CANADA'S NATIONAL PARKS:

WHAT ARE THEY WORTH TO CANADIANS AND WHY?

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ABSTRACT

CANADA'S NATIONAL PARKS: WHAT ARE THEY WORTH TO CANADIANS AND WHY?

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A double-bounded dichotomous choice contingent valuation question with an open-ended follow-up was used to estimate the value of the net benefits that Canadians receive from Canada's national park system, beyond their current expenditures for the parks. The valuation questions were a small component of the 2005 Parks Canada National Public Opinion Survey. The Survey was administered by telephone by the research firm Environics© and was completed by 6,086 respondents. The valuation questions were administered to a randomly assigned sub sample of 1,308 respondents.

Two regression models were used to examine how survey respondents who agreed to pay an unspecified amount compared to those who agreed to pay a specified bid amount. A payment vehicle of an annual or one-time contribution to a non-profit national parks fund yielded a net benefit value of $53.32 per household for the double-bounded question and $69.65 for the open-ended question. About 61% of survey respondents were willing to make a contribution to the fund of which about half were willing to contribute their amount on an annual basis.

The final regression models indicated that respondents who agreed to pay an unspecified dollar amount to the national parks fund differed considerably from those who agreed to pay a specified amount . The most important predictor variables for the

unspecified dollar model were attitudinal variables such as: the level of respondent support for funding national parks with government funds, exposure to information about the national parks, community size, contributions to nature organizations, the perceived individual responsibility for protecting nature, and the impression of national parks as common or unique places.

Conversely, the most important predictor variables for the specified dollar amount model included: the bid amount, the level of agreement statements regarding bequest and option value, region of residence, household language, age, gender, the ability to recall the name of the last national park visited, the number of years since the last national park visit, the level of exposure to information about Parks Canada, the impression of national parks as common or unique, level of education, and volunteered time with a nature protection organization.

DEDICATION

To my dear friend and mentor, Dr. Pablo Colucci.

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Chapter I. INTRODUCTION

1.0 BACKGROUND

Canadians possess a disproportionate share of the remaining places on the planet that are relatively untouched by humans. If Canada's wealth were measured by its remaining endowment of natural areas, by all accounts it would be one of the richest nations on Earth. Canada holds about 20% of the world's remaining wilderness, 9% of the world's fresh water, the world's longest coastline and 25% of the world's wetlands and Boreal forests (Treasury Board of Canada Secretariat, 2001). Given its significant global share of these rapidly deteriorating environmental resources, the responsibility largely rests with Canadians to carefully manage and protect their dwindling endowment, not only for themselves, but for the benefit of all nations, and indeed, for the benefit of the planet.

Around the planet, large, untrammeled natural areas are being reduced to mere vestiges in parks and reserves. Some outstanding examples of Canada's natural areas are found within its system of national parks. In fact, nine of Canada's national parks, including Nahanni, Wood Buffalo, and the seven Rocky Mountain parks, are considered so special that the United Nations has designated them World Heritage Sites (Office of the Auditor General (OAG), 2005; Struzik, 2004a). Parks Canada Agency is the branch of the federal government entrusted with the stewardship of the national parks on behalf of all Canadians.

In these times of budgetary restraint, conservative political ideologies and lingering memories of government corruption, Parks Canada, along with other government agencies, has been increasingly forced to become more transparent about their decisions and fiscally responsible for their actions. Consequently, it is attempting to solicit greater public input into the political process of creating and maintaining national parks.

Canada's national park system is the second oldest in the world and an icon for Canadian identity and tourism. The system possesses enduring citizen popularity, an elaborate planning and organizational structure, legal protection of varying kinds, and the benefits of being located in a sparsely populated, large, affluent nation with a stable economy. However, despite these advantages, there remains another 'inconvenient truth'. There is considerable evidence to show that Canada's system of national parks is too small, heavily reliant on government funding, and unable to adequately protect the landscapes within park boundaries (LeRoy and Green, 2005; Boyd, 2002; Environics International, 2000; Panel on the Ecological Integrity of Canada's National Parks, 2000; World Wildlife Fund Canada, 2000; Federal-Provincial Task Force on the Importance of Nature to Canadians, 1999; Greene and Paine, 1997; Noss, 1996; Stephenson, 1994).

Critics of Parks Canada have suggested that these problems arise largely because, as a government agency, Parks Canada is too isolated from market forces, and therefore, lacks adequate incentives for establishing and managing the national parks efficiently (LeRoy and Cooper, 2006; LeRoy and Green, 2005). These observers have suggested that national parks might better achieve conservation goals through privatization of national park resources and services rather than ownership and management by a government agency. However, others believe national parks should not be privatized and have argued that Parks Canada receives too little political interest and public funding to adequately carry out the important tasks it has been assigned (Struzik 2004a; Panel on the Ecological Integrity of Canada's National Parks, 2000).

Regardless of who is assigned the responsibility of managing Canada's national parks, there remains a basic question that must be answered to help develop an optimal national park management strategy. That is: "What are Canada's national parks worth to Canadians and why"? Knowing the types of national park benefits, their attendant values, the factors that influence them and the distribution of these benefits across the Canadian population - is very important. This information is necessary to inform management decisions and secure the desired flow of park benefits to present and future generations.

This study begins to answer the previous question by using the Contingent Valuation Method (CVM) to derive an economic measure of the importance of the benefits that Canadians receive from their system of national parks. This study is unique in Canadian national park research for two reasons. Firstly, it provides an estimate of the net economic value (i.e. beyond current tourism and tax expenditures) of the benefits that Canadians receive from their national parks – regardless of whether or not they ever visit the parks. Secondly, this study facilitates Parks Canada outreach and communication strategies (such as the 'Engaging Canadians Strategy', Parks Canada Agency, 2001) by clarifying the knowledge, importance and underlying social values held by Canadians for their national parks.

1.1 OVERVIEW OF THE CANADIAN NATIONAL PARK SYSTEM

1.1.a) What is the Canadian National Park System?

Within Canada, national parks are defined as "a special type of public land administered under the provision of the National Parks Act" (Environment Canada Park Service, 1990, p.4). In accordance with the Act, Parks Canada is the branch of the federal government responsible for maintaining and restoring the ecological integrity[1] of Canada's national park system. Parks Canada is also responsible for fostering public understanding, appreciation and enjoyment of national parks in ways that ensure the ecological integrity of these places for future and present generations. In addition to national parks, Parks Canada manages a system of national historic sites and a system of national marine conservation areas (Office of the Auditor General, 2005).

One of the great voices in the conservation movement, Aldo Leopold (1887-1949), believed that the first law of intelligent tinkering was to save all the parts (Leopold, 1949). In broad terms, Canada's system of national parks attempts to accomplish this objective by protecting a representative sample of each of the 39 distinct terrestrial natural regions identified in the National Parks System Plan (Environment Canada Park Service, 1990). Established by the Canadian Parliament, national parks prohibit the extraction of natural resources through mining, logging, hydroelectric development and sport hunting. Opportunities for the public to use, benefit and enjoy

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[1] 'Ecological integrity' means, with respect to a park, a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic (non-living) components and the composition and abundance of native species and biological communities, rates of change and supporting processes (Department of Justice, 2000).

national parks are provided, but are limited to nonconsumptive forms of recreation that emphasize the wilderness characteristics of the park area. Thus, Canada's national parks are largely natural places where Canadians exercise restraint - putting nature's needs ahead of human demands. National parks are embodiments of what Nash (1992. p.2) called "planetary modesty", a recognition that humans share the Earth with millions of other species. As Sax (1976) points out, in a world in which humankind is able to shape the direction of evolution, national parks stand as an eternal standard against which humanity can measure the pace of change.

According to the IUCN, of which Canada is a member, national parks are a type of protected area[2] designated to:

> "(a) protect the ecological integrity of one or more ecosystems for future generations; (b) exclude exploitation or occupation inimical to the purposes of designation of the area; and (c) provide a foundation for spiritual, scientific, recreational and visitor opportunities, all of which must be environmentally compatible" (Ibid, p.19).

The definition above clearly suggests that the aim of ecosystem protection is to provide present and future benefits to society while maintaining ecological integrity. As Suh and Harrison (2005) note, the philosophy of a single dominant use (i.e. preservation) has never arisen in national park history. Rather, the multiple management objectives of preservation, conservation and public use inherent in the IUCN definition have been integrated within the domestic legislation of many national parks throughout the world.

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[2] The World Commission on Protected Areas (WCPA) of the International Union for the Conservation of Nature and Natural Resources (IUCN), defines a protected area as "an area of land and/or sea especially dedicated to the protection of biological diversity and of natural and associated cultural resources and managed through legal or other effective means" (IUCN, 1994, p.7).

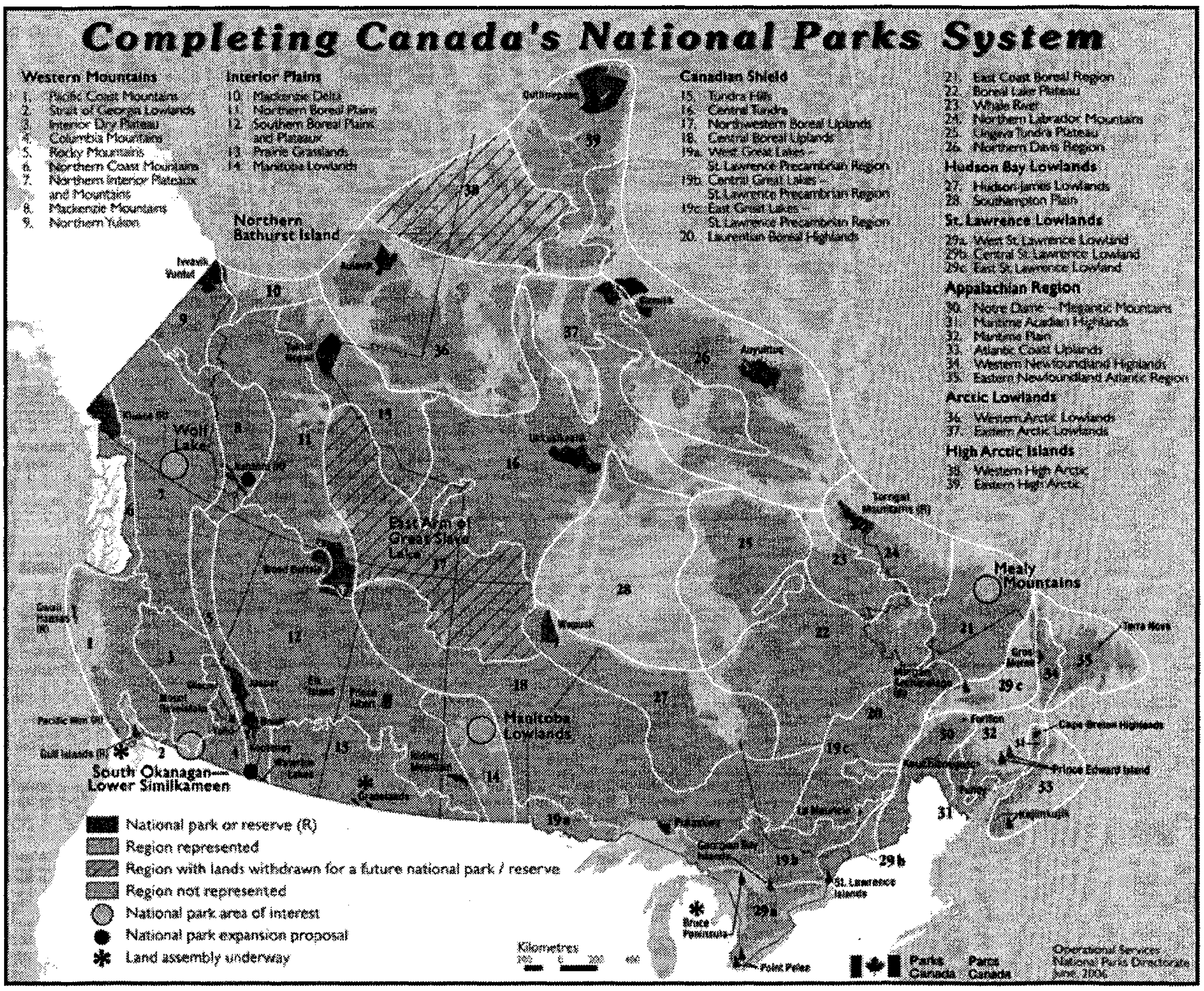
Prior to 1971, national park establishment was still largely an *ad hoc* process, with parks being created wherever there was political support or interest (Dearden and Rollins, 2002). Monumentalism, rather than environmentalism, was the driving force behind early national park site selection. National parks represented a "collection of special places that had been created for a variety of purposes that included protecting scenic areas for national and international tourist resorts, providing recreational areas and preserving habitat for wildlife" (Environment Canada Park Service, 1990, p.4).

In 1971, Parks Canada adopted a 'natural regions' system to guide future park expansion activities. The National Park Systems Plan identified 39 distinct Natural Regions within Canada, based on physical, biological and geographical distinctions. The main goal of the Plan is to represent and protect each identified Natural Region in the national parks system.

Figure 1 shows Parks Canada's progress towards completing the national park system. Currently twenty eight of the Natural Regions are represented within the National Park System (Parks Canada Agency, 2006). As of March, 2005, the eleven unrepresented Natural Regions were Natural Regions 3,7,14,17, 20,21,22,23,25,28 (Parks Canada Agency, 2005e). Theses gaps in the system are located in Quebec, Manitoba, British Columbia, the Yukon Territory and Labrador.

Parks Canada hopes to have 34 of the 39 Natural Regions completed by 2008 (Parks Canada Agency, 2005a).

Figure 1.1. Map of Parks Canada Natural Regions and Progress Towards Completing Canada's National Park System



Parks Canada, 2005c

1.1.b) Relative Importance of the Canadian National Park System

Parks Canada has contemporary and cultural assets worth $7.1 billion in its 36 national parks, 7 national park reserves and 153 national historic sites (Parks Canada Agency, 2006). Through tourism expenditures alone, Canada's national parks make a significant contribution to the Canadian economy. In 2006, Parks Canada contributed about $1.2 billion to Canada's Gross Domestic Product (GDP) and about 38,000 full time equivalent jobs (Parks Canada Agency, 2006).

For many people today, getting back to nature is as important as getting away from nature was to our forebears. Canadians spend considerable time and money taking part in nature-based activities, and Environment Canada (1996) estimated expenditures associated with these activities to be about $11 billion annually (Environment Canada, 1996). Fillon *et al.* (1994) estimated that as much as one-quarter of the tourism expenditures in Canada can be attributed to wildlife tourism. In 1995, non-Canadian visitors to Canada's national parks spent approximately $275 million - about one-quarter of total park visitor expenditures (Parks Canada, 1995).

In 2003, Canadian and international travelers spent more than $52 billion - about 2% of Canada's Gross Domestic Product (GDP) for that year (Parks Canada Agency, 2003). One of the elements of the rapidly growing tourism market is 'wildlife/nature tourism' or 'ecotourism', much of which involves visits to Canada's national parks. In fact, Eagles and Wind (1994) found that ecotour companies frequently used the name 'national park' as a brand to their potential customers.

Canada's national parks continue to be magnets for tourists. From 2001 to 2006, about 12.3 million persons per year visited Canada's national parks (Parks Canada Agency, 2006a). About half of the Europeans and one-quarter of the Americans who come to Canada make their way to a national park. (Struzik, 2004a).

While other nations may no longer have a strong cultural affiliation to wilderness, this does not seem to be the case in Canada. For example, Parks Canada's 2002 public opinion telephone survey of 5,202 adults suggested that 60% of Canadians strongly support the use of their tax dollars for ensuring that Canada's natural heritage is protected for future generations and for maintaining existing parks (Parks Canada Agency, 2003). Other polls suggest that 70% of Canadians view national parks as icons of our national identity, 79% of Canadians are "very upset" about threats to nature and natural ecosystems and 40% remain dissatisfied with the shortage of parks and wilderness areas in the country (Panel on the Ecological Integrity of Canada's National Parks, 2000; Environics International, 2000). As well, evidence suggests that many Canadians believe that protecting nature should be the top priority in national parks, with recreation a distant second (Bocking, 2000).

Data on national parks as symbols of Canadian identity has been collected by the polling firm Environics© Research Group as part of its Focus Canada series of polls for several years. As part of these national public opinion polls respondents are asked which of a list of 10 to 15 objects they regard as important symbols of Canadian identity. As shown in Table 1.1, national parks consistently rank third or fourth on the list based on the proportion of respondents who rate them as very important symbols of Canadian identity (Parks Canada Agency, 2005b).

Table 1.1 Percentage of Respondents Who Rate Item as a Very Important Symbol of Canadian Identity

Item	Year					
	1994	**1996**	**1997**	**2000**	**2003**	**Average**
Canadian Health Care System	-----	82	87	80	78	81.75
Charter of Rights and Freedoms	63	67	72	76	71	69.8
Canadian Flag	69	64	70	73	68	68.8
Canadian National Parks	**66**	**72**	**71**	**73**	**62**	**66.8**
Canadian National Anthem	67	61	67	65	60	64
Royal Canadian Mounted Police	59	53	60	60	60	58.4
Canadian Olympic Athletes	----	45	50	----	----	----
Canadian Literature and Music	44	46	49	58	46	48.6
Canada's Aboriginal People	----	----	----	57	----	----
Multiculturalism	35	36	37	54	47	41.8
Canadian Theatre and Films	----	37	40	----	----	----
Bilingualism	32	35	37	45	38	37.4
National Capital	----	----	----	43	36	----
Canadian Broadcasting Corporation	35	31	39	37	37	35.8
Hockey	31	30	30	35	40	33.2
The Queen	17	14	14	16	16	15.4

(Parks Canada Agency, 2005b, p.26).

A more recent example of the importance of Canada's natural heritage and national parks to Canadians was demonstrated by the voting results to a Canadian Broadcasting Corporation television and radio public opinion poll called the 'Seven Wonders of Canada' (Canadian Broadcasting Corporation, 2007). After 25,000 nominations and over 1 million votes cast, 4 of the top 7 audience selections were represented in whole or in part by national parks. Furthermore, all 7 of these emblematic nominees were examples of Canada's natural landscapes, as opposed to man-made or intellectual examples of Canadian identity.

1.1.c) Current Status of the Canadian National Park System

There is considerable evidence to show that Canada's network of national parks is still too small, poorly protected, underfunded and of insufficient political priority to adequately protect the landscapes within their boundaries. These shortcomings are elaborated below.

1.1.c) i) Area

In 2003, about 9% of the Earth's landmass was protected by parks (Eagles and McCool, 2004; 2003 United Nations Environment Program Convention on Biological Diversity; Eagles *et al.* 2000). However, estimates of the proportion of land that needs to be protected in their natural condition to maintain ecosystem processes is between 25% to 75 % (Sanjayan and Soule, 1997; Noss, 1996; Stephenson, 1994).

Currently, about 9.6% of Canada's landmass is protected by parks of which about 3% is protected by national parks (Treasury Board of Canada Secretariat, 2004; Eagles *et al.* 2000). Although Canada ranks fourth in terms of the amount of area protected (behind the U.S., Greenland and Australia), it has set aside a smaller proportion of its landmass for parks than at least 33 other nations (Eagles *et al.* 2000; Panel on the Ecological Integrity of Canada's National Parks, 2000) and has repeatedly broken promises to meet the international threshold of protecting a minimum of 12% of its lands and waters (World Wildlife Fund, 2000; Green and Paine, 1997). By comparison, the United States has protected 21.2% of its landmass (Eagles *et al.* 2000; Greene and Paine, 1997).

Canadians would probably be surprised to know that even after more than a century of effort, their national park system is less than three-quarters completed. Despite establishing a 'formal' national parks plan in 1971, which identifies the regions of Canada that will have a national park, Canada's national park system is only 72% complete (Parks Canada Agency, 2006). Eleven out of 39 Natural Regions still lack representation by a national park (Parks Canada Agency, 2005a; Parks Canada Agency, 2005b; World Wildlife Fund, 2000).

Since Canada also has the world's longest coastline of any country, the second largest area of continental shelf and about 9% of the world's freshwater (Treasury Board of Canada Secretariat, 2004; Dearden and Rollins, 2002), Parks Canada established the National Marine Conservation Areas Policy in 1995. Like the National Parks Plan, the Policy is designed to conserve examples of marine natural regions. However, to date only 2 out of the 29 Marine Natural Regions are represented by a National Marine Conservation Area (Parks Canada Agency, 2006; Dearden and Rollins, 2002; Canadian Heritage, 1995).

In October 2002, the Government of Canada announced the 2002 Federal Action Plan to create ten new national parks, five new national marine conservation areas, and to expand three existing national parks by the end of 2008 (Parks Canada Agency, 2006). This expansion would add another additional 100,000 square kilometers of wilderness and expand the size of the national park system by 50%. (Treasury Board of Canada Secretariat, 2004). As of 2006, only three new parks have been created with no new marine conservation areas (Parks Canada Agency, 2006). According to the Parks Canada Agency Corporate Plan 2006/07 -2010/11, the Agency is in the midst of a five year plan to increase the number of Natural Regions represented by a national park from 25 to 34.

Over the same period, it hopes to increase the number of marine conservation areas from 2 to 8 (Parks Canada Agency, 2006). Parks Canada acknowledges that current funding will not enable full completion of the Action Plan, and it will have to return to the government to seek additional funding (Ibid, 2006).

1.1.c) ii) Protection

There is considerable evidence that Canada's National Parks are being seriously compromised by human activities both within and outside of park boundaries (Panel on the Ecological Integrity of Canada's National Parks, 2000; Parks Canada, 1998). These threats have become so significant that the United Nations has warned that several of Canada's World Heritage Sites, such as Banff and Jasper National Parks, may have their status revoked if unconstrained development continues in and around these parks (Struzik, 1998).

In 2002, the Panel on Ecological Integrity in Canada's National Parks reported that 38 out of 39 national parks suffered from severe ecological stress, including wildlife diseases, overuse, pollution, invasion of exotic species, and urban/industrial development that is blocking the movement of wildlife and the flow of water in and out of national parks. These stressors may jeopardize the range of benefits that Canadians receive from their national parks and the very reason why they are valued (OAG, 2005).The Panel concluded that human use had not been managed effectively and that the planning process needs to be revised to place ecological integrity at its core (Panel on the Ecological Integrity of Canada's National Parks, 2000). While the most recent Audit Report of the Commissioner of the Environment and Sustainable Development acknowledged the progress made on improving the status of ecological integrity in many parks, it went on to suggest more could be done and added a note of urgency to the Agency's work (OAG, 2005). For example, of the 12 parks audited, 6 had park management plans that were outdated. Furthermore, annual reports on the implementation progress of park management plans were not produced on a regular basis by any of the parks (OAG, 2005). This inadequate monitoring and updating of management efforts potentially jeopardizes the protection of park ecosystems and the benefits accruing to park visitors and non-visitors.

The name 'national park' is closely associated with nature-based tourism and is a symbol of a high quality natural environment with a well-designed tourist infrastructure. Eagles and Wind (1994) found that Canadian ecotourism companies use the name 'national park' as a brand name to attract potential ecotourists to their services. However, this reputation for Canada's national parks is threatened due to inadequate funding of the parks. As described by the Auditor General in her most recent report to Parliament, one third of national park facilities are in urgent need of repair, with another third needing repair in the next five to ten years (OAG, 2003). For example, there are $2.4 billion in assets in the mountain parks of which 35% are in poor condition, 47% are in fair condition and 18% are in good condition (Withey, 2005).

1.1.c) iii) Funding

Very low levels of finance cause management difficulties and most park jurisdictions have fewer people and smaller financial resources than desirable to carry out their social mandate (Eagles, 2003; Eagles *et al.* 2000). The main reason cited by the

United Nations Environment Program Convention on Biological Diversity is because the value of the Earth's natural capital is poorly understood and greatly undervalued. Hence, the common view that the establishment of protected areas incurs huge opportunity costs (UNEP, 2003).

The 2005-2006 Parks Canada Agency budget was about $545 million dollars. The budget for 2006-2007 was about $588 million (Parks Canada Agency, 2006). With less than 15% of its budget covered by internally generated revenue, Parks Canada remains vulnerable to shifting political agendas and their impact on federal government funding appropriations (LeRoy and Green, 2005).

Canada's national park system was not created primarily to generate revenue, but rather to protect terrestrial ecoregion landscapes. However, as Laarman and Gregersen (1994) point out, the generation of small amounts of revenue by the parks often reduce government incentive to provide adequate supplementary park funding. This situation leads to a vicious cycle of low fees, inadequate revenue, and deficient public investment - followed by more low fees, revenue and investment.

