the people of St. Paul's and there is no cultural attachment to something like oil, then there are perhaps other options that could provide an adequate economic return to the town, which should be explored jointly by local residents and managers.

At a public meeting and community workshop held in December 2008 in St. Paul's, the research findings were presented to the local residents, government officials and researchers. In addition, a community handbook titled "St. Paul's: Past. Present. Future." (Kukac *et al.* 2009) was put together to highlight the resources used in the questionnaire as well as the history of St. Paul's. The handbook indirectly showcases the results of the study as well as provides scientific and educational information about the resources in St. Paul's. The book takes a very positive approach, demonstrating the uniqueness of not only the natural resources in St. Paul's but also the community itself.

The dissemination of the research findings at these public events was similar to Gregory and Keeney (1994) and Gregory and Wellman (2001). It was a small step towards bringing interest groups together to share the understanding about resource values. It was an opportunity for the local residents to learn more about the importance of resources that they have undervalued such as saltmarsh

and eelgrass. The events also enabled the interest groups to discuss and explore ideas about the future of St. Paul's. Based partly on this research and the discussion at the workshop, the possibility to conduct a further investigation into the feasibility of nature-based tourism in St. Paul's was raised and a suggestion was made that such tourism could be developed to capitalize on the resources and the assets within the town.

6.8 The Damage Schedule as a Participatory Process

Participation in natural resource management decisions has different processes and degrees to which interest groups can participate. The use and application of the damage schedule method in this case was very much a participatory approach to eliciting the values of the respected interest groups. If these values were considered in resource management decisions, the quality of the decisions could be enhanced (Chuenpagdee *et al.,* 2004; Reed, 2008). The damage schedule approach was used to measure the relative importance of resources and beneficial activities rather than losses or damages to resource; therefore in this case the schedule is one of relative importance. According to Reed (2008), public participation should be considered as early as possible in the decision making process and should systematically represent interest groups throughout the process. A pre-determined schedule and eliciting the importance of resources prior to resource issues arising would be one of the earliest forms of participation. Jentoft and McCay (1995) concluded that the effectiveness and

forcefulness of users as participants in the decision making-process depended on how well they spoke as one voice. However, communities are not homogenous and therefore populations should not be generalized. Applying the schedule of relative importance, a non-parametric approach, to eliciting the importance of resources and collecting qualitative data, made the study reflective of those who participated.

St. Paul's is a unique place with exceptional natural and cultural values worthy of being captured and included in management policies and decisions. Non-monetary valuation of natural resources in St. Paul's, Newfoundland is an inclusive and participatory approach. Prior to conducting this study, it was unknown how people valued the resources in St. Paul's and what, if anything about this area, considered unique by scientists, was important to the people who live there. This study did not obtain the worth of the resources in St. Paul's in monetary terms, nor was it intended to. Capturing the total value, including non-market values, is essential for the formulation of successful policies, whatever the specific goal may be (Gowdy, 1997).

CHAPTER 7

CONCLUSIONS

The purpose of this thesis was to capture how valuable, if at all, coastal resources are to a range of interest groups, specifically local residents, managers, residents in surrounding areas, and tourists (those who visit the area), as well as to determine what impacts they perceive from possible activities in St. Paul's and the surrounding area. The study employed the damage schedule approach, modified to enhance its ease of application by including photographs and clip art in the paired comparison survey, an instrument used to elicit the values of coastal interest groups. Prior to the preliminary field visits, a literature review was undertaken to obtain background information about St. Paul's and the surrounding area. Visits to the area were made to enable informal conversations with various key informants, including local residents and managers, about the types of resources and activities to be included in the study. Photographs and clip art of the resources and activities were gathered and tested on numerous

occasions to avoid suggestive biases. The wording of the questions in the survey was also carefully tested to avoid any misinterpretation. Once the survey was finalized, it was conducted and data were analyzed using the Dunn-Rankin variance stable rank sum method and Kendall *Tau* rank correlation coefficient test. Qualitative information was also obtained from the survey and used to explain the choices made by the respondents.

The case of St. Paul's contributes to the increasingly important field of natural resource values and valuation as well as the methods to capture non-monetary values of natural resources. By eliciting the values of the various interest groups and identifying the reasons underlying these values, the study highlights the importance of recognizing that different interest groups may hold different values and thus may differ in their understanding and/or support of certain resource management policies. It also assists in making all parties aware of not only their own values but also of the values of others. Finally, it contributes to formulating what types of environmental awareness programs are required for resource sustainability in the area (i.e. education and outreach programs applicable to the identified knowledge gaps).

7.1 Key findings

The following are the key findings of this study:

- The damage schedule approach was able to elicit the values of the respected interest groups as a non-monetary valuation method;

- Modifications to the methodology, including the introduction of photographs, were well received by respondents;
- Interest groups have similar values of natural resources despite existing tenuous relationships;
- While the values of interest groups are similar, the reasons for those values are sometimes different;
- Qualitative data provided useful insights into why interest groups valued certain resources that may have otherwise been left unknown;
- Knowledge gaps about the ecological importance of eelgrass and the saltmarsh were identified.

In this study, an alternative approach to examine the values of various interest groups was employed without applying monetary terms to natural resources. It was facilitated through the elicitation of relative importance. While the use of economic valuation has its place in markets, goods and services not traded in the market do not have direct market values. Therefore, both logically and intuitively speaking, they should not be assessed in market terms. This study combines both market and non-market resources in the ranking of relative importance. The damage schedule in this case offered another approach to capture values by eliciting what was important. With the addition of qualitative data, it was possible to determine why each resource was important, and just as significantly, why something was not important. Marine and terrestrial resources

were also compared in the same study, which was an important comparison for coastal communities where the land meets the ocean and ultimately connects both ecosystems to the community.

The ability to recognize the values of other interest groups allows for an understanding of why decisions are made or why people behave in particular ways. For example, tourists did not understand why herring was important to St. Paul's, mostly because the fishery has now disappeared but also because many of them never had the opportunity to learn about the extent of the fishery in St. Paul's and what it meant to the people who were part of it. Also, if residents were more aware of what tourists value about St. Paul's, this could help expand the St. Paul's economy toward tourist-based operations that are geared exactly to what tourists want to see. This could also lead to the protection of the important saltmarsh system, which attracts bird-watching tourists. Appropriate environmental awareness programs could be created to address the knowledge gaps identified through this study, for example, about the lack of appreciation for the importance of eelgrass and its contribution to the fisheries. The agreement on the importance of natural resources by local residents and managers is promising in moving forward in the decision making process and eliminating scepticism in resource management efforts such as protection and conservation initiatives.

Interest groups in coastal communities value the local environment. Yet, among those who value the same resources, they have different reasons why.

On some occasions, various interest groups were able to recognize why a particular resource might be important to local residents.

7.2 Methodological Contributions

The modification of the environmental damage schedule and various other paired comparison questionnaires performed in this study made contributions to the study of values and valuation. The use of photographs, while often noted for being suggestive in nature (Couper *et al.,* 2004), proved to be valuable assets to the survey tool. The comfort level among participants was high and therefore led to some very open discussions about the resources in St. Paul's. Often times, surveys were more like conversations where respondents, especially local residents, would reminisce about the past and how things have changed in the community. This was often where the most useful information came from. The use of photographs in the paired comparison questionnaire differentiated this study substantially from many other social science studies, which helped pique the interests of the respondents. A method such as this would be helpful to employ in places that are considered 'over-researched', and also where literacy is an issue.

Although this was not an ethnographic study of human-natural resource interactions, it was very much community-oriented research. It is important that a researcher spends a significant amount of time in the community in order to become familiar with the local settings and the people and to be able to make

observations about their day-to-day affairs. Prior to this study, very little was known about St. Paul's and the people who live there by other people not from the area. The time spent in the community for personal observations and the participation in community activities are two key aspects enabling this research.