Indeed, a review of federal government spending on national parks and park asset status suggests that Parks Canada lacks the consistent financial resources to adequately maintain park environments. For example, in the 1990s, federal-level staffing and funding for national parks were down by at least 40% compared to 1980s levels (Panel on the Ecological Integrity of Canada's National Parks, 2000; Searle, 2000). Throughout the 1990s, Parks Canada has had its spending power reduced by about 25% and new northern parks had to borrow from those in the south to conduct research and pay staff (Struzik, 2004a).

While many other government departments endured similar cuts, Parks Canada never had the same flexibility to adjust. Instead of downsizing across the board as other federal government departments and agencies were able to do, Parks Canada was given seven new national parks and dozens of new national historic sites to run. It was also handed the task of creating eight new national parks and marine conservation areas in the coming years, and administering a number of other domestic and international programs (Struzik, 2004a).

Inflationary pressure has also reduced Parks Canada's budget. Parks Canada is an operational department with a significant non-discretionary 'Goods and Services Budget' and for the past 20 years Parks Canada has had to absorb the loss of purchasing power due to inflation. Applied to the non-salary portion of the Parks Canada budget, inflation results in a budget reduction of $6 million per year, compounded annually. While the Agency has managed to offset this inflationary pressure by using revenues from fee increases and selective service offer adjustments, without relief in the form of the inflationary protection provided to several other operational departments, Parks Canada may be forced to examine significant service reductions to visitors and non-visitors (Parks Canada Agency, 2006).

Seven years ago, the federal government-appointed an expert panel to examine the ecological integrity of Canada's national parks. The Panel suggested that at least $328 million be allocated to address its recommendations over 5 years, with $85.5 million per year thereafter to restore and maintain habitat for fish and wildlife in the national parks and marine conservation areas across the country (OAG, 2005; Struzik, 2004d; Panel on the Ecological Integrity of Canada's National Parks, 2000). To fulfill that role, Parks Canada received $75 million over 5 years (23 percent of what the Panel recommended) from the federal government *Budget Plan 2003,* and a promise to gradually increase this funding to $25 million per year (29 percent of what the Panel recommended) thereafter (OAG, 2005; Treasury Board of Canada Secretariat, 2004).

Budget 2005 provided an additional $60 million over five years, and an additional $15 million per year thereafter (Department of Finance, 2005). Combined, the additional funds from both *Budget*s provided only 23% of the Panel recommended funding for 2004-05 and 32% of Panel recommended funding for 2006-08. Assuming these *Budgets* remain unchanged, Parks Canada funding would increase to 43% of Panel recommended funding for the years 2009-10 and stabilize at 61% of Panel recommended funding by 2011. Thus, even if inflation and other costs do not increase for the next decade, Parks Canada would still never receive more than about 61% of the funds recommended by the Panel Report to restore and maintain habitat for fish and wildlife in the national parks and marine conservation areas.

Chronic underfunding has also resulted in a significant deterioration of the Parks Canada asset base (Parks Canada Agency, 2006). According to Treasury Board of Canada guidelines, Parks Canada requires an annual investment of $140 million for asset recapitalization. However, the Agency's ongoing annual capital budget has only been $40 million (Parks Canada Agency, 2005). *Budget 2005* promised to invest $209 million over the next five years followed by an annual increase of $75 million (Parks Canada Agency, 2006) to address the $425-million shortfall that Parks Canada faces (Department of Finance, 2005; Struzik, 2004e). Parks Canada plans on spending $512.7 million over the next five years to resolve the recapitalization shortfall (Parks Canada Agency, 2006).

Including the funds from the federal government's *Budget 2005*, Parks Canada's budget has received an annual permanent increase of $155M or 42% of the 2002/2003 budget (Latourelle, 2005). However, given the expansion of the number of national parks, marine conservation areas and historical sites, the shortfalls in terms of decaying infrastructure, and the funds required for ongoing management and restoration of ecological integrity, this increase, while a positive step, is still insufficient.

Despite the popularity and recognized economic and ecological importance of Canada's national parks, in 2003-04 only about one-quarter of a penny of each federal income tax dollar went to Parks Canada, of which less than one-seventh of a penny went to fund Canada's national parks (Government of Canada, 2004; Statistics Canada, 2004a). The details of this calculation are provided in Appendix 1. By contrast, about 6.9 cents, 26.4 cents and 18.9 cents of each federal income tax dollar went to national defense, transfers to individuals and public debt charges, respectively (Statistics Canada, 2004b).

1.1.c) iv) Political Status

If adequate and reliable funding of an organization by the federal government can be regarded as an indicator of high political priority, then Canada's national parks, as shown previously, are not significant in this regard. Additional evidence supports this claim. For example, unlike other federal government departments or agencies, Parks

Canada has had difficulty establishing itself as a worthy stand-alone entity within the federal government. Since the 1980s, Parks Canada has undergone a series of rapid reorganizations, moves, re-naming and down-sizing that have left their mark on the organization (Dearden and Rollins, 2002). Over the years, Parks Canada has been shifted from one department to another, including the Department of Indian and Northern Affairs, Heritage Canada, and now, for the second time in a decade, Environment Canada (Struzik, 2004a).

The low political priority status of national parks is also reflected in the lack of socio-economic information regarding their contribution to the well-being of society. As noted in the most recent Auditor General's Report on Canada's national parks (OAG, 2005), gaps in social science information, including information on the social impacts of visitor use, is a common problem. Additionally, Parks Canada acknowledges it has no systematic information on the extent or nature of Canadians' emotional connections to heritage places or the national park system. It has not defined what is meant by "conservation values" and does not systematically measure support for this concept (Parks Canada Agency, 2006c).

The lack of national data on park use levels and the economic importance of parks and protected areas is a public policy deficiency (Eagles *et al.* 2000). While Statistics Canada provides quarterly Canadian tourism figures to government and the media, there is no system for the regular collection and distribution of nature or park-based tourism. This can lead to a severe under-representation of the importance of parks within the fiscal sectors of government and business. For this reason, national parks do not compare well to other industries, such as forestry, automobile manufacturing, agriculture and mining, where the economic value of the products are carefully documented and continuously reported (Eagles, 1995).

The short-term political horizons of government has also been thought to contribute to the low political priority status of national parks. The short-term political vision may encourage the exploitation of potential park resources to meet short-term economic goals, rather than the longer-term economic goals achieved through park establishment and conservation (UNEP, 2003). Additionally, interagency conflicts may contribute to the poor collection and suppression of data with the goal of not allowing parks to gain the full public-policy profile that they would otherwise enjoy (Eagles, 2003).

1.1.c) v) Public Participation

Parks Canada acknowledges that "the more Canadians know about their national parks, and see them as relevant and representative, the more they will care about them and support the services and programs provided by Parks Canada" (Parks Canada Agency, 2006, p.58). Furthermore the Agency notes that "Park's Canada's success will rest on its capacity to build support across the country for its mandate. As such, it must go beyond the visitors to its parks and reach out to all Canadians - in their homes, their schools, their communities and their places of work" (Ibid, p.59). However, current planning, communication and information strategies of Parks Canada are still primarily focused on the park visitor experience (Parks Canada Agency, 2001). While Parks Canada routinely monitors visitor perception and service quality through the Visitor

Information Program, the Visitor Experience Assessment Planning Tool, and other methods, no similar program or tools exist to routinely determine the broader Canadian public perception of Parks Canada service quality and management direction (Ibid, 2006). Parks Canada largely utilizes a top down approach of informing the non-local Canadian general public *ex post* about park decisions, key park messages and themes - rather than inviting a bottom up approach of inviting and accommodating the interests of all Canadians in park decisions and management approaches.

For example, Section 11.(1) and 12.(1) of the National Parks Act call for the provision of "public awareness" as part of park management plans and:

> "opportunities for public participation at the national, regional and local levels... in the development of parks policy and regulations, the establishment of parks, the formulation of management plans, land use planning and development in relation to park communities and any other matters that the Minister considers relevant"(Department of Justice Canada, 2000. c.32).

However, at present, there is no clear policy direction that identifies what type of national park decisions would require Parks Canada to actively seek the interests of the largely non-visiting, non-local Canadian general public, nor the methodology and extent of the public consultation required (Parks Canada Agency, 2006; Parks Canada Agency, 2004; Parks Canada Agency, 2001). While public input is sought for park establishment and management planning purposes, the effort is usually limited to local or invited stakeholder group meetings and open house presentations for the local community. The biennial Minister's Round Table on Parks Canada, together with consultations carried out by Parks Canada field units with local residents, constitute the key mechanisms by which the public can hold Parks Canada accountable for its actions (Parks Canada Agency, 2005d). The extent of effort to reach the Canadian population is left to the discretion of the field unit superintendent or park planner and is usually limited to media releases in newspapers inviting public comment (personal conversation, Bourque, 2005).

For example, as part of the landmark Banff-Bow Valley Study determining the future of Canada's premier national park (Banff National Park), only Calgary residents were surveyed to establish the relative importance of the criteria for appropriate human use for the Park (Angus Reid Group, 1996). While the Study acknowledges a Canada-wide survey would have been useful, it was "not undertaken due to time and budget constraints" (Minister of Supply and Services, 1996). It is worth noting this was a two-year, two-million dollar study and yet there was not sufficient time or money to consult with more than 400 residents of the Calgary population.

The 2004/05 Parks Canada Agency Corporate Plan identified that a strategic objective of the Heritage Resource Protection Service was to manage the cultural resources at national parks and national historic sites in accordance with the principles of value, public benefit, understanding, respect and integrity (Treasury Board of Canada Secretariat, 2004). However, there is no mention in the Plan of a methodology to estimate the value or public benefit Canadians receive from their national parks. Strategies to inform and involve Canadians are limited to natural science initiatives in elementary education through the National School Curriculum Program, various types of media products and the displays for Parks Canada Discovery Centre experiences.

The 2004/05 Corporate Plan also identified as a strategic objective within the Heritage Presentation Service line to raise awareness, foster understanding, enjoyment, and sense of ownership of, and strengthen emotional connections to Canada's national parks. However, the strategies to achieve this objective are again limited to education activities through school curriculum, media programming, discussion with the tourism industry on the maintenance/improvement of ecological integrity in or near national parks, and better educating of park visitors. Although there are clear performance expectations regarding visitor satisfaction and understanding of national parks (i.e. 50% of visitors are very satisfied with their park experience; 50% of visitors participate in learning experiences (Parks Canada Agency, 2006, p.64)) there are no similar criteria for the non-visiting Canadian public appreciation for national parks or for the students participating in the school programs dedicated to national parks.

Parks Canada delivers its mandate through a Program Activity Architecture (PAA) composed of eight program activities on which the Agency bases its reporting to Parliament and to Canadians (Parks Canada Agency, 2006). The 2005 Minister's Round Table on Parks Canada and the Commissioner of the Environment for Sustainable Development called for Parks Canada to adopt a more integrated approach to visitor experience and education. In response, Parks Canada created a new Directorate of External Relations and Visitor Experience to foster relationships between Canadians and their national parks (Parks Canada Agency, 2006). However, once again the emphasis of this new Directorate and the 'Informing, Involving and Influencing Canadians' theme of the Program Activity 2: Conserve Heritage Resources, is on increasing public awareness, understanding, appreciation, and support for Parks Canada activities and key messages through visitor and school education programs, communication technologies, media partnerships, and relationships with the tourism industry (Ibid, 2006).

Currently, there is no reciprocal program to increase Parks Canada's awareness of the support that Canadians have for Parks Canada management priorities or messages. However, as part of Program Activity 3, the 'Promote Public Understanding and Appreciation Program', Parks Canada does hope to develop indicators, expectations and protocols for measuring public appreciation and understanding of Canadians and stakeholders within 2007 (Ibid, 2006). An appraisal of national park benefits and their attendant values could provide an additional indicator of audience appreciation for Parks Canada activities.

Eagles (2002) suggests that values and valuation influence how parks are managed and that there is not yet an adequate procedure for the participation of all peoples in the determination of resource value. For example, plans for business development in the five townsites located within national parks, major park facility construction such as visitor centers and plans for highway twinning and expansion through the national parks continue to be made with emphasis on visitor and local interests. No comparable efforts have been made to gauge whether the Canadian citizenry favour this type and level of development in their national parks. This is an important point to consider because national parks are owned by all Canadians. Hence, development plans should reflect their broader public interest - not just local or visitor concerns.

The need to better understand these values and the expectations of Canadians on how to manage their national parks is acknowledged by Parks Canada. It is reflected in the wording of Recommendation 11 to the 2005 Minister's Round Table on Parks Canada which urges the Agency to invest in visitor-related and socioeconomic research to better understand the needs, expectations and behaviours of current and potential park visitors (Parks Canada Agency, 2005d).

Planning systems must be increasingly developed to be more inclusive of the people affected by or interested in parks (Eagles and McCool, 2004). This will require a broader, more critical and systematic consultation and evaluation of society's preferences for parks. Although some polls have revealed Canadians are generally supportive of their national parks, few formal studies have been undertaken to quantify the value of the benefits or whether these benefits reflect what Canadians want from their national parks (Angus Reid, 2000; Federal-Provincial Task Force, 1999; Rollins *et al.* 1998).

1.1.d) Possible Reason for Current Status of the Canadian National Park System

Why this apparent contradiction? If national parks are cherished and valued by Canadians, why is this concern not equally reflected in the land area, management outcomes and resources dedicated to parks? One reason may be because the full spectrum and economic value of the benefits that Canadians receive from their national parks is not sufficiently understood, quantified and incorporated into Parks Canada-related decisions.

Generally speaking, many of the environmental and management issues related to national parks are fundamentally economic issues. People cause problems for parks because of their choices, and people distinguish small problems from large ones based on their values. It follows that finding solutions to the problems facing national parks requires an understanding of those values and choices. The study of economics promotes this understanding by examining people's individual incentives and choices, as well as the collective opportunities and constraints faced by society as a whole (Jaeger, 2005). Thus, economics can be used to provide evidence for how important national parks are to Canadians compared to other government services or alternative uses of park landscapes.

1.2 THE ECONOMIC PROBLEM

If the Earth's resources were available in unlimited quantities, and if they could be extracted and processed at no cost, there would be no economic problems. Everyone could have everything they wanted without compromising each other's wants and needs. It would not be necessary to choose. Choice becomes a necessity when resources are finite in terms of their absolute quantity, or in terms of their extraction or user costs (Pearce, 1993). Given that resources are scarce in relation to the human demands placed upon them, choices or tradeoffs have to be made.

For example, anticipated increases in human population and the needs of economic development will likely continue to exert pressures on Canada's remaining wilderness areas for timber, minerals, hydroelectric development and other industrial products. Also, the demand for wilderness areas to provide recreation and other amenity services will likely continue to increase. Balancing these competing demands will require thoughtful and rigorous evaluation of the alternatives and, inevitably, tradeoffs will have to be made between resource extraction and wilderness conservation. To achieve the desirable allocation of the wilderness resource among these competing demands, it is important to know the extent and implications of the tradeoffs. This cannot be known without some idea of the economic values involved in these decisions.

From an economic perspective, there are general rules to place priorities on different economic tradeoffs. For example, Cost-Benefit Analysis (CBA) favours investment in those projects that provide the greatest net present-valued economic benefits for a given amount of investment capital (Sassone and Schaffer, 1978; Dasgupta, 1972). Some economists, have questioned the legitimacy of CBA for environmental decision-making purposes (Jacobs, 1991; Daly and Cobb, 1989). These authors argue that CBA does not adequately consider the interests of all persons affected by a project, including future generations (Pearce and Turner, 1990). Also, depending on the discount rate chosen for the CBA, the social costs of conservation projects often appear high in the short term and the long term benefits are often uncertain and difficult to measure (Jacobs, 1991; Daly and Cobb, 1989).

As an alternative to CBA, Safe Minimum Standards (SMS) may be used. The SMS concept recognizes that regardless of the conceptual framework of CBA, when it is applied, it is often incomplete (Randall, 1987). Safe Minimum Standards constrain human activity above a 'critical zone' so that environmental impacts remain economically reversible (Ciriacy-Wantrup, 1968). The costs of maintaining the critical zone of environmental goods and services are akin to environmental insurance premiums. Determining the point at which the cost of these premiums is 'unacceptably large' lies outside the realm of economics. Rather, this is the responsibility of the political institutions which are charged with making intergenerational equity decisions (Bishop, 1978). While CBA can appropriately identify the efficiency consequences (gainers and losers), its recommendations need to be constrained by the SMS of conservation (van Kooten, 1993; Jacobs, 1991). In both cases, the economists' role is to assist policy officials by estimating the measurable benefits and costs of conservation.

In the case of private goods, individuals reveal their preferences in the market. In the marketplace, the individual has fairly clear information on which to base any choice. The products tend to be visible, many of their characteristics are well-known, and they have market prices. The individual's choice is based on an evaluation of the price, quantity and quality of the good (or service) and is possibly subject to some uncertainty arising from incomplete information. No similar mechanism exists for most recreational and environmental services provided by public resources such as national parks.

1.3 THE ISSUE AS IT APPLIES TO NATIONAL PARKS

Economics is an important component of social decision-making that is typically given low priority in the parks' world (UNEP,2003; Van Sickle and Eagles, 1988; Wells, 1997). As Olson notes: "conservationists may hurt their cause by not emphasizing the economic virtues of parks along with their spiritual, natural and recreational values" (2003, p.34). Furthermore, it may be politically dangerous for any park agency to fail to report use levels and economic impacts on a consistent and continuous basis because those sectors with weak or incomplete information risk being undervalued when policy, planning and management decisions are made (Eagles *et al.* 2000). Therefore, sound appraisal is at the heart of good policy making, and robust valuation of impacts in money terms helps decision makers to take proper account of them (Bateman *et al.* 2002).

On an international scale, a more "full-cost" appraisal of the Canadian national park system is consistent with the United Nations Protected Area goal of :

> "integrating the use of economic valuation and natural resource accounting tools into national planning processes in order to identify the hidden and non-hidden economic benefits provided by protected areas and who appropriates these benefits" (UNEP, 2003, p.80).

At the national level, a more full-cost appraisal of the value to Canadians of national park landscapes – whether or not they ever visit these parks - would provide a useful benchmark to assess the level of resources that can be justifiably invested (or sacrificed) to achieve the optimum allocation of park resources between mandated preservation and human use objectives. In effect, this derived social value can be used as a political lever to demonstrate that this is where citizens want their tax dollars spent and to indicate the need for funds to acquire, extend and manage these natural resources in the same way that grants and subsidies to the arts and business are justified (Eagles *et al.* 2000). Furthermore, a more full-cost approach would provide an empirical basis for estimating appropriate levels of use that are consistent with Parks Canada's mandate to first protect and restore ecological integrity. It could also greatly facilitate Parks Canada outreach and communication strategies (such as the Engaging Canadians Strategy) by clarifying the knowledge, importance and underlying values held by Canadians for their national parks (Parks Canada, 2001).

Whether explicitly or implicitly, both politicians and Parks Canada senior managers make tradeoffs that reflect particular economic values about national park resources and services. Recent budget constraints and public interest in park-related issues have increased the need to justify existing management strategies and their inherent tradeoffs. Indeed, all branches of the federal government are under increasing pressure to deliver services and programs with reduced budgets.

The challenge for Treasury Board is to determine how much federal funding should be appropriated to national parks. Similarly, the challenge for Parks Canada is to determine how much of their resources should be allocated to the various parks and programs. At the park level, management must determine what share of the park budget will be invested in visitor infrastructure versus maintaining and restoring ecological integrity. Furthermore, park officials need to determine what combination of visitor use and user fees will maximize park revenue without compromising park amenities and visitor experience. This is especially important for Parks Canada because in those instances where a visitor is not satisfied with services received, a full money-back guarantee is the Parks Canada policy (Parks Canada Agency, 2006).

To achieve the desirable allocation of financial and other resources among these competing demands, it is important to know the extent and implications of the trade-offs involved. Park planners cannot know this unless they have some idea of the economic value of these trade-offs. To date, Parks Canada has not asked about supportive behaviors and their value directly in previous public opinion polls (Parks Canada Agency, 2005c). While the costs of park establishment, management and expenditures by park visitors are routinely calculated, the broader societal benefits of national parks - especially to non-visitors (which includes most Canadians) - are typically not assessed. This oversight is due, in part, because many of the societal benefits of parks are hard to measure, since they do not have observable market prices reflecting their values to society.

These 'non-market' benefits are of two basic types: use and non-use. Use benefits are those which require actually visiting the park to experience the benefit (e.g. recreation). Non-use benefits, on the other hand, can be enjoyed by all individuals, regardless of whether they ever visit a park (e.g. satisfaction of knowing that parks exist and protect wildlife habitat). Since most non-use benefits of the parks are linked to the protection of the park environment, there is an inevitable trade-off between use and non-use benefits (Myles, 2000).

Zerbe (2001, 1998) argues that individuals care about environmental wealth in general, and that once they are informed about the damage to an environmental resource, they may suffer a real and legitimate loss in non-use value. He provides an interesting example of a wealthy person who owns many firms which are run by managers. The wealthy owner entrusts the management of his/her firms to professional managers and assumes the firms will be well managed. Though the wealthy individual often does not have knowledge of the specific firms, he/she would experience a legitimate welfare loss if they discovered one of their enterprises was damaged or mismanaged.

In keeping with this analogy, Parks Canada officials are acting as the professional managers for the Canadian public who are the owners of, among other assets - the national parks. Like the wealthy business person, Canadians may not have specific knowledge of the status of the national parks, but they would suffer a legitimate loss if they were informed that their national park assets were damaged or mismanaged. For example, if the non-use values of a national park are adversely affected by a park management decision, many Canadians would feel the impact in a tangible way. The inadequate estimation and inclusion of the non-use benefits flowing from the parks may lead to overuse of the parks and damage to the national park asset. If the loss of a non-use benefit equates to a cost, then one can easily see that the benefits enjoyed by each park user will be offset, to some degree, by the costs borne by non-users due to park deterioration from park users. It is therefore conceivable that, in some cases, the lost non-use values to all Canadians may be greater than the gains to park users. In that case, like the wealthy business person, Canadians would suffer a legitimate welfare loss from the damage and foregone opportunities arising from the misappropriation of national park resources.

According to economic theory, the optimal level of national park use will occur when the marginal value of the benefits of park use are exactly equal to the value of the foregone non-use benefits. Thus, Parks Canada should attempt to provide the public with the highest possible net benefits - not simply to recover costs and certainly not to permit national park assets to deteriorate and depreciate.

In spite of recognizing non-use benefits as part of the Total Benefits of Protected Areas Framework advocated by the Federal Provincial Parks Council, very few studies have been done to estimate them for Canadian parks (Rollins *et al.* 1998; Shantz *et al.* 2004). Furthermore, although attempts to quantify the combined use and non-use benefits for national parks have recently been done in other jurisdictions such as Australia (Herath and Kennedy, 2004); The Seychelles (Mathieu *et al.* 2003); Indonesia (van Beukring *et al.* 2003); Korea (Lee and Han, 2002); Portugal (Nunes, 2002), no similar studies have yet been done with respect to the Canadian national park system. Without this baseline information, it is difficult to determine the combination of government funding and park use that maximizes the net benefits flowing to Canadians without compromising the wilderness protection mandate of the national parks.

1.4 THE RESEARCH PROBLEM

There are many ways to demonstrate how important national parks are to society. Economic theory suggests that one approach to measuring the relative importance of goods and services to people is to look at what they are willing to pay for them. Information on the values to different park user groups, and on the driving forces behind these values, is important for enabling better management, ameliorating threats, and resolving conflicts (UNEP,2003). While the use of dollar values as a measure for comparison has attracted much interest in many fields, including health care, market research, the insurance industry and natural resources management, it has not been applied to Canada's national park system.

1.5 PURPOSE

The purpose of this study is to examine the value and importance to Canadians of the benefits associated with Canada's national parks. Specifically this thesis explores the value of the combined use and non-use benefits that Canadians receive from their national park system beyond their current expenditures. The specific research questions are:

1. *Do Canadians value the goods and services provided by Canada's national parks beyond their current visitor, tax and other current expenditures for national parks?*
2. *What types of economic values and other factors influence willingness to pay values?*
3. *How do Canadians who agree to pay an unspecified amount compare to those who agree to pay a specified dollar amount?*

1.6 OBJECTIVES:

1) To explore the social, economic and environmental values and interests that Canadian park visitors and non-visitors have for their national parks.
2) To provide an alternative decision-making approach that estimates and analyzes the monetary values that Canadians place on the benefits generated by parks, rather than try to compare the recreational and ecological benefits directly.
3) To examine the influence of various socio-economic, attitudinal, park knowledge and demographic variables on willingness-to-pay values.
4) To contribute to the development, testing and validation of non-market valuation methods.

1.7 METHODS CORRESPONDING TO STATED OBJECTIVES

1) Develop and administer a nation-wide survey to estimate the magnitude of the net economic benefits accruing to Canadians from their national parks.

2) Estimate the maximum additional cost that Canadians would be willing to bear to ensure the current flow of benefits that they receive from the national parks.
3) Develop and compare regression models that isolate the influence of demographic and variables, such as park usage, public support for parks, and knowledge about Canadian national parks on willingness-to-pay values.
4) Use regression analysis to examine how survey respondents who agree to pay an unspecified amount compare to those who agree to pay a specific dollar amount.

1.8 THESIS ORGANIZATION

Chapter 2 of this thesis begins with a discussion of the economic interpretation of the concept of value. The remainder of the chapter focuses on a description of the methodological considerations of the contingent valuation method (CVM). To date, it is the only economic method for collecting non-use values - hence it was used for this study.

Chapter 3 provides examples of CVM studies that have been done specifically on national parks. It provides a useful context for this thesis and justification for the research design.

Chapter 4 explains the research methodology including the survey design and implementation. It also describes the conceptual framework and models used to answer the research questions.

Chapter 5 presents and interprets the results of the preliminary and final regression models and discusses the implications of these findings. In order to clarify the interpretation of the estimated regression parameters, the final section of Chapter 5 applies a marginal analysis to those regression variables deemed most statistically significant in the final regression models.

Lastly, Chapter 6 summarizes the salient research findings and limitations of this study. It also examines the implications of this research to policymakers, park mangers and academic researchers. The chapter concludes with a discussion of recommendations for each of these groups and directions for future research endeavours.

Chapter 2. LITERATURE REVIEW

2.0 INTRODUCTION

This chapter introduces the accepted theoretical underpinnings of the Contingent Valuation Method (CVM). It introduces the economic conceptualization of the values enshrined within national parks and explains how the CVM can be used to measure them. The discussion characterizes national parks as a public good and summarizes the valuation and management challenges arising from this characterization. A demand curve for national parks is derived to illustrate the nature of the problem of valuation of a public good. The discussion then turns to welfare measures and their estimates (as measured by the CVM) in order to justify the use of compensating variation. The CVM is rationalized as an appropriate approach to better estimate the total economic value Canadians have for their national parks. The remainder of the chapter reviews the evolution, elicitation formats, application and limitations of the CVM. Similarities of the general CVM design and the current study are made throughout the chapter.

2.1 VALUES AND VALUATION OF NATIONAL PARKS

Valuation is an essential element in making any decision in any kind of social setting, so that intelligent decisions can be made under any kind of a moral or legal theory. Individuals are constantly faced with choices in their individual and their collective lives. They could make these decisions at random, or they could try to achieve some particular goal or end. Most people choose the latter. The common way to express their behavior ambition is to assume people compute some expected value for their choices (Epstein, 2003).

2.1 a) Societal Values

Parks generate a wide range of 'values', 'beneficial outcomes' or 'benefits' that flow to society including: recreational and educational opportunities, tourism jobs, carbon sequestration, wildlife protection and preservation of unique ecosystems (Suh and Harrison, 2005; Morton, 2000). Many of the societal benefits of parks are difficult to measure since they do not have observable market prices reflecting their values to society. Whiting (1999) presents a simplified classification of these benefits as either:

monetary/non-monetary	direct/indirect
consumptive/non-consumptive	quantified/unquantified
financial/non-financial	use value/non-use value

Dearden (1995) suggests that parks are not an end in and of themselves, but rather a means toward an end. That end is to retain certain values in the landscape that might otherwise be lost due to the dominance of market resource allocation. Some of these values are shown in Table 2.1 as different buildings in a city and illustrates that parks are not 'single use' areas any more than all the building functions could be united into one structure.

Table 2.1. Protected Area Values and Suggested Allegories

Value	Allegory
Aesthetic	Art gallery
Wildlife viewing	Aquarium
Historical	Museum
Spiritual	Church, temple or mosque
Recreation	Gymnasium
Tourism	Factory
Education	School
Science	Laboratory
Ecological capital	Bank
Ecological services	Hospital
Ambience/setting	Theatre

2.1 b) Economic Value

'Utilitarianism' is a pivotal construct in neoclassical economics and implies that goods and services have value because they satisfy human wants and needs. In the utilitarian theory of value, an individual's welfare is completely determined by the consumption of goods and services (Prato and Fagre, 2005). The philosophical basis for utilitarianism is 'anthropocentrism', which maintains that humans are the dominant species and defines ethical behaviour in terms of human wants and needs (Watson, 1983). It is worth noting that a positive concern for human well-being does not automatically preclude a concern for the well-being of the rest of the natural world (Suh and Harrison, 2005). Indeed, it may even serve to promote it since the value of goods and services is largely 'a judgment call' of a person or people wanting those goods and services. There is no intrinsic value of goods and services. Rather, things become valuable solely by individuals' desiring to have them. This implies that 'worth' is in the mind of the user. For this reason, a good can have great value to one economizing individual, little value to another, and no value at all to a third, depending upon the differences in their requirements and available amounts (Menger, 1871).

According to neoclassical economic theory, 'value' is a subjective concept and can be defined as the maximum amount an individual is willing to exchange [3] for a good from the set of resources that the individual controls. Alternatively, value is the minimum an individual would accept in exchange for a good that he or she possesses (Pearce, 1993; Adamowicz, 1991). The tradeoffs that people make as they choose less of one good and substitute more of some other good reveal something about the values people place on these goods. If one of the goods has a monetary value, the revealed values can be expressed in monetary terms. The money 'price' of a market good is a special case of a trade-off ratio. The money given up to purchase one unit of a good is a proxy for the quantities of one or more other goods that had to be reduced in order to make the purchase (Freeman, 1993).

Economic value is measured by how much better off individuals are made by the provision and use of goods and services. Any good or service that gives satisfaction, or is useful to an individual, produces economic value. There is nothing in economic theory that limits the object of choice to physical private goods (Kontoleon *et al.* 2002). Economic value can exist even though a financial transaction or flow does not take place. The largest and most obvious examples of an economic value that do not typically give rise to a financial payment are the services performed by homemakers. Child care,

[3] Although the exchange is usually measured in monetary units for comparison purposes, putting a dollar value on, say, improved wildlife or protecting a scenic lake is not a prelude to privatizing and selling it to the highest bidder.

cleaning and cooking by homemakers are very valuable economic services that do not give rise to financial transactions.

The anthropocentric view that people are the ultimate source of value, and the notion that park benefits can be 'valued' by the revealed preferences of individuals within society renders economic quantification compelling (Brown, 1984; Loomis, 1993). Thus, to facilitate decisions concerning park-related tradeoffs, park policy makers could estimate the economic values associated with national parks.

The economic valuation of the benefits of parks is but one way of measuring the benefits that society derives from parks. The benefits of parks to society may be assessed using a variety of metrics including satisfaction ratings, importance rankings for ecological services provided, community employment levels, wildlife population changes, level of understanding and knowledge of environmental issues, personal health improvements, number of visitors, mood changes - just to name a few.

2.1 b) i) Economic Values and Pricing the Priceless

It is often alleged that the reason markets cannot be used to allocate resources to national parks is because the benefits derived from parks are 'intangible', 'priceless' or 'unquantifiable'. This view is misconceived. Economists assume that the ultimate aim of economic activity is to satisfy the preferences of consumers. Indeed, this is what is meant by the doctrine of 'consumer sovereignty'. For many questions, in particular for the determination of prices, the processes that shaped people's preferences are irrelevant. All that matters is that people can make rational choices between different possible collections of goods and services.

The benefits of any decision by consumers are always intangible since they are just the satisfaction of a consumer preference. Thus, the benefits that an individual derives from eating a meal at a restaurant, listening to a CD, reading a book or wearing a pair of shoes are no more tangible than the benefits he/she derives from visiting a national park, or knowing that a particular species has been saved from the threat of extinction. Yet the former goods can be traded in markets and command prices, while the latter benefits usually do not. Clearly, therefore, whether or not goods are traded in markets has nothing to do with whether or not their benefits are intangible. As a corollary to this statement, if we accept that for marketed goods and services we can use prices as some measure of the relative value people attach to those goods, then it follows that there is no reason, in principle, why we cannot apply the same kind of valuation to non-marketed goods. That is, although there are no actual prices to reflect what people are willing to pay for non-marketed goods, there is no reason why we cannot ask them what they would be willing to pay under some hypothetical equivalent of market trading. Indeed, that is what this research has attempted to do.

2.1 c) Potential Contribution of Economic Valuation to National Park Management

Values and the determination of values influence how national parks are managed (Eagles, 2002). In order for park officials to make rational choices between alternative uses of a given park environment, it is important to know both what ecosystem services are provided by that environment and what those services are worth. The first item lies in the realm of fact; the second is in the realm of value. Park managers cannot escape the value issue. Whenever they choose among alternative uses of a park, they indicate (at least implicitly) which alternative is deemed to have more value.

To some people, the association of economics with national parks seems strange, for they believe that economics is necessarily opposed to national parks. However, establishing a national park is just one of several possible uses of a particular set of resources, and using monetary values to determine the best uses of resources is a central concern of economics. In this respect, decisions on national parks fall within the scope of economics.

The key contribution that economics can make to national park management is that it offers a systematic, more inclusive and comparative approach to guiding decisions by referring to the relative importance that all Canadians place on different types of values using a common metric (dollars), rather than trying to directly compare the incommensurable values of park preservation and recreation. Just as dollar estimates can be used to compare the relative value of different types of buildings to a community, economics uses dollar estimates to gauge the relative importance of park benefits to Canadians. In so doing, economics can also help ensure that the limited public income dedicated to parks is spent to the best advantage.

The process of economic valuation can provide park managers with information about the park's goods and services; the values that people (park visitors and non-visitors) place on those goods and services; which values are being captured by park decisions and which values are not; and which groups benefit most from the current allocation of park resources (IUCN, 1998). This information is likely to expose those who are not contributing to the parks but who derive benefits from them (and are therefore potential sources of funding), as well as those who are excluded from deriving benefits from the parks but are asked to pay for them through taxes, property loss and foregone opportunities. In this way, valuation may provide useful information for management and financial decisions regarding national parks.

2.2 THE TOTAL ECONOMIC VALUE OF NATIONAL PARKS

The fact that wilderness benefits of national parks are not priced does not mean that they lack value, only that market indicators of the value do not yet exist. Therefore, an economic valuation must account for these unpriced benefits, as well as those more readily observed that are measured in market prices (Loomis and Walsh, 1992).

The difference between economic valuation and financial analysis should be made clear at this point. In the case of a national park, economic valuation, based on economic value, measures non-market and market values that people hold for the park. Financial analysis is a subset of economic valuation and measures only the flow of money through a park (IUCN, 1998). Values which fall outside of these financial transactions - such as many non-use and indirect use values, would not be included in a financial analysis.

A financial analysis only examines costs and benefits as measured by market prices; it is the viewpoint of private industry and is more concerned with profits or losses (Morton, 2000). Conversely, an economic valuation is conducted from the viewpoint of society, which should also be the viewpoint of park managers (Ibid, 2000).

An economic valuation approach for estimating the benefits flowing from protected areas, such as national parks, can be done by determining its Total Economic Value **(TEV)** (Morton, 2000; Stanley, 1997; Howard, 1995; Norton-Griffiths, 1994; Pearce, 1993; Randall and Stoll, 1983). The foundations of TEV are based in welfare economics and focus on the changes in the economic welfare of humans (Nunes, *et al.* 2001). The TEV concept provides a perspective on the various kinds of benefits that arise from wilderness conservation. The adoption of such a standardized approach can reduce the incidence of benefits remaining unvalued and unappreciated. Measuring the benefits in a more standardized way also enables comparisons and aggregations to be made of different studies around the world (IUCN, 1998). The TEV approach is appropriate when comparing wilderness benefits to its opportunity costs (Stanley, 1997; Loomis and Walsh, 1992). It is consistent with the Total Benefits of Protected Areas Framework (FPPC) advocated by the Federal Provincial Parks Council (The Outspan Group, 2000).

Pearce and Moran (1994) suggest that the **TEV** of an environmental resource consists of its use value **(UV)** and non-use value **(NUV)** (See Figure 2.1). Use values arise from actual use of the resource and can be further subdivided into direct use values **(DUV)** and indirect use values **(IUV)**. The non-use values are usually divided into a bequest value **(BV)**, option value **(OV)** and existence value **(XV)**. This leads to the following equation:

TEV = UV + NUV = (DUV + IUV) + (OV + XV + BV)

A detailed explanation of these value categories is presented in Section 2.2 a).

While the TEV is a useful and holistic approach for identifying the array of values from environmental goods such as national parks, the would-be practitioner or reader should be mindful of the following: (i) TEV is anthropocentric in that the values are human-held. It does not account for the possibility that nature in general, and species in particular, have values unrelated to humans; (ii) any attempt to calculate the TEV is likely to have problems with missing and/or conflicting values; and (iii) undertaking a full TEV is often unnecessary. In most cases, only a portion of the TEV values need to be estimated to sufficiently inform a management decision.

2.2 a) Types of Economic Park Values

2.2 a) i) Use Values

'Use' values can be subdivided into either 'direct' or 'indirect' values. Ecosystem services correspond to the 'indirect use' values provided by parks. These include the value of parks for watershed protection, air pollution reduction, nutrient recycling, climate moderation, provision of wildlife habitat and maintenance of biodiversity. Indirect use values are often widely dispersed and thus go unmeasured by markets (Rashev, 2003). However, as Eagles and McCool (2004) suggest, it may very well be that the most fundamental economic value protected areas have in the 21st century is their value for the genetic and biological diversity they contain.

Direct use values are experienced through some form of direct physical contact with park resources. Examples of direct use values include the value of educational and health benefits from visiting parks and the value of the recreation experiences, natural resource harvesting, hunting, gene pool services, and jobs and business opportunities from park tourism. These activities can be commercial in that they are traded on a market (resource harvesting, professionally-guided wilderness trips, bus charter tourism, hotel accommodation), or non-commercial in that there is no formal or regular market on which they are traded (fuel wood collection, fishing, backcountry camping). Direct use values are typically considered to originate from 'private goods' that are 'rivalrous and excludable' (Prato and Fagre, 2005). For instance, the limited size of parks results in congestion, and hence, 'rivalry' among recreational users. Recreation is also considered 'excludable', in that park managers can control access to a park.

Direct use values of parks can be further subdivided into consumptive and non-consumptive use values. Consumptive use values are obtained through consumption of the park resource, meaning their enjoyment normally results in some quantitative or qualitative loss of the resource (Holtermann, 1972). Examples of consumptive use values from parks are the value of the benefits of parks for fishing, water extraction, hunting and firewood collection. Non-consumptive use values are the value of the benefits of parks that do not affect the park resource. These include activities such as bird watching, canoeing and appreciating a scenic view. It is worth noting that non-consumptive use values may become consumptive after some threshold level of participation is exceeded. For example, too many park canoeists may damage shoreline vegetation, pollute lakes, disturb and displace wildlife or diminish the value of the canoeing experience to other park visitors through their backcountry canoeing activities.

Recreational use values are one category of direct use benefits that accrue to park visitors (Rollins *et al.* 1997). While only part of the Total Economic Value of parks, recreational benefits are large, potentially measurable and of direct relevance to park planning. For example, a recent economic study of non-winter recreational use in eight Ontario parks estimated that the combined personal and commercial benefits accruing from these sites to be about $36 million Canadian dollars (Shantz et al, 2004).

2.2 a) ii) Non-Use Values

By contrast, non-use values, also referred to as 'preservation' or 'passive-use' values, are the value of the benefits that accrue to both park visitors and individuals who may never see the parks in person (Arrow *et al.* 1993) Non-use values are almost always 'non-consumptive' in nature, meaning that many individuals can simultaneously enjoy benefits from the resource without it being degraded (Freeman, 1993). Non-use values are typically 'public' in nature and are considered non-rivalrous and non-excludable. For example, the value of the satisfaction or sense of security that one person derives from the fact that the park is preserving biodiversity does not detract from the satisfaction that another person derives from the preservation of biodiversity. Similarly, a park cannot be made to preserve biodiversity for one group and not for another.

There are at least three types of non-use values that society receives from parks. These include option, existence and bequest values. In terms of national parks, 'option' values correspond to what individuals are willing to give up today to preserve the option of being able to visit or use a park at sometime in the future (Krutilla, 1967; Weisbrod, 1964). For this reason, some authors categorize option values as future use values (Suh and Harrison, 2005; Bateman, *et al.* 2002; Pearce, 1993) rather than as non-use values (Prato and Fagre, 2005; Harmon and Putney, 2003; Morton, 2000; Stanley, 1997;

Munasinghe and McNeely, 1994; Sarkar and McKenny, 1992; Sutherland and Walsh, 1985). The future uses arising from option values may be either direct or indirect and may include the future value of information derived from the park. For example, future information of untested genes from plants and animals within parks may provide future inputs into pharmaceutical, agricultural or cosmetic products (IUCN, 1998).

From a park visitor perspective, option values are akin to an insurance premium because they relieve the uncertainty of future park management actions, thereby ensuring that the opportunity for expected types of park visitor experiences will still be available at a future date. For example, a 20-year old Sudbury student may have no current desire to visit Banff National Park, but may wish to preserve the option to take his or her future children to visit Banff Park at some future date (Kahn, 1998; Goldstein, 1995).

'Existence' value corresponds to the value of the satisfaction or pleasure that individuals have for simply knowing that parks 'exist', regardless of whether or not the individual has used or plans to use them (Loomis, 1993; Krutilla, 1967). It is unrelated to either current or optional use of parks. For example, if the federal government decided to sell Point Pelee National Park to an amusement park construction firm to build a 'Disneyworld' type tourism complex, it is not hard to imagine that citizens across Ontario and Canada (perhaps even around the world) might rise up in protest. While there may be significant recreation value gains from the theme park development, the loss of the value of the benefits to society from the destruction of the natural features of this national park would be enormous - even to those who have never visited Point Pelee National Park and probably never will. Examples of existence values that would be lost by society from the hypothetical sale of Point Pelee National Park might include the value of the benefits arising from feelings of cultural pride; heritage appreciation and spiritual fulfillment; wonder and awe for nature; and feelings of moral considerateness for other life forms that share our planet.

The intuitive basis for existence values from parks is easy to understand, because a great many people reveal their willingness to pay for the existence of park assets through wildlife and other environmental charities, but without taking part in the direct use of parks. For example, an individual may have a positive willingness to pay to preserve whales, even though they may get so hopelessly seasick that he or she would never go on a whale-watching trip under any circumstances.

Empirical measures of existence value, obtained through questionnaire approaches (for example, the Contingent Valuation Method), suggest that existence benefits can be a substantial component of Total Economic Value (Silberman *et al.* 1992; Stevens *et al.* 1991; Walsh *et al.* 1984). This finding is even more pronounced where the asset is unique – such as many of the landscapes protected by parks (Kwak *et al.* 2003; Rollins, Gunning-Traunt and Lyke, 1998; Navrud and Mugatana, 1994; Pearce, 1993; Schulze, 1983).

Finally, 'bequest' value corresponds to the value of the benefits that people place on being able to pass an asset on to future generations. In the case of a national park, bequest value relates to the benefit of knowing that others benefit, or will benefit, from the existence of the park (IUCN, 1998). Some analysts regard bequest value as a part of existence value because of the difficulty of people to clearly differentiate and assign values between them.

Unlike recreation benefits, which accrue only to park users, the fact that non-use values from national parks are public in nature means that even small individual benefits must effectively be multiplied by the entire population of Canada. Thus, in order to estimate the contribution of option, bequest and existence values to the Total Economic Value for national parks, we must add up the worth of these values held by all Canadians - regardless of whether or not they ever visit a national park. It is quite possible that in some cases the non-use value from park preservation may outweigh the value generated by park use for tourism and recreation.

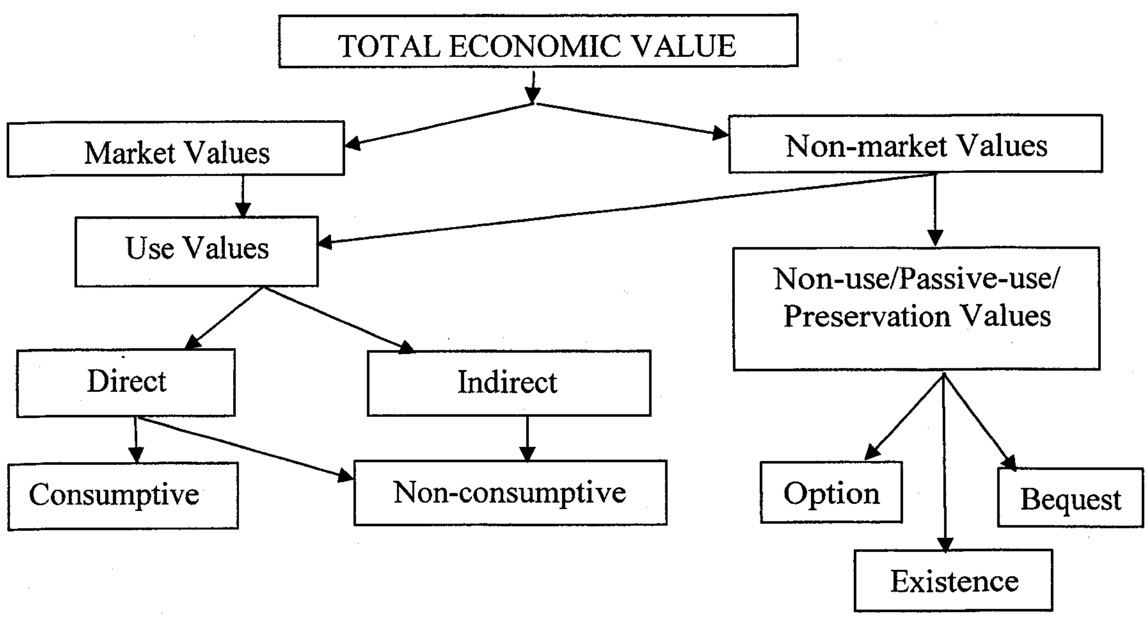
As indicated by Bishop and Welsh (1992) and Larzo *et al.* (1992) there are compelling reasons not to rule out or reduce the significance of non-use values in obscure, far away, and previously unknown areas. Such omissions might have serious resource misallocation effects. For example, wildlife and endangered species may become extinct if their values are not adequately included in the decision-making calculations.

In summary, the fact that non-use values exist is not in dispute, and they have been measured in numerous empirical studies over the last 40 years. (Tietenberg, 2000; Rollins and Lyke, 1998; Freeman, 1993; Smith, 1993; Silberman et al,. 1992; Stevens *et al.* 1991; McConnell, 1989; Walsh *et al.* 1984; Krutilla, 1967). Some researchers have found that the non-use benefits of wilderness are typically greater than the other benefits included in the total economic valuation framework (Walsh *et al.* 1996; Walsh and Loomis, 1989; Walsh *et al.* 1984).

Although in practice it is not necessary, or often possible, to disaggregate individual types of non-use values (Mitchell and Carson, 1989), differentiating between use and non-use values can be very important. This is because, as noted previously, the latter can be very large, relative to the former - especially when the good in question has few substitutes and is widely valued (Bateman *et al.* 2002; de Groot *et al.* 1999; Gunning-Traunt, 1996). As well, since non-use values remain controversial, it may be important to separate them out for presentation and strategic reasons.

Figure 2.1 provides a summary diagram of the previously mentioned values accruing to society from the national parks.

Figure 2.1. Total Economic Value of National Parks



(Sarkar and McKenny, 1992)

2.2 b) Methods for Estimating Total Economic Value

The challenge of properly using economic valuation is to derive credible estimates in contexts, such as national parks, in which there are either no apparent markets or only incomplete markets (Bateman, *et al.* 2002; Kopp and Smith, 1993). The incorporation of the unaccounted for "non-market" values into the decision-making criteria will inevitably affect the performance of economic decision-making criteria such as Cost-Benefit Analysis and Safe Minimum Standard criteria. More generally, valuing both market and non-market benefits of national parks will provide a more complete indicator of the importance of national parks to society and of the public support for national park management strategies.