While the values of various coastal interest groups were captured, there were some notable limitations. First, the population of the community of St. Paul's, as well as that of the entire region, is small. Because it was crucial that the questionnaire to be tested for errors and suggestive photographs, the pool of eligible participants became smaller each time a questionnaire was tested. It was important that the tested questionnaires were designed to do what the study set out to achieve, and respondents who were part of the pre-tests were able to provide constructive feedback.

Second, the questionnaire often took longer than the suggested time of 20-25 minutes. While some respondents breezed through the questionnaire, some respondents took up to two hours. This limited the number of questionnaires that could be completed in a given day. However, many respondents seemed to enjoy the conversations that arose during the survey and valuable information was learned.

7.3 Potential Uses for Policy Development

The importance of resources was derived directly from what the respondents expressed in terms of items that were important and thus valuable

to them. Such expressions provide an important foundation for policy formulation and decision-making about natural resources management in St. Paul's. Given that these scales of relative importance are interval, not ordinal rankings, they indicate not only that one item was ranked more important than the other, but also how much more important it was. This quality allows for possible extrapolation or interpolation of other items not included in the survey or for simple revision of the scales in the future to reflect any changes in values, therefore making this method cost-effective. For example, if one of the resources used in the survey is no longer depended on for a subsistence use and that was the only reason it was important, it could be easily removed from the scale without disrupting the values of the other resources. Also, if a new resource was to become available, it could be compared to a few of the resources in the survey with a smaller group of respondents to determine where on the scale it would sit in terms of value.

The results of this study provide a baseline for monitoring changes in values and evaluating the effectiveness of educational initiatives. For example, if this exact study was replicated in five years, one could see if the importance of resources has changed over time. Also, if education or outreach initiatives were to occur based on the knowledge gaps identified in the results, one could monitor if there were changes in the way people value things if they are informed. For example, if this study were conducted after respondents were informed of the ecological importance of eelgrass, their choices may have been different as

many claimed that they did not know enough about it. Having a baseline of the importance of natural resources will help to assist in not only identifying the focus of educational programming but also its success and effectiveness.

7.3 Future Research

Learning what the values of natural resources in the St. Paul's area are to the local residents, managers, and other relevant groups is only the first step towards achieving the sustainability of the resources in the area. There is potential for various future programs ranging from stewardship initiatives to bird watching attractions that can take place in St. Paul's, none of which can be completed overnight. More involvement from the community, at all ages, may help restore community pride and establish sustainable tourism initiatives. At a community workshop held in December of 2008, youth representatives expressed a potential desire to be involved in various aspects of community planning but were not sure how to go about it or felt that the opportunities were not there.

According to the results of this study and previous literature, the natural resource decision making process is likely to be more positive and well received if it is inclusive of the resource users and it is based on what people consider to be important or valuable. Importantly, understanding whether people agree or disagree on what they value and why, provides insights useful for resource planning. While the findings from this study could be used to leverage funding for

conservation initiatives or future tourism opportunities, it is up to the people of St. Paul's to find the drive for change and provide the lasting stewardship required to conserve and develop the area's unique resources in a sustainable manner.

Environmental policy-making, natural resource management, environmental protection, and sustainable development are mostly concerned with trade-offs between ecosystem health and social and economic well-being. The values of resource users need to be incorporated into these goals and policies because errors and resource miscalculations could occur if they are ignored (Freeman, 2003). Economic valuation of natural resources has its place in determining market values for goods and services traded in markets, however most resource values such as those related to ecosystem goods and services, e.g., aesthetics, heritage, and ecological integrity, do not have market prices. These values need to be captured through non-monetary approaches and taken into consideration in decision-making and policies in hopes to sustain and protect natural resources for future generations.

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APPENDIX A

QUESTIONNAIRE

Appendix A contains the questionnaire cover letter, map of St. Paul's, questionnaire instructions, resource recording sheet, rationale recording sheet, album recording sheet, activity impact recording sheet, and the general information and management questions. To see a sample of the paired comparisons used in this survey, see Figures 4.1 and 4.2.

June 2008

Dear Sir or Madam:

Thank you for agreeing to complete the questionnaire on "Who Values What?" This questionnaire is part of the data collection process for my Master's thesis through the Department of Geography at Memorial University of Newfoundland. I am interested in assessing the importance of resources from St. Paul's Inlet and the surrounding area. Your participation is greatly appreciated.

The objective of this questionnaire is to obtain the opinions of local and non-local residents, resource managers, academics, and tourists regarding what people value about the environment and what activities you feel would most benefit St. Paul's Inlet and the surrounding communities. The responses will be used to better understand how people relate themselves to their natural environment and provide resource managers and policy makers the necessary information to facilitate discussions of resource management. The questionnaire will focus on resources (both land and water) specific to the St. Paul's enclave boundary and activities that could *potentially* occur in the area.

I anticipate the questionnaire will require about 15-20 minutes to complete. Please note that there are no trick questions or duplicates and there are no right or wrong answers. Your participation is completely voluntary and your responses will be kept strictly confidential and anonymous. If at anytime you wish not to continue, feel free to withdraw yourself from the study. There are no penalties for an incomplete survey. For the most part, data will be numerically transformed and recorded in a spreadsheet for further analysis. The questionnaire booklets will be kept in a locked data storage facility for five years before being destroyed. *By participating in this questionnaire, it is understood that I have your permission to use the information you have provided.*

If you have comments or questions, or wish to see a copy of the results of this study, please contact me at **j.kukac@mun.ca** or my supervisor, Dr. Ratana Chuenpagdee at **ratanac@mun.ca** or by telephone at (709) 737-3157.

Thank you.

Sincerely,

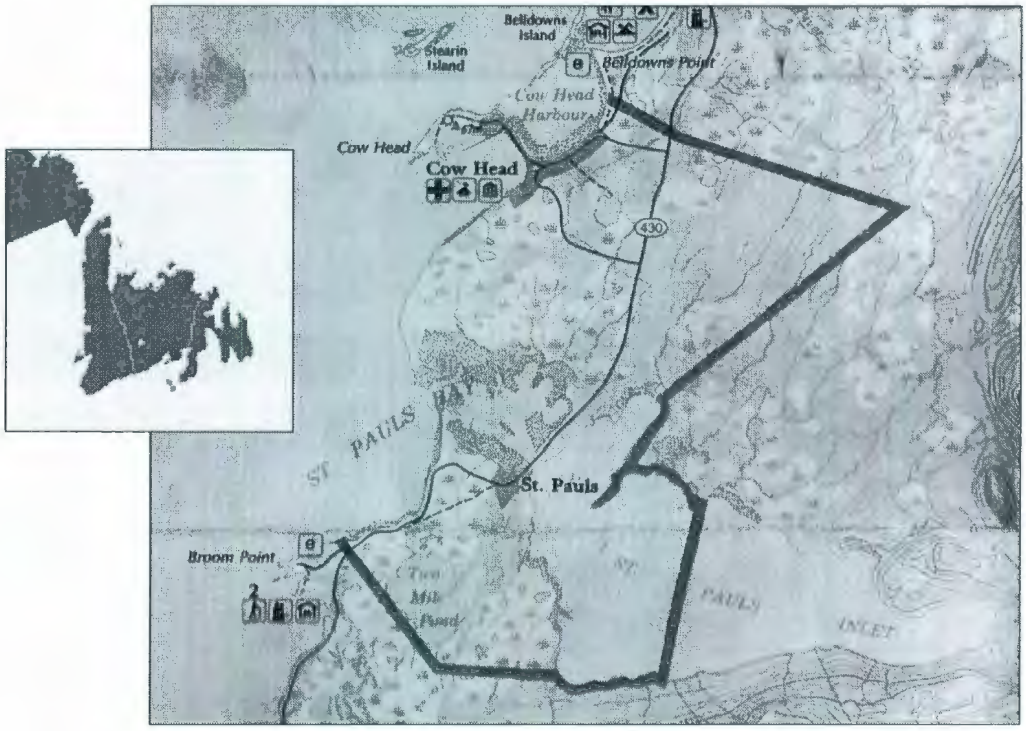
Jessica Kukac
MA Candidate, Department of Geography
Memorial University of Newfoundland

MEMORIAL UNIVERSITY

International Coastal Network

Who Values What?