Several methods are available to estimate both the use and non-use values of parks and other environmental resources. The ultimate goal of these methods is to reveal the monetary value of an environmental resource more completely, and in so doing, to facilitate decision-making. Hanley *et al.* (2001) places these valuation methods into the following groups: stated preference methods; revealed preference methods; and production-function approaches.

The stated preference methods are the only way to estimate non-use values. These methods include contingent valuation, discrete choice experiments and contingent ranking. They are all based on surveys in which the public is directly asked about its willingness to pay for (or willingness to accept) hypothetical changes in environmental quality, or about choices between different levels of environmental quality and the price of each level. The Contingent Valuation Method (CVM) is by far the most common of these approaches and the only method that measures non-use values. Its appeal lies in its potential to identify non-use values where there appears to be no obvious 'behavioral trail' (i.e. some behavioral change which affects the observable price or quantity of a good) to be followed (Arrow *et al.* 1993)

In revealed preference approaches, the analyst tries to infer the value that people place on environmental goods from their actual behavior, rather than their intentions. There are two principal methods in this group, hedonic pricing and the travel cost method. Since non-use values tend not to leave a behavioral trail, revealed preference techniques are unlikely to elicit non-use values. But since use of a greater service leaves a behavioral trail, both revealed and stated preference techniques can be used to elicit use values.

In production function approaches, the environment is typically valued as an input to the production of some market-valued good or service. Changes in the quality and quantity of an environmental resource are valued by estimating the implications of this for outputs and prices of market goods or services. More recent terminology discusses ecosystem function valuation models. Their basic approach is similar; the idea is to identify the different functions of an ecosystem and place monetary values on them.

2.3 GENERAL ECONOMIC CHARACTERISTICS OF NATIONAL PARKS

2.3 a) National Parks as Public Goods

In economics, the term 'public good' does not mean 'in the interests of the general public' or 'for the common good'. Rather, public goods are a classification of economic goods that exhibit non-rivalry in consumption and are non-excludable.

Non-rivalry implies that the benefits generated by the public good can be simultaneously consumed by more than one person and do not diminish as greater numbers of people receive them. For example, a scenic view in a national park is a 'non-rival' good as long as the enjoyment of current views is not diminished by the addition of new viewers. Scenic viewing becomes a 'rival' good when the number of viewers exceeds a threshold beyond which the satisfaction of current viewers is diminished as new viewers are added. Therefore, scenic viewing is a non-rival good as long as the level of use is below this threshold. Randall (1987) refers to this type of public good as a 'congestible public good'. Public highways, wilderness areas and city parks are other examples of congestible public goods. At high levels of use, the enjoyment or consumption of this type of public good by one individual is affected by the number of other users.

A second property of public goods is that of 'non-excludability'. This means that it is difficult, if not impossible, to exclude others from the benefits of the public good. For example, while it may be possible to ration scenic views in a national park through the use of entrance fees and gate staff, it may not be cost effective to do so because the benefits of reduced visitor congestion may be less than the cost of rationing - particularly in large parks that have numerous viewing sites and limited staff. Most of the world's protected areas charge low entry and user fees that cover only a portion of the cost of management (Van Sickle and Eagles, 1998; Well, 1997). Non-excludability is one of the reasons that admission fees to national parks are set low relative to the value of the experience (Prato and Fagre, 2005).

A 'pure' public good is one that has both the characteristics of non-rivalry and non-excludability, without qualification. National security, the ozone layer, the protection of biodiversity in parks, radio and TV signals, lighthouses and sunshine are very close to being pure public goods.

Since many of the benefits that originate within national parks, such as scenic vistas, migratory wildlife, clean air, potable water and protection of biodiversity accrue to individuals outside of park boundaries - and can be enjoyed simultaneously by many persons without diminishing the amount available for others - national parks can largely be considered to be public goods. More precisely, national parks can be classified as 'mixed goods' (Holterman, 1972) or 'quasi-public goods' (Mitchell and Carson, 1989; Kahn, 1998) because they have both private and public good characteristics. For example, recreational use of a national park is a private good characteristic, and subject to rivalry (through congestion) and excludability. Hence, there are clear markets and prices for many of the recreation opportunities provided by the parks. However, the non-use benefits of national parks, such as existence, option and bequest values and the ecological services provided by the parks, can be considered public goods because they possess the public good characteristics of non-rivalry and non-excludability.

2.3 b) Market Failure for Public Goods

Economists say that markets 'fail' when they do not achieve an efficient (or desired) allocation of resources. Markets failing to adjust to the increased scarcity of wilderness resources is an example of market failure. A market failure occurs when incentives created in the market system fail to adequately reflect the present and future economic interests of consumers or society as a whole (Randall, 1983). For example, as the head of the U.K. Government Economic Service and the former chief economist of the World Bank, Sir Nicholas Stern (2007) noted, "Climate change is the biggest market failure the world has ever seen".

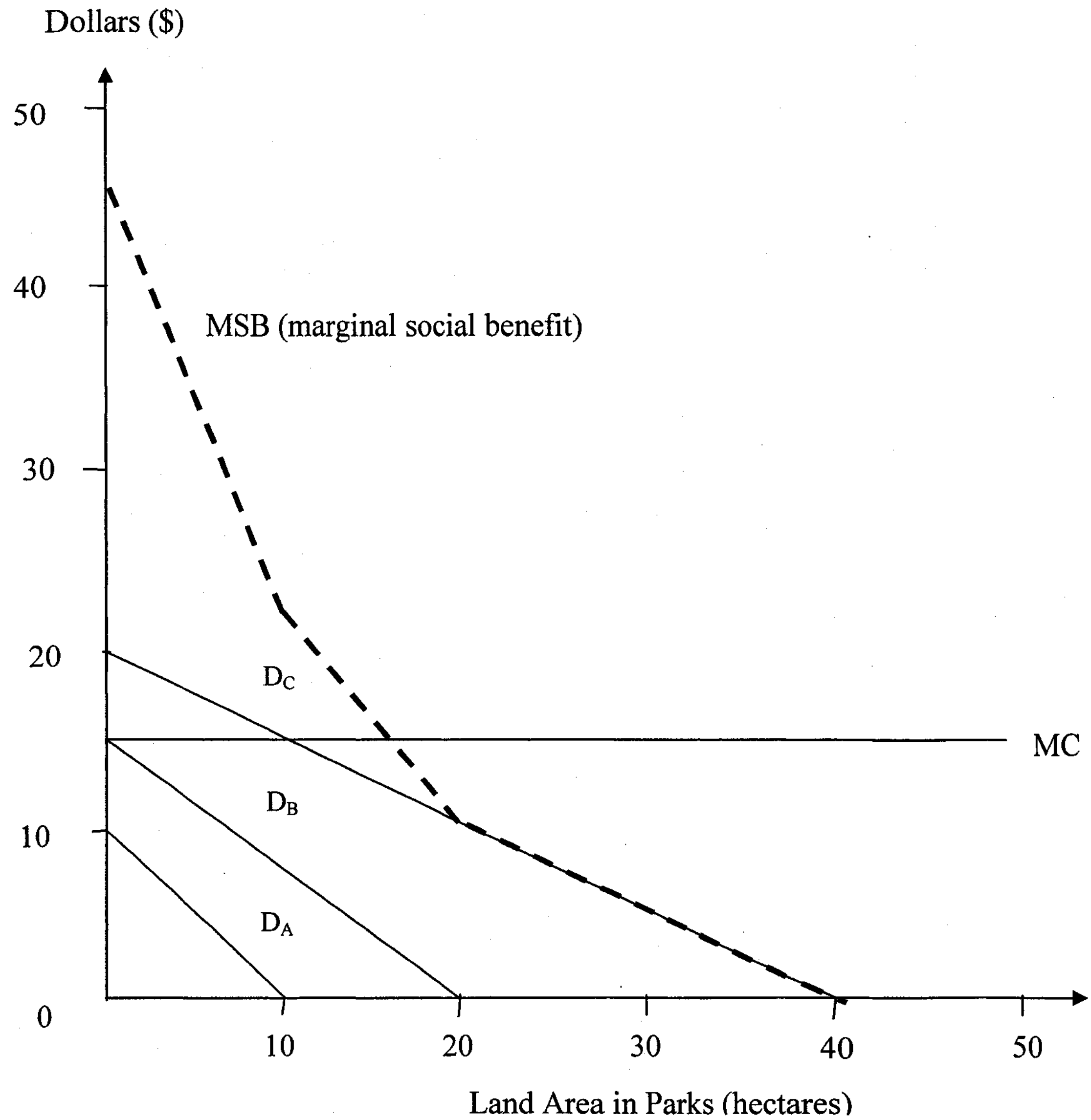
The challenges posed by the non-rival and non-excludable characteristics of public goods means that people can benefit from consuming a public good, even if they do not pay for them. Thus, public goods are prone to 'free riders' and market failure. Consequently, public goods are usually provided, if at all, by some type of government or alternative collective action (Jacobs, 1991; Dollan, 1971).

The reason for this market failure can be illustrated in Figure 2.2 where the individual demand for the public good 'biodiversity protection by national parks' for three people is represented by the three marginal benefit (**MB**) curves $\mathbf{D_A}$, $\mathbf{D_B}$ and $\mathbf{D_C}$. Since the benefits of biodiversity protection by a park are non-rival, all persons can simultaneously consume and benefit from the same biodiversity protection offered by a given area of park land. This implies that the aggregate demand, also called Marginal Social Benefit (**MSB**), curve is constructed by summing the individual demands vertically rather than horizontally, as in the case of a normal 'rival' good shown by the broken line (Field and Olewiler, 1994). If biodiversity protection by parks were a rival good, like pizzas, beer, or houses, the quantity demanded at each price would be summed horizontally.

Individuals would be willing to pay for biodiversity protection only when the benefits exceed the costs. According to Figure 2.2, if the marginal cost (**MC**) of biodiversity protection through protecting land in parks is $15 per hectare, only individual C would pay for some land to be preserved as a park (about 11 hectares). Individuals A and C would be able to enjoy the benefits of the biodiversity protection paid for by individual C, but they would not be willing to pay for it themselves. As a result of this 'free riding' by individuals A and B, there would be only 11 hectares of parks created for biodiversity protection, even though the efficient level (where **MSB = MC**) would be 17 hectares of park area. Free-riding can lead to what is called the tragedy of the commons - the overuse of common property resources due to individual incentives to capture the benefits as quickly as possible before someone else gets them (Johansson, 1991; Daly and Cobb, 1989; Boadway and Bruce, 1984).

What if there were thousands of individuals with **MB** curves similar to the ones in Figure 2.2, but if the marginal cost of biodiversity protection was above $20? It is clear that the market could easily fail to provide any units of this public good, even though its collective value to society is very high. Most individuals are willing to pay for biodiversity protection, national security and roads, but few would be willing to pay for an entire park, an army or a highway. This is a fundamental source of market failure - the

Figure 2.2. The Social Value of a Public Good: Biodiversity Protection by Parks



(adapted from Jaeger, 2005)

failure to supply public goods at the efficient or 'socially optimal' level. Though the vertical summation of individual demand curves is theoretically possible, in reality, people do not know their demand curve for a public good. Furthermore, where no markets exist (such as entrance or recreational fees for a national park), there is no information with which to estimate a demand curve. The efficient pricing system requires charging a different price to each consumer. However, in the absence of excludability, consumers may not choose to reveal their strength of preference for this commodity. Hence, the producer(s) could not possibly know what prices to charge (Tietenberg, 2000).

Lack of information is another common cause of market failure for public goods - especially those related to wilderness resources. For example, while biodiversity is our 'green infrastructure', our living natural capital necessary to sustain our life-support systems, it is frequently undervalued by private markets because of inadequate information (Morton, 2000). Market prices depend on accurate information and knowledge, which is currently very limited for biological resources. Hence, without adequate information, prices are misleading or unrevealing about economic values. To make matters worse, whereas, say the timber industry, has a financial incentive to fund traditional timber research, no such incentive exists for wilderness research. Since the benefits of wilderness research will never be fully captured in timber market prices, the research, will rarely, if ever, be funded by private industry. In other words, a market failure not only exists for wilderness, but even for wilderness research.

2.3 c) Management Challenges Arising from Public Good Characteristics of National Parks

The public goods nature of national parks gives rise to three dominant management challenges; externalities, conflicting goals and multi-generational time frames. These are explained and examples provided in the following sub-sections.

2.3 c) i) Externalities

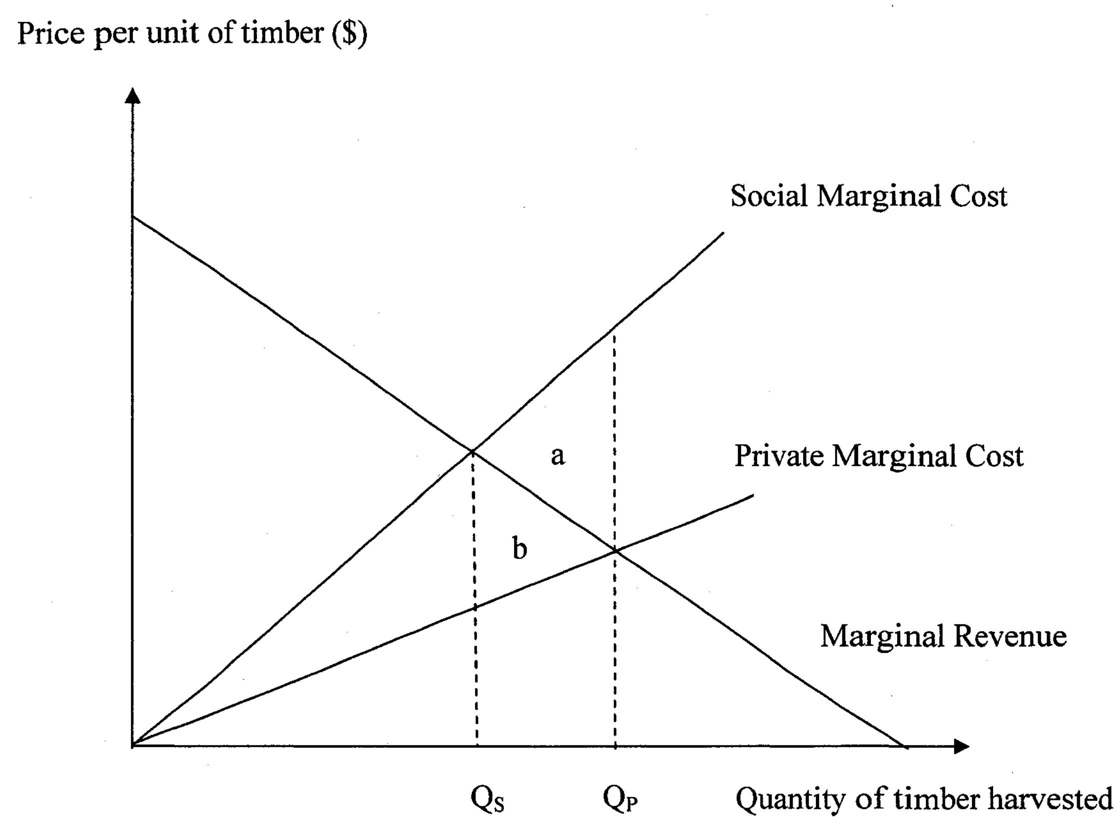
Since many of the ecological goods and services provided by national parks are not subject to the market forces of supply and demand, there are no readily observable prices for making management decisions. Hence, markets for park goods and services often fail due to price 'externalities'. An externality exists when the market price or the cost of production does not include the true social impact, cost or benefit (Rashev, 2003). Consequently, an externality exists when a person does not bear all the costs or receive all the benefits of his or her actions. Since many of the benefits of parks do not have clear prices or yield a return in a commercial sense, there is a danger, when there is competition for the use of land resources (for example, logging, mining, water supply, hydro generation or tourism development), that these alternative market-based activities will appear to be a better allocation of land because their benefits are easily calculated in dollar terms - and so they seem more profitable. The problem is that the benefits from national parks are often not realizable in conventional economic terms, and are often received by those who do not bear the costs because they are distant from the park in space (e.g., city residents) or time (e.g., future generations). Old growth forests, for example, help maintain climate regimes, provide clean water for downstream users and conserve biodiversity. However, unlike the value of logging the forest, the value of these non-timber, 'positive externalities' does not translate into income for local residents

(UNEP, 2003).

Typically, when there are positive externalities, private markets will not provide enough of the related good or activity. For example, because the spillover benefits of national parks, such as indirect use and non-use values, largely go to nonvisitors, there is no reason that private owners of parks would take these benefits into account in managing park visitation (Turner, 2002). The ability of market-based land uses to outbid non-market ones is often further distorted by tax incentives and subsidies that further inflate market values (UNEP, 2003; Eagles *et al.* 2003).

An example of a negative externality is shown in Figure 2.3. The example assumes that timber harvesting on private land adjacent to a national park imposes an external cost on the park in the form of losses in wildlife habitat. Because the timber harvesting company does not bear the cost of the losses in wildlife habitat, it is not likely to include this cost in its decision making. Hence, it will only consider its private marginal costs, and harvest $\mathbf{Q_P}$ amount of timber to maximize its profits. As a result, it will harvest too much timber, and an efficient allocation of the forest will not be attained. Because society considers both the costs of losses in wildlife habitat and the cost of timber harvesting, the social marginal cost function includes both of these costs. Therefore, the socially optimal amount of timber harvested occurs at $\mathbf{Q_S}$ where social marginal costs equal private marginal revenue. The privately optimal harvest exceeds the socially optimal harvest by $\mathbf{Q_P}$ - $\mathbf{Q_S}$, which from society's viewpoint, implies too much timber is being harvested. Compared to $\mathbf{Q_S}$, $\mathbf{Q_P}$ imposes an external cost on society given by area **a** + **b**.

Figure 2.3. Negative Externality and Optimal Timber Harvesting



2.3 c) ii) Conflicting Goals

A second problem relating to the public good characteristics of national parks is because many of the benefits that originate within national parks, such as watershed protection, scenic vistas, clean air, wildlife habitat, and protection of biodiversity, accrue to individuals outside of park boundaries, the goals of public enjoyment and resource conservation can easily conflict. This type of disagreement is almost unavoidable for national parks, because of their dual mandate of providing public enjoyment and conserving resources for future generations (IUCN, 1994). Increasingly, national parks are expected to serve as both a cornerstone Canadian tourism destination and unspoiled wilderness refuge. The dilemma of how to balance human use with park preservation can be traced back to the problematic wording of the National Parks Act mandate which states:

> The national parks of Canada are hereby dedicated to the people of Canada for their benefit, education and enjoyment, subject to this Act and the regulations, and the parks shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations (Section **4.** (1) Department of Justice, 2000).

Given that virtually any human use of parks will have an impact on park environments, the problem arising from the Act is: 'How to determine and optimize these opposing forces?' Although Parks Canada has unequivocally expounded that "protecting ecological integrity takes precedence" and that "this guiding principle is paramount" (Parks Canada, 1994, p.16.), at both the park and system level, this is still not a reality (Parks Canada 1998; Auditor General, 1996).

The current reliance of park managers on easily measured tourism (use) values, rather than more difficult to measure ecological (non-use) values, is still problematic. By relying primarily on tourism and recreational use values, the total economic value of parks can be severely underestimated during the planning process (Langer, 1992). As noted by van der Straaten (2000), national parks which are located near urban areas are visited, *ceteris paribus*, by more people than those located in remote areas. If focusing on tourism-related expenditures, one can calculate higher economic values for the popular parks and perhaps wrongly conclude that they are more valuable to society than those less visited parks.

The problem of balancing human use of national parks with the preservation of park environments will likely always be a central challenge for national park managers. However, as noted above, this problem is made even more complicated if the value of the non-use park benefits are largely omitted from park valuation and decision making efforts.

2.3 c) iii) Multigenerational Timeframes

The management of national parks is challenging because the timeframes for managing the public goods provided by protected areas is multigenerational (Prato and Fagre, 2005). Many of the benefits of national parks, especially the non-recreational benefits, either extend far into the future or have large uncertainties attached to them. Thus, the decision to preserve an area as a national park will convey benefits to all subsequent generations, unlike most capital assets which depreciate rapidly over time (Ulph, 1980). Protected areas will likely 'lose out' over other land use options if only short-term values are considered. However, as a range of values (both use and non-use) are considered over longer time frames, protected areas values will tend to increase as compared to other possible land use options (UNEP, 2003).

2.3 d) Government Provision of National Parks

Generally speaking, the market alone will not support an adequate system of protected areas such as national parks (IUCN, 1998). Hence society, through its various levels of government, provides national parks as a public service in the same manner that it provides health, education, defense and legal systems. Failure to provide these public services impoverishes the quality of life for individuals, and indeed, for entire nations.

As discussed, the public good characteristics of national parks provide an important economic rationale for government ownership of national parks. This allows governments to better internalize all the benefits and costs from these lands and supply the socially-optimal amount of land dedicated to parks than if these areas were allocated exclusively through private markets (Loomis, 1993; Pearse, 1990). However, funding national parks entirely from general tax revenues will likely mean asking some individuals to pay more for them than they would want, and they would surely vote against doing so. Therein lies the dilemma for provision of public goods such as national parks: let the public good be undersupplied, or pay for the efficient level of the public good in distortionary and potentially unfair ways. Both have drawbacks. Often some combination of user charges and partial public financing is the resultant compromise. However, the extent of government subsidization required for public goods is a perennial political debate. In the case of national parks, while visitor fees and business rents serve to offset Parks Canada reliance on tax revenues to fund the parks, there is still much debate on the appropriate level of these charges.

Of course, government financing and provision of public goods does not automatically guarantee that the socially desirable amount of national parks will be provided. If not all the benefits and costs are adequately accounted for, the socially desirable level of support in terms of resources dedicated to national parks will not be supplied (Turner, 2002.). This may be the case with Canada's national parks. Since current national park planning approaches are not obliged to estimate the full spectrum of benefits accruing to Canadians from their national parks, only the more commonly and easily quantified values are considered while others are overlooked.

The facts regarding the current status of Canada's national park system, combined with the public good challenges posed by national parks, clearly suggest that park planners and managers need to improve their understanding of the types, magnitude, distribution and value of the benefits derived from national parks to achieve the Parks Canada mandate and ensure sufficient resources are committed to the national park system. This understanding will not only require knowledge about how human use affects the ecological integrity of park landscapes, but also knowledge about the value that Canadians place on the benefits associated with both park use and park ecological integrity.

The relevant evidence regarding the value of the benefits from national parks is not easy to obtain (Turner, 2002). However, as noted previously, just because obvious market prices do not exist for many of these benefits does not mean that the benefits of national parks are not valuable, or cannot be approximated through 'non-market' valuation approaches (Herath, 2004; Klocek, 2004; Mathieu et. al., 2003; Nunes, 2002; Parks Victoria, 2003; Lee and Han, 2002; Gunning-Trant, 1996; Kahn, 1995).

2.3 e) Estimating the Demand Curve for Public Goods

As shown in Chapter 3, the Contingent Valuation Method (CVM) has proven a useful way to estimate the benefits from a public good, such as national parks, where market prices do not exist to estimate these benefits. An appealing aspect of the CVM is that it estimates the total economic value (TEV) of any environmental amenity in question (Pate and Loomis, 1997). The CVM measures the individual's maximum willingness to pay (WTP) for a sample of the population. The researcher then aggregates these values to the appropriate population level.

2.4 ECONOMIC MEASURES OF CONSUMER WELFARE

The purpose of this section is to introduce and explain the alternative economic welfare measures derived from asking 'willingness to pay' (WTP) questions. Most of this discussion draws upon the theoretical description by van Kooten, (1993).

2.4 a) Measures of Consumer Welfare Change

WTP has a formal relationship to the notion of a demand curve. Economics uses the notion of demand curves to identify three theoretical measures of consumer welfare. These are consumer surplus (CS), compensating variation (CV) and equivalent variation (EV). CS is related to the Marshallian demand curve while both CV and EV are derived from the Hicksian demand curve. The difference between these demand curves is that the Marshallian is income constrained while the Hicksian is income compensated and utility constrained. Each of these measures is described in more detail below.

2.4 a) i) Consumer Surplus

The concept of consumer surplus (CS) was first introduced by the French engineer Dupuit in 1883 to measure the benefits that accrue to consumers when they purchase goods and services (van Kooten, 1993). The concept is the difference between an individual's marginal willingness to pay and the market price of the good in question. As Johansson (1991) observed, one could say that CS expresses in observable monetary units an unobservable gain in utility; we transform the measurement problem from an unobservable dimension (utility) to an observable one (dollars).

The marginal willingness to pay curve for an individual (also called the Marshallian, market or ordinary demand curve), is derived from that person's utility function and budget constraint along with market prices. It depicts how the quantity demanded of a good changes as the price of that good changes, holding a person's income, budget and preferences constant. Hence, marginal WTP is given by points on the demand curve, and total WTP is given by the area under the demand curve up to the amount purchased. For most goods, as the price increases, the quantity demanded of that good decreases (Fogiel, 1989).

As shown in Figure 2.4, the CS can be represented graphically as the area between the price line and the demand curve (Johansson, 1991). Consumer surplus represents the dollar amount that a consumer would be willing to pay over and above the actual price of the good. For example, if the price and quantity of commodity **Q** purchased by a consumer is given by $\mathbf{P_0}$ and $\mathbf{q_0}$, then CS is denoted by area **a**. It is the difference between total WTP and actual expenditure. Hence, it is a measure of the net benefit (or increase in welfare or utility) the consumer receives from their purchasing decision. A basic formula, then, is:

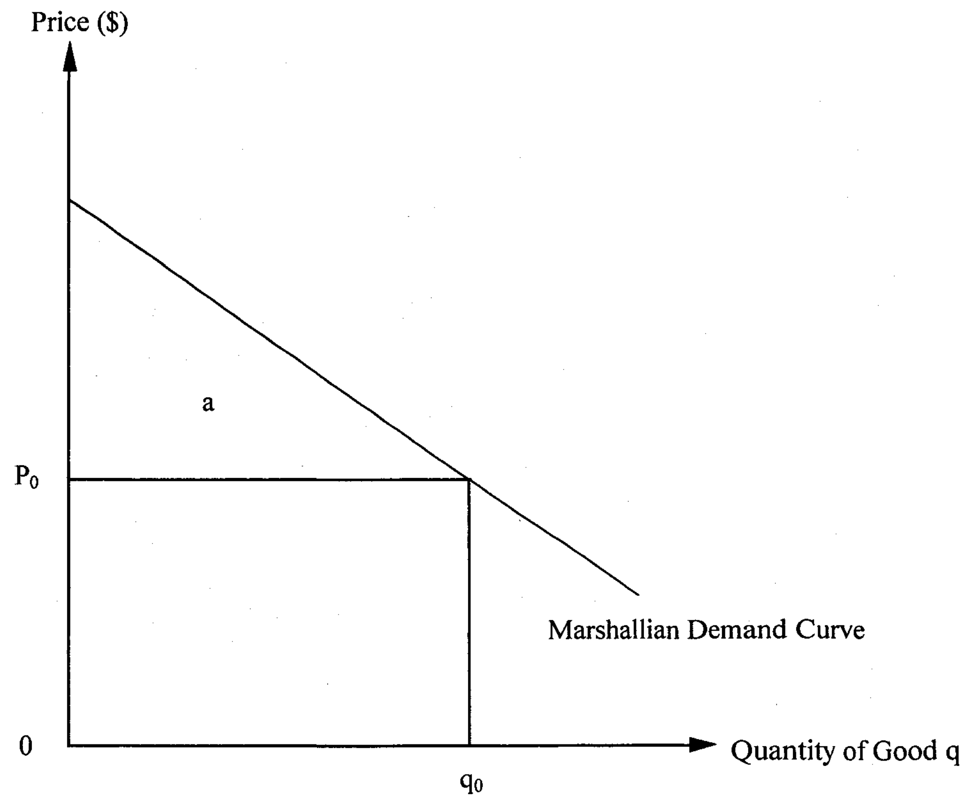
Total WTP = Market Price + Consumer's Surplus

In most cases, economists are not interested in the absolute level of consumer surplus, but the change brought about by a change in policy or price (Nicholson, 1992). One of the concerns of applied welfare economics is the change in CS that a specific policy may bring about. One might ask whether CS is the best measure of welfare when there are income effects related to price changes. It is not. The reason for this is because CS does not take into account any income effects related to price changes. The best measure of the change in consumer welfare is one which provides a value equal to the difference in income that would be required to leave the individual as well off after the policy implementation as they were before the policy change. Only in some cases are the two measures equivalent. This suggests that CS is only an approximation of consumer welfare. The more accurate welfare measures appropriate for policy changes are compensating variation (CV) and equivalent variation (EV).

2.4 a) ii) Ordinary versus Compensated Demands

Before proceeding to the CV and EV measures of consumer welfare, it is important to distinguish between Marshallian (ordinary) and Hicksian (compensated) demand functions. This is done with the aid of Figure 2.5. In this figure, it is assumed that the consumer divides his/her income between two goods, **q** and **G**. Let good **q** be the good we are interested in and **G** be all other goods and services available to the consumer. The price of **G**, ($\mathbf{P_G}$), is assumed to remain fixed throughout this analysis and normalized to $\mathbf{P_G}$=1. Thus, if **q** is assumed to constitute only a small portion of a person's income (**Y**), then **G** can be thought of as the numeraire, or a type of measuring stick and any

Figure 2.4. Consumer Surplus

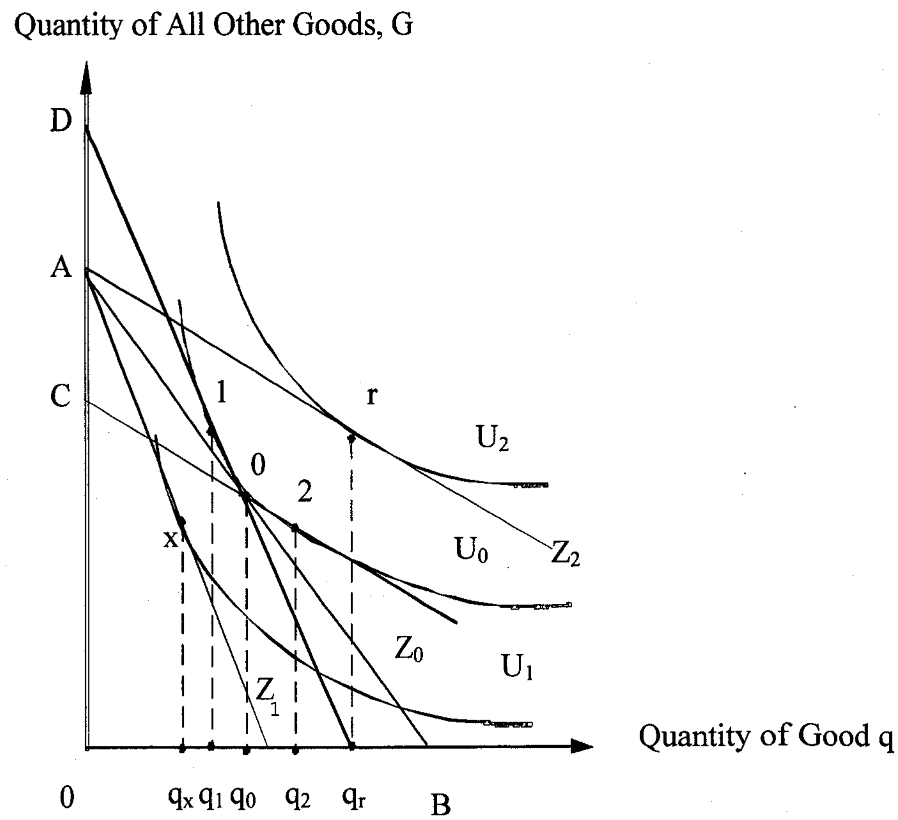


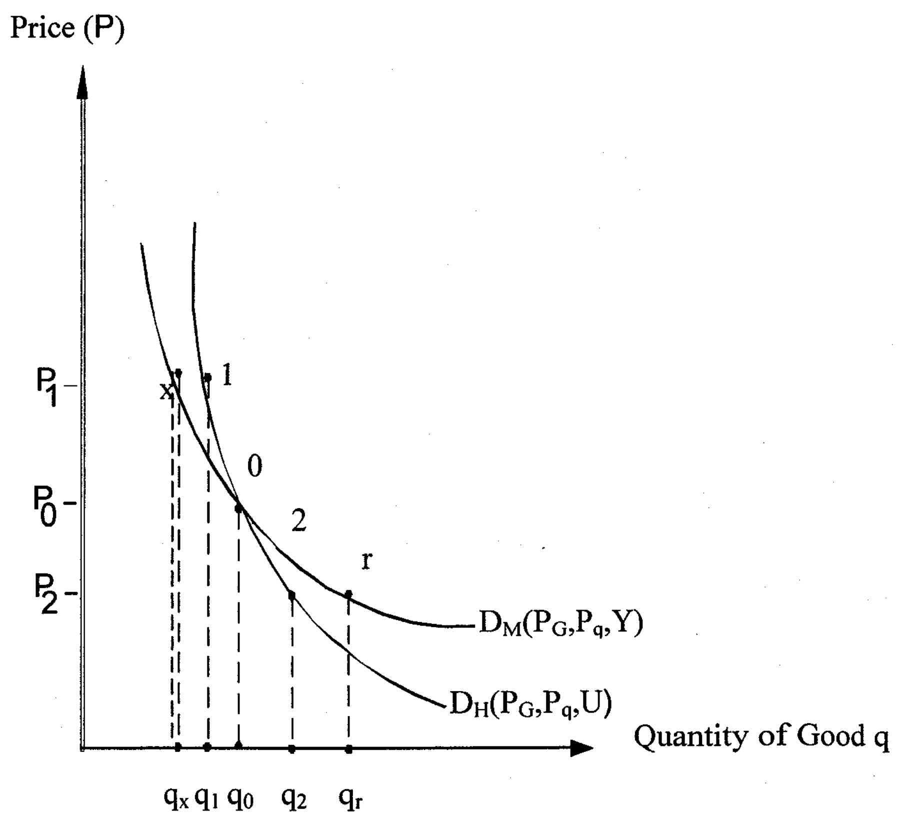
change in the consumption of **G** is comparable to a change in income.

The upper graph of Figure 2.5 illustrates the situation in which the consumer maximizes utility subject to a budget constraint. Initially, the consumer faces a price of $\mathbf{P_0}$ for **q** and has a fixed budget of $\mathbf{m_0}$. The size of the budget and the price of **q** determine the location of the budget line **Z** and its slope.

Let us assume that the entire budget is spent on **G**, then **A** units of **G** can be purchased. Similarly, if the entire budget is spent on **q**, then $\mathbf{m_0/P_0}$ dollars worth of **q** can be purchased (point **B**).

Figure 2.5. Derivation of the Hicksian and Marshallian Demand Curves





The slope of the budget line $\mathbf{Z_0}$ is given by the negative of the price ratios; in this case $\mathbf{-P_0}$. According to consumer theory, a single indifference curve, $\mathbf{U_0}$, lies tangent to that budget line. Given these prices and income and the assumption of utility maximizing behaviour, in equilibrium the consumer attains the indifference curve (utility level) $\mathbf{U_0}$ at point **O**. Thus, at point **O**, he/she consumes $\mathbf{q_0}$ units of **q**. The combination $(\mathbf{q_0},\mathbf{P_0})$ constitutes a common point on both the Marshallian $(\mathbf{D_M}(\mathbf{P_G},\mathbf{P_q},\mathbf{Y})$ and Hicksian $\mathbf{D_H}(\mathbf{P_G}, \mathbf{P_q}, \mathrm{U})$ demand curves in the lower graph of Figure 2.5.

The Marshallian demand function for **q** can be determined by holding the budget amount $\mathbf{m_0}$ constant and changing the price of **q**. At the higher price $\mathbf{P_1}$, the budget line $\mathbf{Z_1}$ is steeper and the consumer adjusts their purchases of **G** and **q** to achieve a new equilibrium at the lower utility level $\mathbf{U_1}$ (point **x**). Thus, they now consume only $\mathbf{q_x}$ units of **q**. The combination $(\mathbf{q_x},\mathbf{P_1})$ forms the second point on the Marshallian demand function.

In a similar fashion, by reducing the price of **q** from $\mathbf{P_0}$ to $\mathbf{P_2}$, a third point on the Marshallian demand function can be located. In this case, the budget line rotates outward and becomes less steep. The consumer adjusts purchases of **G** and **q** to achieve a new point of tangency (point **r**) between the new budget line $\mathbf{Z_2}$ and the higher level of utility $\mathbf{U_2}$. Thus, he/she now consumes $\mathbf{q_r}$ units of **q**. The combination $(\mathbf{q_r},\mathbf{P_2})$ forms the third point on the Marshallian demand function. The Marshallian demand function is drawn by connecting the points **x**,**O** and **r**. It is labeled $\mathbf{D_M}(\mathbf{P_G},\mathbf{P_q},\mathbf{Y})$ to indicate that it depends on the level of income **Y** (or budget **m**) remaining constant.

The Hicksian demand function for **q** is obtained by holding utility at a constant level, say $\mathbf{U_0}$, and changing the price of **q**. In order to maintain the original level of utility $\mathbf{U_0}$, we must 'compensate' the individual by giving (or taking away) some additional income. Thus, rather than allowing utility to change, as in the derivation of the Marshallian demand function, income is changed to maintain the original level of utility.

Recall that at the higher price $\mathbf{P_1}$, the budget line $\mathbf{Z_1}$ is steeper. Income or compensation is provided to the consumer to shift the budget line in a parallel fashion so the individual can attain the original level of utility ($\mathbf{U_0}$). Thus, a parallel shift of the budget line $\mathbf{Z_1}$ upwards until it is tangent to $\mathbf{U_0}$ removes the income effect caused by the price increase. The consumer, confronted with a new price regime, adjusts purchases of **G** and **q** to achieve a new equilibrium at the original utility level $\mathbf{U_0}$ (point **1**). The individual now consumes only $\mathbf{q_1}$ units of **q**. The combination ($\mathbf{q_1}$,$\mathbf{P_1}$) forms the second point on the Hicksian demand function (Recall that the point ($\mathbf{q_0}$,$\mathbf{P_0}$) constitutes a common point on both the Marshallian and Hicksian demand curves in the lower graph of Figure 2.5). By reducing the price of **q** from $\mathbf{P_0}$ to $\mathbf{P_2}$, a third point on the Hicksian demand function can be located. In this case, as indicated in the upper graph of Figure 2.5, the budget line $\mathbf{Z_2}$ rotates outward (the slope of the line becomes less steep), and income must now be taken away from the consumer in order to get him/her back to the original indifference curve. A parallel shift downwards of $\mathbf{Z_2}$ so that it lies tangent to the original level of utility $\mathbf{U_0}$ will remove the income effect caused by the price decrease. The reduction in income that needs to be taken away is given by the distance **AC** on the vertical axis (since income is measured in units of **G**). Once again, the consumer is confronting a new price ratio and adjusts purchases of **G** and **q** to achieve a new equilibrium at point **2** on $\mathbf{U_0}$. Thus, the individual now consumes only $\mathbf{q_2}$ units of **q**. The combination ($\mathbf{q_2}$,$\mathbf{P_2}$) forms the third point on the Hicksian demand function. The Hicksian demand function can be drawn by connecting the points **1**,**O** and **2** in the lower graph of Figure 2.5. It is labelled $\mathbf{D_H}$($\mathbf{P_G}$, $\mathbf{P_q}$,**U**) to indicate that it depends on the level of utility remaining constant.

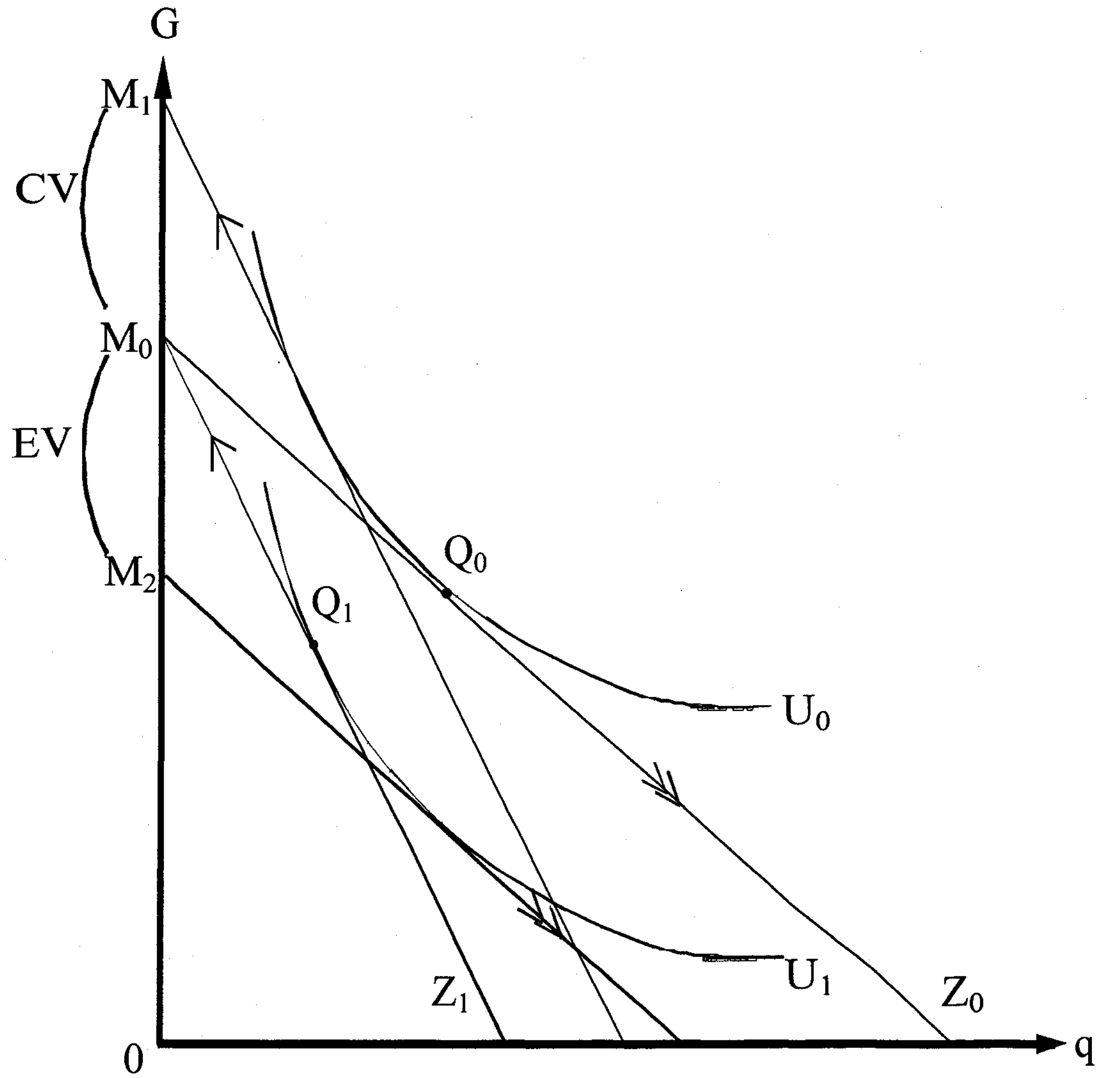
The reason for the shallower slope of the Marshallian demand function is because the movement from point **O** to point **x** or point **r** involves two unobservable and simultaneous effects; the substitution and income effects. The substitution effect describes the change in demand in response to the price change, assuming utility is held constant. Graphically, this is obtained by shifting the new budget line inward (for a price increase) or outward (for a price decrease) and parallel to the old budget line so that it just touches the original indifference curve. The change in demand due to the substitution effect can then be read off the **q** axis of the upper graph in Figure 2.5. The substitution effect is marked by movement along the original indifference curve. This is because a price change involves changing not only the position of the budget line but also its slope. Therefore, assuming convex indifference curves, the consumer will adjust his/her purchases of **q** and **G** until the slope of their original indifference curve (the Marginal Rate of Substitution, or MRS) equals the slope of the new budget line (the price ratio).

The income effect arises because a price change necessarily changes the individual's 'real' income or purchasing power, and the consumer must move to a new indifference curve. Graphically, this is shown by the change in the demand for **q** given by the distance between the substitution effect and the new equilibrium point. In contrast to the Marshallian demand function, for prices above $\mathbf{P_0}$, the individual's income is increased with the Hicksian demand function to keep the individual at the original level of utility ($\mathbf{U_0}$). Hence, more **q** is demanded than with the Marshallian function. Conversely, for prices below $\mathbf{P_0}$, income is reduced for the Hicksian function, so less **q** is demanded than with the Marshallian function. Thus, for most goods, the Marshallian demand curve is flatter than the Hicksian demand curve because it incorporates both income and substitution effects, whereas the Hicksian demand curve reflects only the substitution effects (Nicholson, 1992).

2.4 a) iii) Compensating and Equivalent Variation

Imagine an economy consisting of two commodities **G** and **q**. Once again, consider **G** as the numeraire. Suppose the price of **q** increases from $\mathbf{P_0}$ to $\mathbf{P_1}$. Hence, the budget line shifts from $\mathbf{Z_0}$ to $\mathbf{Z_1}$. The compensating variation (CV) of the price increase is defined as the amount of money (measured in terms of **G**) required to compensate the individual for the higher price of **q** so that the individual is able to maintain their initial level of utility $\mathbf{U_0}$. Hence, the individual is left as well off as before the price change (Johanson, 1991). The individual, in this case, must be given income to maintain the same level of welfare as before the increase in the price of **q**. Thus, CV measures gains or losses associated with taking a proposed action, in this case changing the price of **q** (Just, Heuth and Schmitz, 1982). The derivation of CV is depicted graphically in Figure 2.6.

Figure 2.6. Compensating and Equivalent Variation for a Price Increase



The price increase in **q** causes the budget line to rotate inward and the individual to purchase less of **q**. Specifically, the individual will purchase commodity bundle $\mathbf{Q_1}$ on $\mathbf{U_1}$ rather than bundle $\mathbf{Q_0}$ on $\mathbf{U_0}$. By drawing a line that is parallel to the new budget line

$\mathbf{Z_1}$ and tangent to $\mathbf{U_0}$, the CV of the price increase is measured on the vertical axis as the distance $\mathbf{m_0}$ - $\mathbf{m_1}$.

Conversely, if the price of **q** decreases, the budget line would rotate outward and the consumer would purchase more of **q**. Therefore, the CV of a price decrease in **q** is the amount of money that needs to be taken away from a household to ensure that a change in policy will leave it just as well off as before the change (Hanemann, 1991; Johansson, 1987). The vertical distance $\mathbf{m_0}$ - $\mathbf{m_1}$ represents the maximum amount the individual would be willing to pay for the policy change.

The equivalent variation (EV), of an increase in the price of **q**, is defined as the maximum amount of money (or **G**) that would have to be taken from an individual to provide him/her with a utility level of $\mathbf{U_1}$ at the original set of prices. Note that this is different than the CV which focused on the original level of utility and the new set of prices). EV measures gains and losses to households associated with not taking a proposed action. In this case, it is the maximum bribe the consumer is willing to pay to avoid an adverse change in economic conditions as a result of the higher price of **q** (Just, Heuth and Schmitz, 1982). By drawing a line that is parallel to the original budget line and tangent to $\mathbf{U_1}$, it is possible to measure the EV of the price increase as the distance $\mathbf{m_0}$ - $\mathbf{m_2}$ on the vertical axis.

If the price of **q** had declined, a similar argument could be followed by simply switching the labels on the budget lines and indifference curves in Figure 2.6. In this case, the CV is given by $\mathbf{m_2}$ - $\mathbf{m_0}$, and the EV is given by $\mathbf{m_1}$ - $\mathbf{m_0}$. Thus,

CV of a price increase = - EV of a price decrease

EV of a price increase = - CV of a price decrease

The equations above illustrates that both the EV and CV welfare measures are defined with respect to a reference level of utility or a set of implied property rights. The CV is defined with respect to the original or currently existing property rights (original indifference curve $\mathbf{U_0}$), while EV is defined with respect to a proposed set of property rights (the new indifference curve $\mathbf{U_1}$) (Mitchell and Carson, 1989). Thus, willingness to pay or compensation demanded are a matter of property rights. Compensating Variation is known as the willingness to pay (WTP) for preserving or acquiring property rights. On the other hand, Equivalent Variation is the willingness to accept (WTA) compensation for relinquishing property rights. Both measures allow the individual to adjust the quantities of goods G and q in response to changes in prices and income. This idea of associating property rights with the concepts of EV and CV is particularly important when it comes to valuing goods and services, such as national parks, that are not traded in the marketplace.