Assessing the Importance of resources from St. Paul's Inlet, Newfoundland



Please refer to this map for the boundary of St. Paul's described in this survey.

INFORMATION FOR COMPLETING THE QUESTIONNAIRE

Attached is a questionnaire about natural resources and activities in the St. Paul's enclave boundary. Resources will include marine resources as well as land resources. The objective of this questionnaire is to determine what natural resources you consider to be important and what activities you feel have the potential to benefit or impact the boundary area and its communities. The resources and activities included in this questionnaire were determined through preliminary research.

Part 1:
Each question contains two resources, A or B. Select which of the two resources is most important to you, your family, and future generations. You will then be asked to explain why you chose each resource.

Part 2:
The questions in part two contain two scenarios, A or B. Select which of the two scenarios you feel would more beneficial to St. Paul's Inlet and the surrounding communities. It is important to note that although some of these situations may seem entirely practical, they are simply hypothetical. You will then be asked to address any concerns or issues you have with each of the scenarios.

Part 3:
These questions are based on general information about yourself and your experience in the resource management process. If you wish not to answer a question in this section, please leave it blank.

Please note that *there are no trick questions or duplicates and there are no right or wrong answers*. I am simply interested in knowing *your* opinion.

Your participation is truly appreciated. Thank you.

Resource Recording Sheet: **Album 1**

Use this tracking sheet to record your selections from the corresponding *Resource* photo album. If you have comments about any of the resources from the album, please feel free to write them in the space provided. The next page will ask you to explain why each resource is important to you.

Pair #	A	B
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		

Please explain the importance of these resources.
(Ex. economic, cultural, ecological, recreational, historical, future, aesthetic, subsistence, not important).

Resource	Rationale
American Lobster	
Atlantic Herring	
Atlantic Salmon	
Birds and Waterfowl	
Eelgrass/ Goosegrass	
Moose	
Saltmarsh	
Forest	

Activity Recording Sheet: **Album 1**

Use this tracking sheet to record your selections from the corresponding *Activity* photo album. If you have comments about any of the activities from the album, please feel free to write them in the space provided. The next page will ask you to address any issues or concerns you feel may be associated with each activity.

Pair #	A	B
1		
2		
3		
4		
5		
6		
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8		
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10		
11		
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27		
28		

Do you feel that there any issues or concerns related to these activities?

Activity	Issues/Concerns
Oil Exploration and Development	
Increased Boat Tour Operations	
Re-Forestation Program	
Waste Clean-Up Plan for the Saltmarsh	
Protection Plan for Eelgrass/ Goosegrass Beds	
Interpretation of Birds and Marsh on Walking Trail	
Saltmarsh Restoration Plan	
Resort Operations and Expansion	

General Information

Please provide some information about yourself by answering the following questions. If you do not wish to answer a particular question, please leave it blank.

1. Are you? ❑Male or ❑Female

2. What is your current job? _____

How many years of experience do you have in this field? _____ years.

3. Where do you live? _____ (city/town)

4. Age? ❑18-24 ❑25-30 ❑31-45 ❑46-64 ❑ 65+

5. As part of your occupation or livelihood, how often do you encounter or engage with the following resources? Please check one box for each resource.

	Daily	Weekly	Monthly	Occasionally	Never
Moose					
Birds &Waterfowl					
Eelgrass/Goosegrass					
Saltmarsh					
Forest					
Atlantic Salmon					
Atlantic Herring					
American Lobster					

6. Who do you feel should be involved in making general resource management decisions or policies? (Check all that apply)

❑Local authority (mayor, clerk, etc.)
❑Regional Development Board
❑Parks Canada
❑DFO
❑Academics/Researchers
❑Local community members
❑Tourists
❑Communities in the surrounding areas
❑Other:_____

7. If you were making resource management policies, what factors would you take into consideration? (Ex. economic, cultural, etc.)

_____

_____

Please provide any additional comments on the back of this page. Thank you for your participation.

APPENDIX B

Number of respondents per interest group and their interaction level with the resources used in the survey

(1) Daily, (2) Weekly, (3) Monthly, (4) Occasionally, (5) Never

Interaction Level	Moose	Birds	Eelgrass	Saltmarsh	Forest	Salmon	Herring	Lobster
Local Residents								
1	11	13	3	7	14	1	2	3
2	8	5	2	2	5	3	0	5
3	2	0	1	1	1	3	4	2
4	3	3	14	11	3	12	13	13
5	1	4	5	4	2	6	6	2
Managers								
1	4	6	1	1	11	2	0	2
2	7	7	2	1	7	2	1	2
3	7	4	1	3	2	5	3	2
4	5	6	14	12	3	12	14	15
5	1	2	6	7	1	2	5	3
Area-residents								
1	6	10	5	4	12	4	2	4
2	8	5	1	3	6	1	0	1
3	2	0	4	2	2	2	0	2
4	7	9	5	8	5	11	13	10
5	2	1	10	8	0	7	10	8
Tourists								
1	0	5	1	1	2	0	1	1
2	0	3	0	0	5	2	0	0
3	2	3	2	1	7	3	0	1
4	12	11	3	7	6	12	5	8
5	11	3	19	16	5	8	19	15

APPENDIX C

Rationale for Resource Selection

	Local Residents	Area Residents	Managers	Tourists
American Lobster	**Economic** – source of personal income for fishers and the fishery supports the town **Cultural** – a way of life in St. Paul's **Future** – will hopefully be important to future generations	**Economic** – provides jobs for local people and therefore supports the local economy; it is an important species to the commercial fishery **Historical** – the reason why people settled in the area **Cultural** – a way of life for people in the area; it is who we are	**Economic** – large commercial value that supports the local economy and basic livelihoods of people in the community; it is the main income for people in the area **Cultural** – it is a traditional way of life for people in the community	**Economic** – provides jobs and income for local people **Delicacy** – considered to be a food eaten by wealthy people or on special occasions **Cultural** – a way of life for local people
Atlantic Herring	**Economic** – provides additional income to fishers and is used for bait by fishers to catch lobster **Historical** – inlet was once abundant in herring and since its collapse it has taught us important lessons of overfishing **Ecological** – provides food for many species **Subsistence** – some people still eat herring **Future** – hope for its return	**Economic** – provides bait for the lobster fishery **Ecological** – provides food for other marine species **Historical** – was once important to the commercial fishery **Future** – would like to see it return to the area in the future **Subsistence** – some people still eat herring	**Historical** – was once an important fish to the commercial fishery in the local area; provides important lessons to be learned about resource management **Economic** – now used for bait in the commercial lobster fishery **Future** – potential for recovery and stewardship initiatives **Ecological** – fundamental to the food chain and plays an important role in rebounding other fish stocks such as cod	**Historical** – once important to the local fisher but no current value **Economic** – used for bait in the lobster fishery **Ecological** – part of the food chain
Atlantic Salmon	**Recreational** – fishing **Future** – would like to see local salmon river re-opened for fishing for locals and	**Recreational** – fishing for both locals and tourists **Future** – increased recreational potential to	**Future** – potential for stewardship from the local community; potential for lucrative sport fishery if	**Recreational** – sport fishing **Economic** – attracts many tourists to the area **Subsistence** – source of food