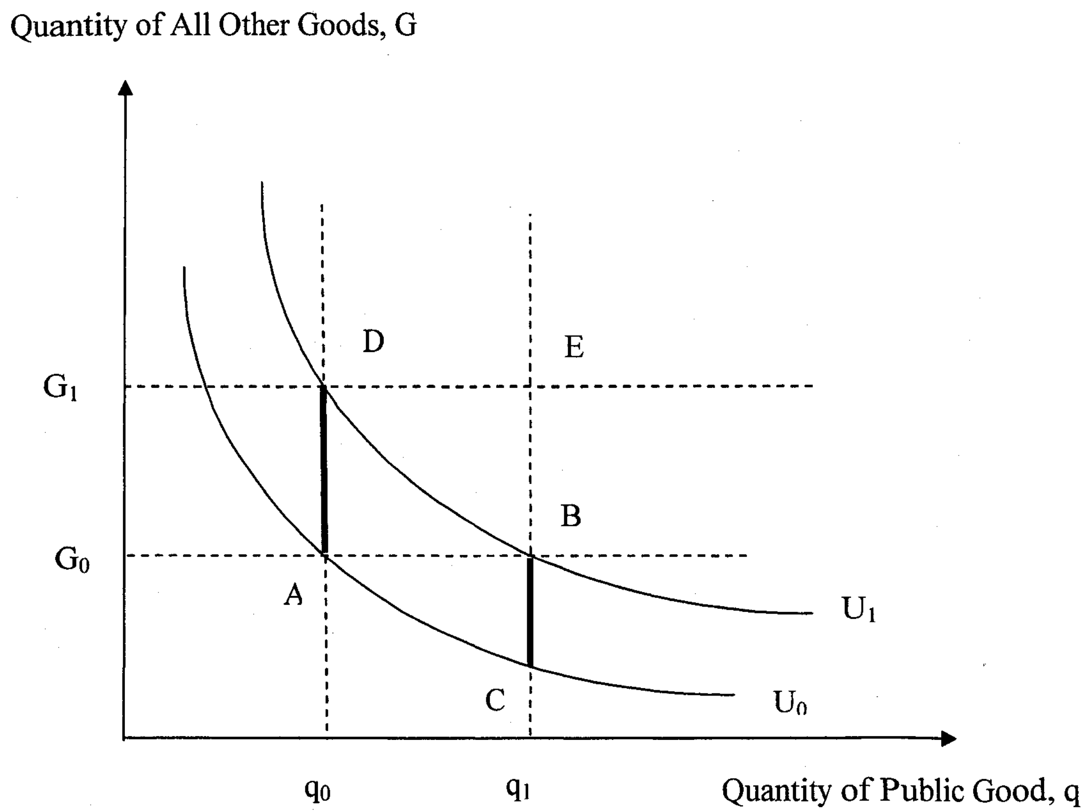
For example, a Canadian citizen may feel they have a right to free access of Canada's national parks for recreation purposes. This feeling of 'inherent right' by virtue of citizenship may exist simply because of how the individual perceives reality (Hanemann, 1991). It does not matter whether this perception is true or not. The key point is that 'perception is reality' and perception often governs the decisions made by an individual. However, in reality, persons visiting a national park for recreation purposes must purchase 'the right' to do so and are obliged to pay a user fee. The value of this payment (referred to as their willingness to pay) is the measure of CV which returns the individual to the original level of utility and leaves them indifferent as to whether they have or do not have access to national parks for recreation purposes. This willingness to pay value may or may not correspond to the actual fee charged by the national parks.

2.4 a) iv) Comparison of WTP and WTA Values

The concepts of WTP and WTA, and the relationships between them, can also be explained by using only indifference curves (Bateman *et al.* 2002). Figure 2.7 represents the preferences of a given individual. Let good **q** be the public good we are interested in and **G** be all other goods and services available to the consumer.

Consider the value to the individual of an increase in the quantity of the public good from $\mathbf{q_0}$ to $\mathbf{q_1}$. Suppose that initially, the individual has $\mathbf{G_0}$ private consumption, and so is at point **A**. At point **C**, the individual can enjoy $\mathbf{q_1}$ of the public good but his/her private consumption is less by the amount **BC**. Since **A**. and **C** are on the same indifference curve $\mathbf{U_0}$, we can infer that their willingness to pay for the increase in the public good is **BC**. The negative of this amount is the Compensating Variation (CV) for the increase in the public good, since the loss of **BC** in private consumption exactly compensates for that increase. Thus, **BC = WTP for ↑ q = - CV**.

Figure 2.7. Comparison of WTP and WTA for a Public Good



Now consider the opposite case, in which the individual, again starting with $\mathbf{G_0}$ private consumption, faces a decrease in the public good from $\mathbf{q_1}$ to $\mathbf{q_0}$. Now the initial position is point **B** on the indifference curve $\mathbf{U_1}$. To remain indifferent to the decrease of **q** , the individual must be given **DA** more of private consumption (**G**). The WTA for the reduction in the public good is **DA**. This is the Compensating Variation (CV) for the reduction in the public good. Thus, **DA = WTA for ↓q = CV.**

Suppose that the individual starts off at point **A**. What additional amount of private consumption would be just as preferable as an increase in the public good to $\mathbf{q_1}$? Since **D** is on the same indifference curve as **B**, the individual would have to receive **DA** more of private consumption to be indifferent between an increase in private consumption above $\mathbf{G_0}$ or an increase in the public good from $\mathbf{q_0}$ to $\mathbf{q_1}$. **DA** is the Equivalent Variation (EV) for an increase in the public good. Thus, **DA = WTA for ↑q = EV**.

Now imagine that the individual starts off at point **B**. What loss of private consumption would be just as preferable as a decrease in the public good to $\mathbf{q_0}$? Since **C** and **A** are on the same indifference curve, the individual would have to lose **BC** of private consumption to be indifferent between a decrease in private consumption below $\mathbf{G_1}$ or a decrease in the public good from $\mathbf{q_1}$ to $\mathbf{q_0}$. The negative of **BC** is the Equivalent Variation (EV) for the decrease in the public good. Thus, **BC = WTP for ↓q = -EV**.

Summing up the above:

for an increase in the quantity of a public good (↑**q**), -CV = EV

for a decrease in the quantity of a public good (↓**q**), CV = -EV

From Figure 2.7, it is clear that the difference between WTA and WTP will be greater the more convex the indifference curves are. That is, the less substitutability there is between private consumption and the public good, and the greater the difference between $\mathbf{q_0}$ and $\mathbf{q_1}$, the more WTP and WTA will differ. These conclusions are derived formally by Hanemann (1999).

2.4 a) v) Selection of the Appropriate Welfare Measure

The practical problem in using the CV or EV measures is that Hicksian compensated demand curves are unobservable because utility levels are unobservable (Johanson, 1991). Only Marshallian demand functions, and hence CS, can be estimated from actual market data.

Willig (1976) showed that for most goods, the theoretical difference between CV, CS and EV appear to be negligible and can be ignored. His findings were later supported by Randall and Stoll (1980). Any differences among these welfare measures were found to be trivial for amenities that commanded a modest fraction of the consumer's budget (Bateman *et al.* 2000; Knetsch, 1990; Coursey *et al.* 1987). However, the theoretical prediction of congruence between the willingness to pay (WTP) and willingness to accept (WTA) values for CV and EV respectively, did not align with actual findings for valuing non-market goods. Surveys consistently found that WTA measures were consistently much larger than WTP for the same environmental good (Knetsch, 1990; Cummings *et al.* 1986; Knetsch and Sinden, 1984).

The discrepancy between WTP and WTA is especially important for the issue of compensation for damages to environmental resources such as national parks. For example, at present it is unclear whether persons holding non-use values for parks have property rights for them because they are not explicitly quantified and included in the Parks Canada decision making process. Since 'property' is regarded as a benefits stream, and 'property rights' constitute the assurance of the state that it will protect that benefits stream (Bishop and Welsh, 1992), failure to include non-use values in Parks Canada decisions implies inadequate consideration of the property rights of Canadian citizens. As Kontoleon *et al.* (2002) argue, though the assignment of property rights that would give rise to non-use values is problematic when the environmental resource is privately held, the assignment of such rights for publicly owned resources is quite sound from a conceptual, moral and legal perspective.

Several explanations for the discrepancies between WTP and WTA are offered including the influence of income, strategic bias, and the hypothetical scenarios of surveys designed to estimate the value of non-market goods (Bateman *et al.* 2002; Diamond, 1996; Mitchell and Carson, 1989; Knetsch and Sinden, 1984). Other authors conclude that the disparity between WTP and WTA is inconsistent with people's behavior or limited to survey based approaches (Horowitz and McConnell, 2002). They argue that WTP/WTA ratios are not experimental artifacts and that loss aversion, existence values, the lack of adequate substitutes and market experience could explain the difference (List, 2003; Hanemann, 1999; Kostad and Guzman, 1999; Kahneman and Tversky, 1979).

For example, people who regard a national park as part of their endowment, and for which there are no real substitutes or formal markets to approximate their worth, require large amounts of compensation to give up that entitlement. Consequently, their WTA is much greater than their WTP to maintain the national park endowment. This value discrepancy, and reluctance to forego their entitlement, stems from the risk of future regret that might arise from undervaluing and giving up the national park resource prematurely. Shogren *et al.* (2001) suggest that more elaborate auction mechanisms may decrease or even remove this 'endowment effect'.

Boyce *et al.* (1992) suggests that the intrinsic or existence values that people hold for environmental goods, such as national parks, may offer another explanation for the disparity between WTA and WTP estimates. Therefore, the non-use use values that people hold for national parks because they protect unique landscapes and endangered species will be included in the WTA values but excluded from the WTP measures of values. Accepting compensation for surrendering the endowment of national parks would be synonymous to accepting the moral responsibility for extinction of many species and destruction of rare landscapes. For this reason, very high WTA values might represent a moral 'protest bid' against the question, rather than reflecting the valuation of environmental loss. Thus monetary compensation may not be seen as a legitimate reaction to the loss of some environmental goods such as endangered species. Conversely, WTP would be an indicator of the level of responsibility people have for the protection of an environmental resource.

Mitchell and Carson (1989) suggested that for many environmental amenities such as clean air, national parks or potable water, society may hold 'collective rights'. In this case, the access to the good is available to all members and access rights cannot be sold or transferred to others. The non-transferable character of these collective property rights implies that asking for an individual's WTA is clearly an inappropriate way of determining the value of these environmental goods. If there is a cost to providing the good at a given level of quality, it is borne by all consumers through a combination of taxes, fees or higher prices. Since the consumer is already paying for the good through taxes, their WTP is the amount they are willing to pay to avoid the reduction in quality of the good and still be as well off as before. If informed of a threat of deterioration to the good, the WTP would indicate the value the individual has for the benefits they receive from the current level of provision and quality of the good (Mitchell and Carson, 1989).

Bateman *et al.* (2000) suggest that the question of whether WTP or WTA valuations should be addressed by taking one policy option (usually the 'do-nothing' scenario) as the baseline in relation to which costs and benefits are defined. Benefit changes that are more preferred than the baseline should be measured by WTP. Conversely, changes that are less preferred than the baseline (costs), should be measured by WTA.

In the context of this thesis, the theoretically correct welfare measure is Compensating Variation (CV). The method used, the Contingent Valuation Method (CVM), uses a survey instrument to directly measure the CV. The survey respondents WTP values indicate what Canadians are willing to pay to avoid a reduction in the quality of their national park system. In so doing, it indicates the value of the benefits that they receive beyond their current expenditures for national parks.

The following section examines the theoretical underpinnings and the advantages and disadvantages details of this non-market valuation approach.

2.5. THE CONTINGENT VALUATION METHOD

The Contingent Valuation Method (CVM) is the most commonly used method for measuring the compensating and equivalent variation of non-market goods. It is the oldest and most popular method to derive use and non-use values for many public goods, such as protected natural areas. In fact, it is the only method for eliciting non-use values and is used worldwide by government agencies and the World Bank for assessing a variety of investments (Pearce, 1993; Hanemann, 1994). For these reasons, it was selected for this study.

Broadly speaking, the CVM is an effort to establish the value of some non-market good with survey data. It involves replicating a market situation that treats a non-market good as if it was a private good, and then determines the price people would pay for it. The term 'contingent' valuation arises from the fact that the valuation of the non-market good is contingent on the hypothetical assumption of a plausible market for that good. A simple contingent valuation study might consist of a detailed description of a good (such as a description of a park) followed by a question asking the respondent what he or she would be willing to pay for the good. There are a number of variations in the design of contingent value questions using different approaches to the way the market is described and also how the price question is posed.

The CVM relies on survey techniques and hypothetical situations to elicit peoples' willingness to pay (WTP), or willingness to accept compensation (WTA, also referred to as compensation demanded (CD)), for hypothetical changes in the quality or quantity of a non-market good (Mitchell and Carson, 1989). These responses correspond to the exact welfare measures of compensating or equivalent variation under quality constraints, contingent on the nature of the hypothetical market.

As discussed previously, compensating variation (CV) is the level of payment required to keep an individual at a certain level of satisfaction if he or she were forced to face new circumstances that were not as favourable. Equivalent variation (EV) refers to the satisfaction level of the individual after a change is made (rather than before as compensating variation does). It measures how much he or she would be willing to pay to avoid returning to the initial situation or how much he or she would have to receive in compensation to forego returning to the initial situation.

Two assumptions are implicit in the CVM model. Firstly, respondents are assumed to be able to accurately assign values to non-market goods. Secondly, these values can be captured through the hypothetical markets of the CVM.

The CVM originated from a suggestion by S.V. Ciriacy-Wantrup (1947) in an article about the public economics of soil erosion abatement. This author suggested that one way to obtain information on the demand for the favorable effects of preventing soil erosion would be to ask individuals how much they would be willing to pay for successive increments. However, no empirical CVM valuation was attempted (Nunes, 2002).

Among the other earliest studies using the CVM are Davis's (1963) study of recreation in the Maine forests in the northeastern United States; Hammock and Brown's (1974) study on wetland preservation; and Randall *et al.*'s (1974) study on air pollution and visibility in the southwestern United States. Although the CVM was only used sporadically during the 1960s, by the end of the 1970s, it was used so frequently that it was given official recognition by the US Water Resources Council as a recommended valuation technique for estimating the benefits of water and related land resource projects. This decade also witnessed the first applications of the CVM by European economists (Bateman and Willis, 2001).

In the United States, the use of the CVM to value natural resource damages has, in some cases, been given legal status (Portney, 1994). Regulations drafted by the United States Department of the Interior, in 1986, and revised in 1989, endorsed the use of the CVM in calculating lost use and non-use values (Kopp and Smith, 1993). Loomis (1993), describes how the use of CVM by federal agencies in the United States evolved.

Perhaps the most relevant event in the development of the CVM was the lawsuit pursued by the State of Alaska and the United States federal government against Exxon as a result of the Exxon Valdez oil spill (Bateman and Willis, 2001). Following the Valdez oil spill, the U.S. Congress passed the Oil Pollution Act of 1990 to reduce the risk of future spills and to provide a mechanism to recover damages. The method of assessing damages was to be developed by the Department of Commerce through the National Oceanic and Atmospheric Administration (NOAA). A panel headed by Nobel Prize Laureates in Economics Robert Solow and Kenneth Arrow was established by NOAA to judge the reliability of the CVM in assessing resource damages. This panel was named the 'NOAA Panel' and concluded that the CVM can produce estimates reliable enough to provide a starting point in damage assessments including lost passive use values - provided the Panel's guidelines were followed (U.S. Department of the Interior, 1993). Its guidelines are still regarded as the most preferred way to conduct a CVM survey. According to Portney (1994), the Panel developed the guidelines because they felt the casual applications of CVM should not be used for damage assessment. Of these guidelines, the six most important are noted below:

- CVM should rely on the 'discrete choice' (i.e. 'Yes' or 'No') question format. Respondents should, in other words, be questioned on how they would vote yes or no. The 'Yes/No' decision is similar to that frequently experienced in actual purchase decisions or in voting for important public programs. As well, responses to discrete choice questions are closer to actual valuations.
- Personal interviews are preferable to telephone surveys, which in turn are better than mailed questionnaires.
- The CVM scenario should accurately and clearly describe the expected effects of the policy or program being valued.

- Questionnaires should include reminders that any expressed willingness to pay for the policy in question would reduce the amount available for other goods and services.
- The CVM applications should include reminders of the substitutes available for the improved good or service in question.
- Surveys should include follow-up questions that ensure that respondents comprehend the decision they are asked to make and help the analysts understand the basis for their responses.

Since these early studies, the use of CVM has spread explosively around the world. It has been used to determine values associated with a wide range of environmental services, including values associated with protecting endangered species (Tisdell, et al, 2005; Bandara and Tisdell, 2004; Loomis and White, 1996; Walsh, 1991; Bowker and Stoll, 1988), air quality improvements in Los Angeles (Brookshire *et al.* 1982), acid rain reduction (Johansson and Kristrom, 1988), and water quality improvements in the Monongahela River (Desvouges *et al.* 1987). The CVM has been used to estimate values associated with recreational activities such as hiking, fishing, camping, hunting, cross-country skiing, mountain running and wildlife photography and preserving unique scenic vistas (McCollum, Gilbert and Peterson, 1990; Hanemann, Carson, Gum and Mitchell, 1988; Walsh, Johnson and McKean, 1988; Fiore and Ward, 1987; Johnson and Walsh, 1987; Peterson and Arnold, 1987; Stoll and Johnson, 1984).

Carson *et al.* (1994) list over 2000 studies and papers on CVM. The method has aroused enormous interest among economists; on balance the reaction is favorable, but some of it is highly distrustful. Since its first applications, several book-length expositions and assessments have traced the various stages of development. Hausman (1993) and Cummings *et al*, (1986) exemplify the skeptical perspective. Mitchell and

Carson (1989) provide a still valuable general assessment. The papers collected in Bateman and Willis (2001) give an exhaustive critique of the CVM. Other recent treatments include Boyle (2003); Bateman *et al.* (2002); Garrod and Willis (1999); and Kopp *et al.* (1997).

2.6. METHODOLOGICAL ISSUES IN DESIGNING A CVM STUDY

2.6 a) Target Population and Sampling

For studies of direct use values, such as recreational use of a national park, the target population would be park visitors. In contrast, to estimate non-user values such as existence, bequest, or option values, a study must address a regional or even larger population. This stems from the realization that those who are not current users of the resource in question may still place significant value on the option of future use of the resource or knowledge that it will continue to exist (Bishop and Heberlein, 1989).

Once the target population is defined, a sampling frame (or sampling strategy) must be determined that will support statistical inferences about the population. Since the welfare estimates are to be aggregated up to the population level, the sample used in contingent valuation instruments must elicit individual WTP responses that are representative of the population surveyed. For example, to reflect the general Canadian population, a sampling strategy should at least reflect the Canadian population by province, by urban versus rural region, by language, by income, and by gender. These particular demographics should fall within a 7-10% error of the true population to be considered truly representative of the target population (Mitchell and Carson, 1989).

The procedures for defining the sampling frame vary according to the survey method used; in-person, mail or telephone (Rea and Parker, 1997; Salant and Dillman, 1994; Dillman, 1978;). For example, the sampling frame for a telephone survey can either be chosen by random digit dialing or from numbers listed in phone books. Mail survey sampling frames are typically based on a specific clientele mailing list (Dillman, 1978). The sampling frame for in-person surveys of people who live in a given geographic area can be based on a physical enumeration of residential data from government census findings (Carson *et al.* 1992).

2.6 b) Defining the Good and Hypothetical Market

Respondents should be given adequate, unbiased information on the environmental good and its hypothetical market in order to let them make an informed judgment (Hanley *et al.* 2001). The hypothetical market should describe to the participant the initial condition of the good, how people may gain access to it, in what ways different uses affect the condition of the good, the institutions that regulate citizens' access to the good, the range of available substitutes, and the method, frequency and timing of payment for access (or compensation for those denied access) to the good in its initial state. Additionally, depending on the environmental good being appraised, the scenario should convey to participants whether they are speaking for themselves or for their households.

Some researchers have employed a variety of multimedia devices such as photographs, verbal descriptions, graphs and devices that use the senses of sight, taste, sound and smell have been used to provide respondents with additional information to aid the non-market valuation process (Brown and Daniel, 1984; Mitchell and Carson, 1984; Brookshire, Ives and Schulze, 1976). Conversely, other researchers rely on verbal descriptions in telephone or mail questionnaire surveys.

2.6 c) Payment Vehicle

The objective of a CVM study is to obtain from respondents measures of consumer welfare associated with prospective policy changes. Individual valuations are elicited via some specific mechanism for payment, called the 'payment vehicle', which must be specified as part of the contingent valuation questions (Bishop and Heberlein, 1989). While payment vehicles can include donations to trust funds, an increase in site fees, or an increase in taxes, the vehicle should be a realistic, plausible and non-controversial way of collecting revenue (Mitchell and Carson, 1989).

'Instrument bias' (or vehicle bias), is the potential error introduced if respondents believe the payment vehicle is unreasonable or unrealistic (Hanley, 1988). Studies have recognized that the mechanism used to collect the bid or to pay compensation may influence welfare estimates (Randall *et al.* 1974). For example, a park visitor's WTP for an environmental attribute may differ depending on whether he/she pays for an improvement as a higher park entrance fee, a general tax or higher prices for other goods associated with the wilderness experience (Rowe *et al.* 1980).

An example of payment vehicle bias can be found in the research findings of Greenley *et al.* (1981). Their study of recreation and water quality of the South Platte

River used a sales tax and water fee surcharge as payment vehicles. The WTP levels for the sales tax were three times higher than the WTP for water fees. The authors suggest that residents may have felt that the sales tax was a more equitable vehicle since the tourists enjoying the benefits would also pay this tax, while only property owners would pay the water fee.

Thus, where possible, the actual method of payment currently used to pay for the non-market good should be used in the survey. According to the NOAA Panel (U.S. Department of the Interior, 1993), a tax increase is the most preferred CVM payment vehicle for many environmental goods because it is realistic to the respondent and commits him/her to any payment agreement made in the survey.

2.6 d) Data Collection Technique

The choice of whether to use personal interview, telephone or mail surveys for implementing the CV study depends on the tradeoffs deemed acceptable by the researcher(s). From a methodological point of view, each of these survey administration methods has advantages and disadvantages.

In-person survey methods most easily capture all characteristics but they are also the most costly and time consuming. Telephone surveys preclude the use of visual aids and also tend to be more impersonal, resulting in the inability to motivate respondents. Mail surveys allow the use of visual aids and avoid interviewer bias; however, they do require the time and ability to read the survey and to comprehend what was read. Hence, they are the most susceptible to nonresponse bias. Internet surveys are becoming increasingly popular because of the speed and low cost of processing the survey responses into a database. However, the internet also poses some restrictions. Most notably, an internet survey may not easily be representative of the target population because not everyone has access to a computer or uses the internet (Rashev, 2003). Regardless of the survey instrument format, there is a need to present this information in simple, objective, consistent and understandable terms (Bishop and Heberlein, 1989).

Edwards and Anderson (1987) and Dillman (1978) describe three biases in CVM surveys that may occur during the data collection stage of the research. 'Sampling error bias' occurs when the sample population does not correspond to the target population. 'Nonresponse bias' occurs when the researcher, in aggregating values, assumes nonrespondents have the same values as respondents. Finally, there is 'selection bias' which occurs when respondents refuse to answer some questions. Hence, the analyst is unsure whether a non-response is a zero WTP value or an objection to the survey. Similar concerns regarding problems of aggregation and non-response are expressed by Loomis (1987) in a study involving the protection of ecologic and scenic features of a California lake.

2.6 e) Survey Elicitation Question Format

Once the respondent has been given the description of the environmental change(s) and the contingent market involving such provision(s), he/she is asked to report monetary valuation. This involves the choice of an elicitation question format. CVM researchers have developed four main question formats for obtaining WTP values. These are: (i) the bidding game; (ii) the payment card method (iii) the open-ended question method; and (iv) the dichotomous choice model. These elicitation methods are reviewed below.

2.6 e) i) Bidding Game

One of the earliest elicitation formats was developed by Davis (1963) and is called the bidding game. In the bidding game approach (Rowe, 1980; Brookshire *et al.* 1976; Randall *et al.* 1974) the interviewer asks whether the respondent would be willing to pay a specified amount, known as 'the starting bid'. If the response is affirmative, then the interviewer gradually revises the bid upward until a maximum WTP (or minimum compensation demanded) is reached. If the starting bid elicits a negative response, the interviewer revises the bid downward until the respondent indicates an acceptable amount.