	tourists **Historical** – people of St. Paul's used to be part of both recreational and commercial salmon fishery	attract more tourists and create jobs for local guiding operations **Economic** – provides revenue through licences, gear, guides, and tourism **Subsistence** – an important part of the food fishery **Cultural** – fishing for salmon is something that has always been done in the area.	recovery is successful **Historical** – commercial fishery that ended with the cod **Ecological** – would have irreversible effects to the natural system if the salmon were gone **Recreational** – sport salmon fishing is a great way to connect people with the environment	
Birds and Waterfowl	**Recreational** – brings in tourists for bird watching and duck hunting is a popular fall activity for locals **Historical** – once killed for food **Ecological** – help to control the growth of eelgrass **Future** – possibilities to make something more out of bird watching **Aesthetic** – nice to look at and listen to	**Recreational** – bird watching and duck hunting **Aesthetic** – tourists like to take pictures of all the birds **Future** – could make more out of birds for tourism purposes	**Historical** – used to be part of a local diet **Aesthetic** – nice to have around **Recreational** – duck hunting is a popular pastime for local residents; bird watching attracts tourists **Ecological** – important ecological component to the saltmarsh, shoreline, and eelgrass beds; many non-native species frequent the area	**Recreational** – rare bird species visit the area attracting many bird watchers; hunted by local people **Aesthetic** – nice to look at and listen to **Not important** **Ecological** – valuable member of the ecosystem
Eelgrass/ Goosegrass	**Ecological**- food for birds and spawning ground for fish **Future** – may have medicinal purposes Historical – once used to insulate homes with	**Ecological** – a source of food and habitat for sea creatures and other animals	**Ecological** – habitat for bottom dwellers and juvenile fish species; fundamental base of the food chain **Future** – need to be protected for future success of local species	**What is this?** **Ecological** – habitat for fish species
Moose	**Subsistence** – a moose can feed a family for an entire winter **Economic** – fishers guide	**Subsistence** – a major food source for people in the area **Economic/Aesthetic** – many tourists are attracted to the	**Subsistence** – provides food and protein to many local people **Economic** – popular	**Aesthetic** – great to be able to see large animals in a natural setting; a symbol of Newfoundland

	tourists in the off season to go moose hunting; attracts tourists to the area **Recreational** – hunting **Ecological** – over population damaging the forest ecosystem	area to see moose **Ecological** – concern for the damage moose are causing to forests in the area	attraction for tourists **Future** – concerns for the effects moose (non-native species) will have on the forest ecosystem **Recreational** – hunting for locals and tourists	**Hazardous** – concerns on the roads
Saltmarsh	**Ecological** – provides habitat for certain species; allows for certain berries to grow **Recreational** – Berry picking **Future** – could attract tourists one day and may help to produce healthy fish populations	**Ecological** – perfect area for berries to grow; base of the ecosystem in the area; provides habitat and feeding grounds for fish and wildlife; a resting area for birds	**Ecological** - highly productive ecosystem; important migratory stop for birds and waterfowl; base of the food chain **Aesthetic** – rare and uncommon feature to the park area	**Aesthetic** – nice to look at but not sure of its purpose **Ecological** – migratory stop for waterfowl and fish species
Forest	**Subsistence** – provides major source of heat for homes in the community, wood for traps, sheds, etc., **Ecological** – habitat for moose **Recreational** – hunting, skidooing; etc	**Ecological** – source of shelter for wildlife; provides oxygen and food to many species **Subsistence** – provides wood needed to heat homes and building materials **Recreational** – provides trails and camp grounds for tourists	**Cultural** – traditional use of forest products by local communities; **Economic** – local people still involved in the forestry industry **Future** – concern of illegal cutting, deforestation, and moose impacts **Subsistence** – provides heat and building materials to local communities	**Aesthetic** – provides a beautiful landscape to the park as well as walking trails and campgrounds **Ecological** – provides habitat for moose and other wildlife **Economic** – a source of lumber for the area and wood for local people