This iterative bidding technique helps respondents to evaluate their preferences incrementally and, therefore, has the advantage of obtaining the highest WTP bid. However, there has been considerable dissatisfaction with this technique for several reasons.

Firstly, this method requires costly personal or telephone interviews to conduct the iterative bidding game. Secondly, the obtained WTP values may be sensitive to the starting bid as well as the size of the dollar value increments used in the iterations. That is, the respondent may believe that the starting bid is suggestive of an appropriate value. This 'starting-point bias' can be a problem with iterative bidding (FAO, 2000; Desvouges, Smith and Fisher, 1987; Cummings, 1986; and Boyle, Bishop and Welsh 1985).

However, starting point bias is usually not large, and can be reduced with pretests to determine the likely range of response so that the initial bids can be set near this amount (Young, 2005).

Another reason for dissatisfaction with this elicitation method is the possibility that the respondent may suffer 'interviewer fatigue'. This problem may occur if the gap between the starting bid and the respondent's true WTP is large relative to the iterative dollar increments. In this case, the respondent may become tired or bored of the iterative bidding questions and end the bidding process prematurely (Forster, 1989).

Lastly, the bidding game format is highly vulnerable to 'yea-saying'; respondents tend to agree with increasing bids, regardless of their true valuations (Kanninen, 1993).

2.6 e) ii) Payment Card

The payment card format was proposed by Mitchell and Carson (1984) as a response to the large proportions of known responses and protest 'zeros' which were obtained in the CVM applications with open-ended formats. After describing the good to be valued, the interviewer hands the respondent a card which identifies some of the dollar amounts that households in the respondent's income category are currently paying for other public goods such as highways and national parks. After considering the values on the card, the respondent is asked the maximum he or she would be willing to pay for the level of good being proposed. The response is final and no bidding is required. The payment card approach has been found to reduce, but not eliminate, the starting-point bias problem (Mitchell and Carson, 1989). The validity of the stated WTP amounts may be questioned, because the range of the payment card, especially the maximum of that amount, may influence the final WTP answers of the respondents (Hoevenagel, 1994). In spite of these difficulties, the payment card approach remains a popular way of eliciting WTP values (FAO, 2000).

2.6 e) iii) Open-Ended

Unlike the previously mentioned elicitation methods, the open-ended method is conducive to mail surveys and does not influence respondents with a starting bid. Once the good and payment vehicle have been described, the respondent is simply asked to state his or her maximum WTP bid. Mitchell and Carson (1989) list more than 30 studies that employed an open-ended elicitation method. The main advantage of the open-ended question format is that calculating the mean and median WTP values is computationally simple.

While this approach avoids starting-point bias, it is criticized for two reasons. Firstly, the scenario lacks realism since respondents have rarely, if ever, been asked to place a dollar value on non-market goods (Hoevenagel, 1994; Bishop and Heberlein, 1989; Cummings *et al.* 1986). Hence, there is no assurance that respondents have truly selected their highest WTP bid.

Secondly, some studies indicate that the open-ended elicitation method is vulnerable to strategic overstatement or understatement (also called strategic bias). In the former case, the respondent has an opportunity to promote a desired policy outcome by exaggerating their WTP amount (U.S. Dept. of the Interior, 1993). In the latter case, some respondents may immediately state a 'zero' WTP, even though the amenity has value for them (Hoehn and Randall, 1987). That is to say, there is a possibility that the respondents will reveal a WTP that is biased downward in the hope of getting 'something for nothing'. This concern is based on Samuelson's (1954) article regarding revealed preferences for public goods. The argument postulates that if individuals believe that they will have to pay their stated WTP amounts, then they have an incentive to become a 'free rider' and understate their true preferences (Stiglitz, 1988). Alternatively, if they believe they will not have to pay their stated WTP amounts, they may be inclined to overstate their true preferences in order to ensure that the proposed project is undertaken.

However, empirical evidence from early CVM studies have shown that strategic behaviour is not a major concern. Bohm (1972), failed to find that strategic bias affected the outcomes of experiments utilizing actual payments for public television. Similarly, Scherr and Babb (1975), found little evidence supporting the existence of strategic bias in their experiments utilizing different mechanisms for valuing public commodities. Also, studies by Cummings *et al.* 1986; Schulze, d'Arge and Brookshire, 1981; Rowe *et al.* 1980; Bishop and Heberlein, 1979; Grether and Plott, 1979; Smith, 1977; and Brookshire *et al.* 1976, support the general conclusion that strategic bias has not been a major problem in the application of the CVM to practical problems. In fact, Hammit *et al.* (2001); Jakobsson and Dragun (1996), and Cummings *et al.* (1986) reported that in a number of CVM studies containing both open-ended questions and bidding games, the open-ended questions consistently produced lower values.

Kealy and Turner (1993) observed similar findings in their study comparing the equality of values for an unfamiliar public good (Adirondack region aquatic system) and a familiar private good (Cadbury candy bar) using both an open-ended and a close-ended contingent valuation question. Values for the public good using the open ended question range were found to be lower (ranging from \$7.97 to \$24.49) than for the closed-ended question format (\$17.54 to \$65.49). Values for the private good using the open-ended question format were \$0.58 to \$1.49 compared to \$0.65 to \$1.54 for the closed-ended format, The authors concluded that question format affected the values for the public good, but not for the private good.

The open-ended question format is nowadays less frequently used due to the perceived respondent difficulty in answering the payment question, which may result in missing WTP values (FAO, 2000). However, it is still commonly used to establish the range of bid values for other WTP elicitation methods during pretest and development of the CVM survey instrument. As well, it is commonly used in market research efforts to determine what consumers may be willing to pay for a product.

2.6 e) iv) Dichotomous Choice

The most widely accepted approach to eliciting information about a respondent's WTP is the so-called dichotomous choice format (also known as the closed-ended or discrete choice approach). Bishop and Heberlein (1979) developed the dichotomous choice approach for eliciting non-market values. The dichotomous choice approach mimics behavior in regular markets where people purchase a good at set prices. Each survey respondent is given one specified dollar 'price' and asked whether they would be willing to pay the amount stated in each question.

Although the offer amount is varied across the survey respondents, each respondent has only a binary choice - 'Yes' or 'No'. Participants are randomly assigned an 'offer amount' from a range of possible values. This is done to capture the distribution of maximum WTP or minimum compensation demanded values. Hence, this elicitation method is considered 'closed-ended' and has a dichotomous choice dependent variable.

It is important to note that the dichotomous choice approach does not observe WTP values directly. The mean WTP is estimated by fitting special statistical models to the 'Yes' and 'No' responses to various bid amounts. These 'Yes' and 'No' responses become the basis for estimating values through the application of probabilistic qualitative choice models, such as probit or logit models, to obtain estimates of the indirect utility or bid functions.

There are several advantages to the dichotomous choice format. First, it is realistic. Many private market transactions typically involve goods offered on a take-it-or-leave-it basis in which the individual decides whether or not to purchase the good at the offered price. Hence, one of the properties of the bidding game is kept: it burdens the respondent less than the open-ended question formats. For example, in their study of recreational boating in Texas, Seller *et al.* (1985) used both closed-ended and open-ended formats in separate mail surveys. The closed-ended format consistently produced higher values. The authors attributed this difference to the format of the questions. They concluded that in the open-ended format the boaters were not revealing their true values because the boaters were less accustomed to volunteer a commodity price for the open-ended questions than they were to responding to the specified commodity prices in the closed-ended format. This argument was reflected in the last part of the questionnaire in which the respondents were asked how accurately they felt they had answered the permit questions. Almost 25% of the respondents reported that they were unable to come up with an accurate answer in response to the open-ended CV question. This figure was reduced to 9.2% for those respondents who had received the closed-ended CV question. Thus, since only a 'Yes' or 'No' answer is required, this question format poses a relatively simple decision problem for individuals. This may result in lower item nonresponse rates and fewer refusals to participate in the survey (Freeman, 1993).

A second advantage of the dichotomous choice format is that it is easily incorporated into either mail, interview or telephone survey designs (Bishop and Heberlein, 1989). Another important advantage of this format is that there is no reason to suspect starting point bias in the responses since offer amounts are randomly assigned (Freeman, 1993).

A third advantage of this elicitation question format is that it has the characteristic of being incentive compatible. That is, truth telling is the individually optimal strategy (Hoehn and Randall, 1987).

The primary disadvantages of a dichotomous choice survey are in data needs and analysis. When compared to the elicitation question formats, mentioned above, the dichotomous choice format involves a stronger financial effort in interviewing, since it requires many more observations for the same level of statistical precision in sample WTP estimates. This is because only a discrete indicator of maximum WTP is obtained instead of the actual maximum WTP amount (Mitchell and Carson, 1989). Additionally, the analysis of the discrete choice responses requires more sophisticated mathematical and statistical manipulations - usually maximum likelihood and logit or probit models. This is because of the use of probabilistic choice models to infer maximum WTP values from the observed probabilities of 'Yes' versus 'No' responses (Loomis, 1988).

Lastly, this format may also encourage the 'yea-saying' phenomenon, where the posted bid is accepted as a hint of what is really a reasonable payment (Kanninen, 1995).

2.6 e) iv.1) Referendum Model

The referendum model is a format variant of the dichotomous choice approach. In this model, the participant is told that the 'decision rule' for determining whether or not the proposed change to the environmental good will occur, is a majority vote. Thus, if a plurality of citizens vote 'Yes', then the respondent will have to pay the amount specified in the questionnaire. In this way, the format is 'incentive compatible'. In other words, truth-telling is the individually optimal strategy. The respondent has no incentive to strategically bias answers toward desired outcomes (Hoehn and Randall, 1987).

Another advantage of this elicitation format is that referenda on, for example, the provision of public goods, are not uncommon in real life. Respondents are likely to be familiar with their method of operation and the economic implications if the proposal passes (Mitchell and Carson, 1989). Furthermore, since real referenda are exposed to the response effects that occur with attitude surveys, and since we take the result of referenda as telling us something about peoples' true preferences, it is not necessary to be overly concerned that response effects can not be eliminated from this type of CVM approach (U.S. Dept. of the Interior, 1993).

2.6 e) iv.2) Multiple-Bounded Model

Under discrete choice formats, the responses may not show the respondent's maximum WTP, so a larger sample size is required to measure the WTP function. The multiple-bounded dichotomous choice model was proposed as a way to circumvent the large sample size needs of the basic (also called 'single-bounded') dichotomous choice model (Mitchell and Carson, 1989). The multiple-bounded dichotomous choice model calls for a second question, or even a third to CVM question to follow the first. If the first response is 'No', a randomly selected second lower bid is posed; if the first response is 'Yes', a randomly selected higher second question follows. Gains in the information content per response are achieved because the follow-up more often brackets the true WTP.

As in the single-bounded dichotomous choice, a nice property of this solicitation format is that the cumulative density function (or survival function) can be estimated, from which the mean and median can be derived (Cameron and Quiggin, 1994; Kriström, 1990; Cameron, 1988). It has also been proven that the follow up WTP questions may greatly improve the statistical efficiency of the dichotomous choice format (Hanemann *et al.* 1991). This is because for each observation, that is for each respondent, the researcher has more information about the location of the respondent's WTP value. This additional information is reflected in a higher precision in the estimation of the truncated intervals of the cumulative density function and more robust valuation estimates. In other words, it is possible to get more precise WTP value estimates with the same sample size.

Even though it was recommended by the NOAA Panel (U.S. Dept. of the Interior,

1993) and has been subject to much refinement and testing, the discrete choice question formats have not avoided controversy. Studies that compared the discrete versus open-ended CVM question formats found that the discrete choice questions yielded values much larger than estimates using the open-ended format (Young, 2005; Reaves *et al.* 1999; Kealy and Turner, 1993). However, a meta-analysis of CVM studies did not confirm that discrete choice, or referendum questions, yield significantly larger estimates than did open-ended questions (Rosenberger and Loomis, 2000).

2.6 f) Method of Statistical Analysis

The appropriate statistical method depends on the question format. While standard regression methods usually apply, the dichotomous choice format questions require discrete choice statistical models such as the logit or probit approaches. It is very common to estimate the mean or median WTP and aggregate this amount to obtain a total population value (See Appendix 2 'Main Conclusions' for examples).

2.6 g) Supplementary Data Analysis

In addition to asking valuation questions, the last section of the CVM questionnaire includes a set of socioeconomic and attitudinal questions about the respondents (Nunes, 2000). These typically include questions regarding the respondent's age, household income, education, marital status, level of experience with the good in question, number of dependents, recreational participation, size of household, and some general 'attitude' questions, such as whether the respondent considers them self an environmentalist (U.S. Dept. of the Interior, 1993; FAO, 2000). The purpose of these additional questions is to expand the questionnaire or interview to satisfy other objectives. For example, in addition to descriptive statistics, 'bid equations', which regress expressed values on socioeconomic and attitudinal variables, are also routinely estimated for all variations of the CVM studies. These equations typically have WTP as the dependent variable and various socioeconomic and attitudinal variables such as the independent variables. This information helps relate the characteristics of the non-market good being valued to the characteristics of the respondents. In so doing, it is helpful for generalizing the results of a specific CVM study to other similar situations (Bishop and Heberlein, 1989).

A second reason for expanding the survey instrument beyond valuation questions is to address specific policy issues that are of interest to policymakers. However, caution is advised when basing policy decisions on single survey findings because the results are of a limited scope and are relevant for a specific area at a specific point in time.

2.7 ANALYSIS OF CONTINGENT VALUATION DATA

2.7 a) Qualitative Choice Models

The NOAA Panel regarded the dichotomous choice elicitation format as the only acceptable format for a CVM study to determine passive use values (U.S. Dept. of the Interior, 1993). Analysis of responses to dichotomous choice questions infer maximum WTP or minimum compensation demanded (CD) through qualitative choice models such as logit and probit. These models predict the probability of rejecting an offer as a function of the offer amount and other independent variables. The estimated probabilities are then used to calculate the mathematical expectation of mean WTP or the median offer amount (Bishop and Heberlein, 1989).

2.7 b) Form of the Utility Function

The principal idea underlying the CVM method is that individual consumers have not only defined preferences over the described environmental good, but are also capable of transforming these preferences into monetary units (Nunnes, 2002). As noted previously, from a welfare-theoretic point of view, the CVM methodology denotes a set of procedures used to generate, through direct questioning, estimates of the Hicksian measures of welfare change. As in the case of the open-ended question format, the respondents' answers directly provide the information that the CVM researcher is looking for. Conversely, as in the dichotomous choice question format, the researcher presents a given price to the respondent and asks whether he/she is willing to pay this amount for the described environmental change proposed by the policy action. Since the respondents' willingness to pay is not known to the researcher, the researcher uses the respondents 'Yes' responses to elicit the range of WTP values. With this information, the researcher is able to infer the sample mean or (median) WTP. This valuation scheme was originally proposed by Bishop and Heberlein (1979) and popularized by Cameron (1988) and Hanemann (1984).

2.7 b) i) Hanemann's Utility Difference Model

The utility difference model (Hanemann, 1984) provides one approach to developing a theoretical framework for deriving Hicksian compensating and equivalent welfare measures from dichotomous choice CVM data. It is favored by many analysts (Hanemann, 1996, 1984; McFadden and Leonard, 1993; Sellar, Chavas and Stoll, 1986) because this model is explicitly derived from the welfare economic principles of constrained utility maximization.

The explanation of the form of the utility function given below pertains to the dichotomous choice CVM survey questions Q-22X to Q-24X. These questions asked respondents how much they would be WTP to a non-profit fund for Canada's national parks.

Suppose that an individual receives utility from their money income (**Y**) and contributing to a non-profit fund dedicated to securing better management of Canada's national parks. To represent the non-profit national parks fund, the variable **NPF** is introduced. If the individual believes Canada's national parks are underfunded, and supports the notion of the non-profit parks fund to address the problems associated with underfunding of the national parks, then they will respond in the affirmative and make a donation to the fund. In this case, **NPF = 1**. Alternatively, **NPF = 0** if the individual is not willing to make a donation to the national parks fund.

The decision of whether or not an individual will make a donation is based on the assumption that when faced with a feasible set of discrete choices, they will choose the alternative that maximizes their utility. Hence, this model assumes that an individual is willing to pay the bid amount (**B**) only if the value of utility generated by securing better maintenance of Canada's national parks, less their contribution to the non-profit national parks fund, equals or exceeds their utility when no fund donation is made and national park environments and services are maintained at current or lower levels. This can be rewritten as:

$$\mathbf{U(1,Y\text{-}B;S) > U(0,Y;S)} \qquad \text{(Eq.2.7.1)}$$

where **NPF = 0** is the condition of accepting current levels of maintenance of national park environments and services; **NPF = 1** is the condition of improved levels of maintenance of national park environments; **Y** is the individual income; and **S** is a vector of other attributes or "other things" (Nicholson, 1992, p.58) including the individual's age, tastes, gender, prior visits to national parks, etc. that may affect the WTP decision. These other factors are assumed to be held constant to simplify the data analysis.

A second assumption of this model is that although the individual knows his/her utility function, it contains elements that are unobservable to the researcher. While the true utility function is denoted by **U(NPF,Y;S)**, the researcher's model is given by **u(NPF,y;s)**. The lower case letters reflect the fact that, due to the unobservable elements of the true utility function, the factors included by the analyst in the model will not be the exact same set of factors considered by the respondent (Bateman *et al.* 2002). The unobservable factors are treated by the researcher as 'stochastic' and serve to generate the stochastic structure of the statistical binary response model. These stochastic elements could be characteristics of the individual and/or attributes of the alternative good offered to the individual.

From the researcher's viewpoint, **u(0,y;s)** and **u(1,y;s)** are random variables with some given parametric probability distribution and with means **v(0,y;s)** and **v(1,y;s)**. The means depend on the observable characteristics of the individual through given parametric functions (Hanemann, 1984). Equivalently, the utility function can be algebraically described as the sum of its non-stochastic and stochastic components:

$$\mathbf{u(j,y;s) = v(j,y;s)} + \epsilon_j, \quad \text{where } j = 0,1 \qquad \text{(Eq.2.7.2)}$$

In order to estimate an equation to predict the individuals' choices, utility must be divided into observable and random components. The observable portion **v(NPF,y;s)**, is also referred to as the 'indirect utility[4]' function and is the mean of the random variable **u**.

The random components (**ϵ_0** and **ϵ_1**), are assumed to be independent and identically distributed (i.i.d.) random variables with zero means (Ibid, 1984). Thus, the e individual's decision to donate **B** dollars to the non-profit national parks fund can be re-expressed as:

$$\mathbf{v(1,y\text{-}B;s)} + \epsilon_1 \geq \mathbf{v(0,y;s)} + \epsilon_0 \qquad \text{(Eq.2.7.3)}$$

Equation (Eq.2.7.3) suggests that people will donate a specified dollar amount to the national parks fund only if the value of the utility gained from the activities generated by the national parks fund, less the donation amount, equals or exceeds utility gained when no donation is given and the park fund generated activities are not secured. Of course, the more an individual pays (i.e. the higher the dollar value of **B**), the less utility

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[4] Indirect utility is the maximum utility (or well-being) a household or individual can derive from: their income, the given prices and the given provision of goods. A complete description of indirect utility can be found in standard university microeconomic texts including Bateman, *et al.* 2002; Freeman, 1993; Nicholson, 1992; Varian, 1984.

they realize. The maximum WTP (equivalent to the compensating variation in this study) is the case where the monetary donation is so high that the individual's utility gain from the activities generated by the national parks fund, less the donation amount, equals the utility gained when no donation is given and the park fund generated activities are foregone. Algebraically, this can be expressed as:

$$\mathbf{WTP_{max} = [v(1,y\text{-}B;s) + \epsilon_1 = v(0,y;s) + \epsilon_0]} \qquad \text{(Eq.2.7.4)}$$

A further consideration provided by economic theory is that an individual's maximum WTP is bounded by their ability to pay. Income is the upper bound on an individual's WTP because, given that the payment vehicle is a donation to a non-profit fund, no respondent can give more than they earn. Thus, in mathematical notation:

$\mathbf{B_{ij} \leq max\ WTP < y}$, where B = bid amount,
and i = number of individuals from 1....N
and j = number of bid amounts from 1...K

While the individual is assumed to know which choice maximizes their utility, this choice is not clear to the researcher because the observable utility function is complicated by the unobservable component. Hence, the researcher expresses the individuals' choice in a probabilistic framework. The individuals' choice is considered a random variable whose probability distribution is given by:

$$\mathbf{Pr^Y = Pr(willing\ to\ donate) = Pr[v(1,y\text{-}B;s) + \epsilon_1]} \qquad \text{(Eq.2.7.5)}$$

and where:

$$\mathbf{Pr^N = Pr(individual\ not\ willing\ to\ donate) = 1 - Pr^Y} \qquad \text{(Eq.2.7.6)}$$

In accordance with Hanemann (1984), let the difference in the error terms be represented $\boldsymbol{\eta}$ where $\boldsymbol{\eta} = \epsilon_1 - \epsilon_0$ and $\mathbf{F}_\eta$ (.) be the cumulative density function (cdf) of $\boldsymbol{\eta}$. Therefore, the WTP probability may be written as:

$$\mathbf{Pr}^{\mathbf{Y}} = \mathbf{F}_\eta(\Delta \mathbf{v}) \tag{Eq.2.7.7}$$

where the difference in utility is given by:

$$\Delta \mathbf{v} = \mathbf{v(1,y\text{-}B;s) - v(0,y;s)} \tag{Eq.2.7.8}$$

The term $\mathbf{F}_\eta(\Delta \mathbf{v})$ is the cumulative probability distribution function of the respondent's maximum WTP, which is a random variable. In the logit model, $\mathbf{F}_\eta$ (.) is the cumulative density function of a standard, logistic variate. Thus,

$$\mathbf{Pr}^{\mathbf{Y}} = \mathbf{F}_\eta(\Delta \mathbf{v}) = (\mathbf{1} + \mathbf{e}^{-\Delta \mathbf{v}})^{-1} \tag{Eq.2.7.9}$$

If the statistical logit model is to be consistent with the economic model for a utility maximizing choice, the arguments for $\mathbf{F}_\eta$ (.) in Eq.2.7.7 and Eq.2.7.9 must take the form of a utility difference as in Eq.2.7.8. To utilize the dichotomous choice CVM data in a manner compatible with the economic hypothesis of utility maximization, a functional form for indirect utility needs to be postulated and the difference in utility determined.

Hanemann (1984), provides two specifications of the non-random component of the indirect utility functions:

$$\mathbf{v(NPF,y;s)} = \boldsymbol{\alpha}_{\mathbf{NPF}} + \boldsymbol{\beta}\mathbf{y}, \quad \text{where NPF} = 0,1 \text{ and } \beta > 0 \tag{Eq.2.7.10}$$

and $$\mathbf{v(NPF,y;s)} = \boldsymbol{\alpha}_{\mathbf{NPF}} + \boldsymbol{\beta}\mathbf{lny}, \quad \text{where NPF} = 0,1 \text{ and } \beta > 0 \tag{Eq.2.7.11}$$

and where $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ are parameters.

The utility difference yielded by Eq.2.7.10 is given below:

If $\mathbf{v(NPF,y;s)} = \boldsymbol{\alpha}_{\mathbf{NPF}} + \boldsymbol{\beta}\mathbf{y}$, where NPF = 0,1 and $\beta > 0$ (Eq.2.7.10)

then $\Delta v = (\boldsymbol{\alpha}_1 + \boldsymbol{\beta}(\mathrm{¥}_1)) - (\boldsymbol{\alpha}_0 + \boldsymbol{\beta}(\mathrm{¥}_0))$ where $\mathrm{¥}_1 = y - B$ and $\mathrm{¥}_0 = y$ (Eq.2.7.12)

$$= (\alpha_1 - \alpha_0) + \beta y - \beta y - \beta B \qquad \text{(Eq.2.7.13)}$$

$$= (\alpha_1 - \alpha_0) - \beta B \qquad \text{(Eq.2.7.14)}$$

Similarly, the utility difference given by Eq.2.7.11 is:

$$\Delta v = (\alpha_1 - \alpha_0) + \beta \ln(1 - B/y) \qquad \text{(Eq.2.7.15)}$$

Inserting Eq.2.7.15 into the logit function (Eq.2.7.9) yields:

$$Pr^Y = F_\eta(\Delta v) = (1 + e^{-\Delta v})^{-1} \qquad \text{(Eq.2.7.9)}$$

$$Pr^Y = F_\eta(\Delta v) = (1 + e^{-((\alpha 0 - \alpha 1) + \beta B)})^{-1} \qquad \text{(Eq.2.7.16)}$$

Similarly, inserting Eq.2.7.15 into the logit function (Eq.2.7.9) yields:

$$Pr^Y = F_\eta(\Delta v) = (1 + e^{-\Delta v})^{-1} \qquad \text{(Eq.2.7.9)}$$

$$Pr^Y = F_\eta(\Delta v) = (1 + e^{-((\alpha 0 - \alpha 1) - \beta \ln(1 - B/y))})^{-1}$$

(Eq.2.7.17)

Note that in the case of the linear utility model (Eq.2.7.10), the discrete choice probabilities $\mathbf{Pr^N}$ and $\mathbf{Pr^Y}$ are independent of the individual's income (i.e. because **y** does not appear in equation (Eq.2.7.14). Therefore, 'income effects' do not occur in this model. In other words, the amount being spent on the good that is being valued is not large enough, relative to the individual's income, to change the quantity of the good demanded. The summary statistics from other studies (Chapter 3) and from this research suggest that individual WTP values for national parks are too small to have significant income effects. Hence, the linear utility form is used for the models presented in this thesis.