APPENDIX D

Perceived Impacts and Concerns of Activities

	Local Residents	Area Residents	Managers	Tourists
Oil Exploration	**Environmental** – leaks and spills could disturb wildlife habitat and valuable fishing grounds **Social** – influx of people and money will create social issues like drugs; very short term and will abandon the community when the oil runs out **Positives** – would create many well-paying jobs and keep young people in the community	**Environmental** – spills could cause damage to the environment; would destroy the natural landscape; would deplete wildlife populations in the area **Social** – currently not at capacity to have an oil industry; could result in loss of history and culture **Positives** – more jobs would keep young people in the community	**Environmental** – spill and contamination would cause serious damage to the fishery and other natural resources; fear of no remediation plan **Social** – area is not at capacity to have an oil industry; would ignore the issues of what went wrong in the fishery; it is only a quick fix to some term issues **Aesthetics** – would be an eyesore in such a pristine area; does not fit a park mandate **Positives** – would provide good paying jobs and alleviate the stress on other natural resources	**Environmental** – will cause many disruptions to the local ecosystem **Social** – will bring in negative social issues like drugs etc.; oil companies will abandon the town when the resource runs out **Positives** – will create jobs in the local area
Additional Boat Tours	**Economic** – too many tours would threaten the success of the already existing tour; the tour that exists is not at capacity; only a seasonal operation; employment would be limited; too expensive to run **Environmental** –	**Economic** – already too many boat tours in the area; only a seasonal operation **Environmental** – pollution could hurt natural resources in the area like fish and forests	**Economic** – already too many boat tours in the park area; would water down a business that is already not successful; better to have one attraction that is successful than a few that are just okay **Environmental** – would disturb eelgrass and other	**Economic** – already too many boat tours in the area **Positives** – it is a way to educate tourists about the area

	increased pollution in the inlet would harm fish		marine resources; would interfere with spawning, feeding, and migration patterns	
Re-forestation Program	**Environmental** – something needs to be done about the moose before new trees are planted	**Environmental** – moose population should be dealt with first **Social** – if it brought back to a 'good' state, people will just abuse it again Positive – needed to replenish trees that were destroyed by insects and moose	**Environmental** – moose and bug populations need to be controlled first **Political** – the need for re-forestation implies mismanagement in the first place	**Environmental** - other forest 'users' such a s moose and wood cutters need to be dealt with
Dump Site Clean Up	**Social/Political** – people will continue to dump on the saltmarsh so how do you keep people from doing it again and how will it be enforced?	**Social/Political** – who will make sure that dumping does not re-occur? **Environmental** – the area is already sensitive and cleaning up unknown waste could be risky Positives – needed to protect the visual integrity of the area	No negative impacts associated to the clean up but rather if they are *not* cleaned up. Cleaning up the dumpsites would action with immediate results.	**Social/Political** – there needs to be some level of enforcement to ensure that it does not happen again
Eelgrass Protection	**Social/Political** – may restrict use of certain areas by local people	**Social/Political** – would restrict fishing in certain areas	**Social** – not enough people know about the importance of eelgrass and may not understand why it is being protected	**Not needed**
Interpretive Signage	**Social** – something that is not needed right now; priorities are elsewhere	**Positives** – a critical initiative for tourism	**Economic** – no income is generated from this; already too many interpretation sites and walking trails; trail needs to be maintained **Positives** – other projects are not worth the money if	No negative impacts associated with signage. **Positives** – will help to educate not only tourists but local residents about the natural area

			people are not educated; inexpensive; educational	
Local Research/ Management of Fish Stocks	**Economic** – waste of time and money; nothing has come out of research done in the past; there are no fish left; younger generations are not interested in the fishery **Positives** – would allow for more local quotas; would allow for more input from local people; would help in protecting our culture in the fishery	**Political** – fear of mismanagement **Positives** – would be beneficial to fishers in the area	No negative impacts or concerns associated with this. Instead it is seen a positive approach toward fisheries management	**Social/Political** – certain areas may become restricted use; how will it be monitored?
Resort and Golf Course Operations and Expansion	**Environmental** – will require further land clearing **Economic** – the weather will not permit for full golf season; will only be short term; not sustainable **Positives** – gives tourists a place to stay; provides social benefits to local people in that there is a place to go out to and have supper; provides community with year-round jobs and tax benefits	**Environmental** – disruptive to the local environment; large amounts of land have already been cleared; **Economic** – only provides seasonal jobs and recreational opportunities	**Environmental** – could infringe on local landscapes and ecosystems; use of pesticides and herbicides will cause harm to local water sources damaging marine species and habitats **Positives** – a major tourist and economic attraction the area	**Environmental** – will use a lot of water and pesticides to maintain the golf course