In the linear model, the change in the quantity of the good demanded is entirely attributed to the effect of a change in the price of the good relative to the prices of other goods. This is called the 'substitution effect' (Nicholson, 1992; Emery, 1984).

Hanemann (1984) suggests that when confronted with a bid amount of **(B)** dollars, the individual is willing to pay **(B)** if it is less than or equal to his maximum WTP and will refuse it otherwise. Thus, an equivalent way of expressing the binary response probabilities in (Eq.2.7.5) and (Eq.2.7.6) is given by:

$$\mathbf{Pr^{Y} = Pr(WTP_{max} > B) = 1 - G_{WTPmax}(B) = F_{\eta}(\Delta v(B))} \qquad \text{(Eq.2.7.18)}$$

where **(WTP_{max})**, the individual's maximum WTP donation to the national parks fund satisfies:

$$\mathbf{u(0,y;s) = u(1,y\text{-}WTP_{max}\,;s)} \qquad \text{(Eq.2.7.19)}$$

and $\mathbf{G_{WTPmax}(.)}$ is the cumulative density function (cdf) of $\mathbf{WTP_{max}}$.

The term $\mathbf{F_{\eta}}(\Delta\mathbf{v(B)})$ means that the $\mathbf{Pr(WTP_{max} > B)}$ is a function of the distribution in the error term differences **(F_{η})**, which is a function of changes in the observable components of utility **(Δv)**. Recall, the observable components of the utility function are **NPF, y** and **s**. Hence, the term **(Δv)** is affected by **(B)** because **(B)** affects **(y)** which is an argument of the utility function **u(NPF,y;s)**.

Hanemann (1984) also showed that the specific form of the logit function specified by Bishop and Heberlein (1979) was not consistent with any theoretically acceptable utility function. While Bishop and Heberlein (1989) agree that a functional form that fits the data and is consistent with utility theory will provide stronger results, they state that as long as the estimated logit function is upward sloping (to reflect the increasing probability that an individual will reject the offer as the offer amount increases), and has statistically significant coefficients, the minimum requirements of utility theory are satisfied.

In conclusion, the researcher should strive to find a functional form that adequately fits the data and is consistent with the axioms of utility theory. As mentioned previously, the linear utility form described by Hanemann (1984) is used for the models presented in this thesis. This decision was based on the assumption that the respondents' utility for national parks is not affected by their income. The bid amounts used in this study (between $10 and $80) were sufficiently low so as not to affect the respondents' marginal value of a dollar. Therefore, income effects were assumed to be negligible.

2.7 c) Welfare Measures from the Dichotomous Choice Model

This section explains how to use the fitted binary response model to obtain a utility-theoretic measure of the money value of the surplus benefits accruing to Canadians from their national park system.

One welfare measure proposed by Hanemann (1984), is the mean of the WTP distribution described by Eq.2.7.18. Assuming WTP is a non-negative random variable, the mean willingness to pay (**WTP_{mean}**) can be written as:

$$\mathbf{WTP_{mean} = Expected\ value\ of\ WTP_{max} = E(WTP_{max}) = \int_0^{+\infty} [1 - G_{WTPmax}(B)]\,dB,} \qquad \text{(Eq.2.7.20)}$$

where $\mathbf{\lim_{B\to 0} G_{WTPmax}(B) = 0}$ and $\mathbf{\lim_{B\to +\infty} G_{WTPmax}(B) = 1}$. These two conditions ensure that the area below the probability distribution function is equal to 1 (Boyle and Bishop, 1988).

Equation 2.7.20 suggests that the mean willingness to pay (**WTP_{mean}**) is equal to the expected value of the individuals' maximum WTP given by $\mathbf{E(WTP_{max})}$. For this thesis, the term $\mathbf{G_{WTPmax}(B)}$ is the probability that the respondent will pay the bid amount **(B)** as a donation to the national parks fund. This implies $\mathbf{Pr(WTP_{max} > B)}$. The parameters **a** and $\boldsymbol{\beta}$ in the logit equation identify $\mathbf{G_{WTPmax}(B)}$, where the mean of $\mathbf{G_{WTPmax}(B)}$ is the expected value of WTP.

An alternative welfare measure presented by Hanemann (1984), is called the median and can be defined as:

$$\mathbf{Pr(v(1,y\text{-}WTP_{median};s) \quad Pr(v(0,y;s) = 0.5} \qquad \text{(Eq.2.7.21)}$$

The median is interpreted as the WTP value at which 50% of the respondents vote 'No' to making a contribution to the national parks fund. The $\mathbf{WTP_{median}}$ is the median of the cumulative density function $\mathbf{G_{WTPmax}(.)}$ and can be calculated as follows:

Recall that $\mathbf{G_{WTPmax}(.)}$ is the cdf of the maximum willingness to pay as a donation to the national parks fund and is assumed to be logistical distribution. If WTP is assumed to be a non-negative random variable and $\mathbf{WTP_{max}}$ satisfies the utility equality of $\mathbf{u(0,y;s) = u(1,y\text{-}WTP_{max})}$, then the probability of replying 'Yes' ($\mathbf{Pr^Y}$) is given by:

$$\mathbf{Pr^Y = Pr(WTP_{max} > B) = F_\eta(\Delta v(B))} \qquad \text{(Eq.2.7.22)}$$

$$\mathbf{= 1 - G_{WTPmax}(B)} \qquad \text{(Eq.2.7.23)}$$

$$\mathbf{= (1 + exp^{-(\alpha+\beta B)})^{-1}} \qquad \text{(Eq.2.7.24)}$$

The formula for the median value of the logistic is determined by setting $\mathbf{Pr(WTP_{max} > B) = .5}$ and solving for **(B)**. Therefore:

$$\mathbf{.5 = (1 + e^{-(\alpha+\beta B)})^{-1}} \qquad \text{(Eq.2.7.25)}$$

$$\mathbf{1 + e^{-(\alpha+\beta B)} = 2} \qquad \text{(Eq.2.7.26)}$$

$$e^{-(\alpha+\beta B)} = 1 \quad \text{(Eq.2.7.27)}$$

Taking the ln of both sides yields:

$$-(\alpha+\beta B) = 0 \quad \text{(Eq.2.7.28)}$$

$$-\alpha/\beta = B \quad \text{(Eq.2.7.29)}$$

Therefore, the median is $-\alpha/\beta$ (Eq.2.7.30)

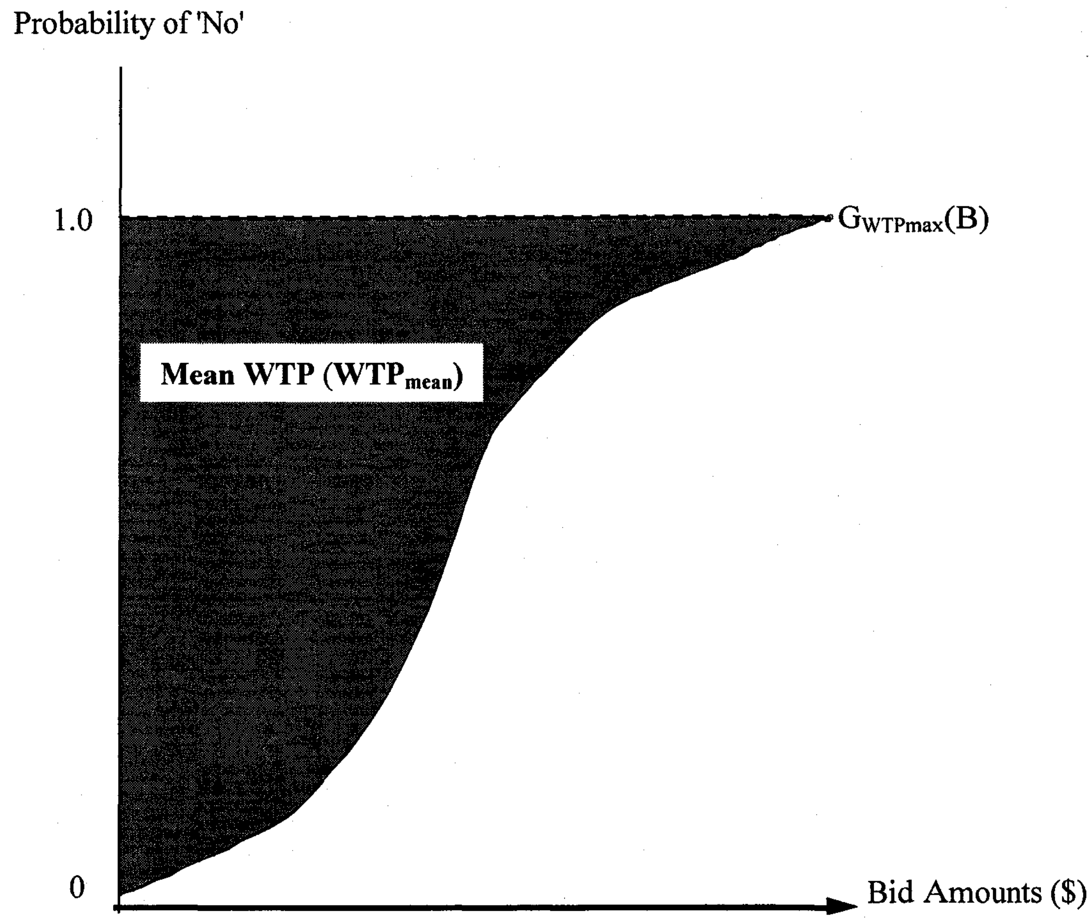
2.7 d) The Cumulative Density Function

The common way to trace out the distribution of underlying WTP values is to estimate the probability curve to the binary responses. This curve is known as the cumulative density function (cdf), $G_{WTPmax}(B)$, and refers to the function of probabilities of negative responses. The expected value (mean) from the logit function is calculated by integrating the area under the cumulative density function.

A graphical illustration of how values from dichotomous choice questions are calculated is presented in Figure 2.8. The horizontal axis represents increasing bid **($B)** amounts. The vertical axis measures the probability that a randomly selected respondent will answer 'No' when asked whether he or she would be willing to pay a specified bid amount.

Each **B** dollar amount is associated with a probability (Pr^Y) that an individual would say 'Yes'. The probability that an individual would say 'No" is denoted by (Pr^N). Since the sum of the probabilities is one, $Pr^Y = 1 - Pr^N$. Rejecting a bid amount means the respondent's maximum willingness to pay is less than **B**, and hence, would lie in the shaded area of Figure 2.8.

Figure 2.8. Cumulative Density Function



The regression function $\mathbf{G_{WTPmax}(B)}$, which is estimated using probit or logit estimation methods, is upward sloping. Intuitively, this characteristic makes sense, since one would expect that the percentage responding with a 'No' vote increases as the amount that the respondent is asked to pay increases.

Since a refusal to pay **B** implies a refusal to pay all amounts greater than **B**, $\mathbf{G_{WTPmax}(B)}$ is interpreted as a cumulative density function on the probability of rejecting

B. One feature of cumulative density functions is that the expected value (mean) of the random variable equals the area below the cumulative density function. In this case, the area below $\mathbf{G_{WTPmax}(B)}$ is the probability of a 'No' response. Conversely, the area below $\mathbf{1 - G_{WTPmax}(B)}$ is the probability of a 'Yes' response and corresponds to the mean willingness to pay. This area is represented by the shaded portion in Figure 2.8. It is calculated through integration of Eq.2.7.20 as indicated below:

$$\mathbf{meanWTP = WTP_{mean} = \int_0^{+\infty} Bd[G_{WTPmax}(B)] = \int_0^{+\infty} [1 - G_{WTPmax}(B)]\mathit{d}B} \qquad \text{(Eq.2.7.31)}$$

2.7 e) Choice of Welfare Measure: Mean or Median?

In general, mean WTP and median WTP will take on different values. Frequently, WTP data show a distribution that is skewed to the right (i.e the mean is greater than the median). This is not unusual if the distribution of WTP values has a logistic distribution as shown in Figure 2.8. Since the offer amounts are greater than zero, the lower tail of the function is truncated at zero causing it to be skewed. In such a case, the mean will tend to take on a higher value than the median.

Hanemann (1984) pointed out that if the logistic distribution had a 'fat tail' (i.e. the probability of rejecting the offer amount is substantially less than unity for large bid amounts), then integration to the average of the distribution will yield excessively high mean values for the resource. Thus, he suggests the use of the median rather than the expected value as the correct welfare measure because it is less affected by the size of the tail. However, the median is difficult to defend from a welfare perspective because it ignores those people who have the greatest dollar value for the resource.

Bishop *et al.* (1988) argue that unless 'protest responses' can be identified and deleted, the remaining extreme values are legitimately-held economic values and should be included in the data set. Hence, these authors recommend using the mean as the welfare measure. Furthermore, they state that truncation problems can be avoided through careful survey design and pretesting of the offer amounts. For example, allowing respondents to explain why they accepted/rejected a given bid amount may facilitate the discovery of overstated WTP values (U.S. Dept. of the Interior, 1993).

It is somewhat unclear which welfare measure will provide the highest quality of information (Condon, 1993). Equation 2.7.20 suggests that the mean WTP distribution is unbounded from above. This overall mean is inconsistent with the theoretical constraints that follow from basic consumption theory because the plausible upper limit to the WTP distribution is not infinity, but something less than income (Duffield and Patterson, 1991). Thus, some authors have chosen to present their results in terms of a truncated mean WTP value (Sellar, Stoll and Chavas, 1985; Bishop and Heberlein, 1979).

The decision of whether to truncate the integral of the mean WTP value is the responsibility of the researcher. Obviously, the untruncated mean better reflects the true distribution of stated WTP responses and their variation. Additionally, if the sample size is large enough, outliers will not significantly influence the mean value. However, because the WTP distribution is non-negative, it may be skewed and, hence, the mean and median may differ considerably. In a very skewed distribution, the mean is heavily influenced by the upper tail of the distribution and may reflect the values of only a small proportion of the population (Hanemann, 1989). Although truncating the mean reduces the possibility of unjustifiably high WTP values, like the median, it neglects the dollar values of respondents who have the highest value for the resource.

The issue in the use of the truncated mean is the determination of the truncation point. Boyle *et al.* (1988) recommend rigorous pretesting to establish a maximum bid sufficiently high so that the probability of a 'Yes' response approaches zero. Another approach to limiting the influence of high WTP values is by setting the truncation point at a particular percentile of the WTP distribution (Bowker and Stoll, 1988). For example, to limit the influence of the top 10 percent of the WTP values, one would use the 90th percentile as the truncation point. In this study, the decision whether to use a truncated mean will be premised on the severity of the skewness as indicated by the difference between the mean and median values.

From the perspective of decision-makers, the mean and median measures for summarizing the distribution of WTP values can be seen to have quite different interpretations. If the decision-maker wishes to make a decision based on efficiency criteria, then the mean is the most appropriate measure. So long as the mean WTP outweighs the cost per person, then the decision maker can pronounce that the project should proceed. In this case, even if gainers compensate losers, net profits are still positive (Bateman *et al.* 2002). While multiplying the mean estimate by the population size gives the total value, no such interpretation can be given to the median (Kriström, 1990).

The median is the relevant WTP measure if the outcome is to be interpreted as the result of a referendum. Thus, if the decision maker prefers to choose a course of action based on a majority voting rule, the median is the more appropriate measure. In this case, if the median WTP is greater than the cost per person, than the decision maker can conclude that the majority of households would vote in favor of the project (Bateman *et al.* 2002).

Since neither measure is innately superior, the researcher should always report both mean and median values of WTP. It should also be noted that a decision maker may be interested in many aspects of the distribution of WTP. These may include how many households receive little or no benefits from the project; whether the benefits are highly concentrated; and how the benefits vary with different parameters such as geographical area, gender, education, age, income, etc.

2.7 f) Offer Amount Selection Methods for the Dichotomous Choice Model

There are two main methods of choosing offer amounts. Both require pretesting to determine an estimation of the mean offer amount that is acceptable to respondents. Additionally, both methods use equal numbers of offer amounts selected from either side of the mean.

The first method of choosing offer amounts corresponds most closely to the method used in this study. In this method, a small number of offer amounts are selected that lie close to the mean offer amount determined through the pretests (Carson *et al.* 1992). The primary advantage of this method is that since the variance is indirectly proportional to the sample size of each offer, this method can result in low standard errors of the mean WTP. However, if the pretest mean is different from the sample mean in the survey, then the sample will not lie evenly on either side of the mean. In this case, the mean and WTP estimates will have very large errors, and possibly be biased.

The second method of choosing offer amounts involves specifying a large number of offer amounts that are evenly distributed on either side of the pretested mean (Lyke, 1993; Bishop and Heberlein, 1989). The offer amounts entered in the surveys are drawn from a random sample generated by an assumed distribution. The advantage of this method is that offer amounts are selected from the entire assumed distribution of offer amounts. The problem with this method is that outliers on the tails of the WTP distribution have inordinately large weights and may skew the sample distribution. Also, for a survey of moderate size, the large number of offer amounts implies that the sample size on each is lower. This will result in larger standard errors of the estimated welfare measures.

2.8 ADVANTAGES OF THE CONTINGENT VALUATION METHOD

The primary attraction of CVM is that it can measure the economic benefits of a wide assortment of beneficial (or adverse) effects in a way consistent with economic theory. As noted by Nunes *et al.* (2001), the CVM is able to express the Hicksian welfare measure directly in monetary terms.

King and Mazzota (2003) list the number of advantages of the CVM in comparison with other methods for economic valuation of the environmental goods.

According to these authors, the CVM is enormously flexible in that it can be used to estimate the economic value of virtually anything. They observe that it is currently the most widely-accepted method for estimating Total Economic Value and is still the only method capable of measuring non-use or passive use values.

Another major advantage of the CVM is its ability to evaluate proposed, in addition to already available, goods, services and institutional arrangements. This is important in numerous cases where the impacts of potential changes in the supply or quality of an environmental good cannot yet be observed.

Lastly, while other valuation techniques require competent survey analysts to achieve defensible estimates, the nature and the results of CVM studies are not difficult to analyze and describe. Monetary values can be presented in terms of the mean or median value per capita or per household, or as an aggregate value for the affected population.

To date, the CVM has been widely used, and a great deal of research is being conducted to improve the methodology, make results more valid and reliable, and better understand its strengths and limitations. While a full discussion of the debatable issues regarding the CVM is beyond the scope of this report, the following section introduces the debatable issues that were considered most relevant to the current study and explains the efforts made to address them.

2.9 ISSUES RELATED TO THE CONTINGENT VALUATION METHOD

Despite its popularity, the CVM has been the target of diverse critiques. Some scholars express their doubts with respect to the suitability of CVM results for inclusion in cost-benefit analysis (Desvousges, 1993; Diamond *et al.* 1993; Hausman, 1993; Milgrom, 1993).

The first difficulty arises because this method takes the current distribution of income as a starting point. It is not the environmental good that is taken as the central issue, but the market, the boundaries of countries, and the current income distribution (van der Straaten, 2000). This means that valuation for the same environmental good can lead to different WTP outcomes. For example, had the same Exxon Valdez oil spill that occurred off the coast of Alaska taken place on the coast of Gambia, Denmark, or Nicaragua, the outcome of the CVM valuation to assess damage costs would have likely been very different. The strange result that a similar ecological damage can lead to different monetary outcomes draws from the fact that the current geographical situation and the current income distribution are used as guiding principles in the CVM. 'Willingness to pay' is based on 'ability-to-pay', and hence, it is likely that populations with different income distributions will value the same resource differently. In some cases, it may be better to express WTP as a percentage of income, rather than a specific currency amount, to better reflect the true value of the environmental good to the population (IUCN, 1998).

Epstein (2003), however, notes that there is difficulty inherent in all systems of valuation. He posits that the use of market valuations solves only a tiny corner of the overall problem of valuation - even for goods that are regularly bought and sold. The author notes that most market goods have a subjectively derived 'use' or 'consumption' value that is greater than the market value - which explains why we do not see 'for sale' signs on every home, even when real estate values increase. This example is just another way of saying that most of the time, particular goods are in the hands of those who value them most. The author notes that since the subjective use value is unobservable, and because market exchange values systematically underestimate the subjective use values, some form of CVM is usually done to extract the consumption value that an individual has for a good or service. For example, in the case of real estate property damages, determination of taxes, compensation for serious injury and appraisal of unique assets, some variation of a CVM study is done by the courts and private sector appraisers, and used to 'top-off" market values.

2.9 a) Hypothetical Bias

One of the basic critiques of CVM is summarized in the phrase: "Ask a hypothetical question; get a hypothetical answer" (Young, 2005). This skepticism is particularly strong when the CVM is used to measure non-use values. For example, Hausman raises the question: "Is some number better than no number?" (1994, p.45). This challenge arises because the CVM assumes that people understand the good(s) in question, and will reveal their preferences in the contingent market, just as they would in a real market. Most people are unfamiliar with placing monetary values on environmental goods and services and may not have an adequate basis for stating their true value (King and Mazzotta, 2003).

The NOAA Panel, however, pointed out that the valuation challenge is not limited to environmental goods. The Panel pointed out that:

> "the problem of estimating the demand for highly innovative commercial products, including some that have not yet actually been produced, is much like the problems faced in CVM research. It is the problem of estimating willingness to pay for a necessarily unfamiliar product...There is an anchoring problem, even with private goods - that is, absolute willingness to pay is hard to pin down" (U.S. Dept. of the Interior, p.4609).

Some researchers have observed that the actual WTP is less than the stated WTP and concluded that this 'hypothetical bias' is due to the hypothetical nature of the payment commitment (Cummings and Taylor, 2001; Getzner, 2000; Champ et, al., 1997; Cummings *et al.* 1997; Brown *et al.* 1996). Diamond and Hausman (1992) suggest that people are just making up their answer and may have no real value for the good or service in question until the CVM process generates that value. Hence, their WTP responses do not reflect their true economic preferences. Hanemann (1994) counters this criticism by addressing the definition of 'true economic preferences'. He argues that as long as CVM derived values can be shown to be stable over time, they are valid and reliable. A number of CVM test-retest studies have been conducted that confirm that CVM derived values are reasonably consistent over time (Whitehead and Hoban, 1999; McConnell, 1998; Carson *et al.* 1997; Stevens *et al.* 1994).

Kontoleon *et al.* (2002) examined the extent to which preference-based values, such as those from CVM studies, are suitable for guiding environmental policy and damage assessment decisions on conception, moral and legal grounds. The authors concluded that even if we accept measurements of economic values that are not accurate, the use of this information is still justified if losses avoided by such use exceed those from not using the information. Seen in this way, the authors state that those who oppose the use of individual preferences in the determination of damage assessments should demonstrate that the information has no merit. They argue that skewed WTP values can still be useful indicators to improve the decision-making process, provided the ways in which they are skewed are understood. As an analogy, even prior to its repair, the Hubble space telescope was still providing valuable information to NASA astronomers, despite the distortions produced by its imperfect design (Hubin, 1994).

2.9 b) Information Bias

Information bias may arise whenever respondents are forced to value attributes with which they have little or no experience. In such cases, the amount and type of information presented to respondents may affect their WTP answers (King and Mazzotta, 2003; Munro and Hanley, 1999;). Furthermore, even if unbiased and detailed information is supplied, WTP answers may be affected if respondents do not accept, internalize and formulate their responses from the information given (Arrow *et al.* 1993).

The provision of information about the good or service to be valued by the CVM survey raises three questions: (i) what is the optimal amount of information the researcher should provide to the respondent? (ii) how is true, accurate and unbiased information defined? and (iii) to what extent is information accepted at face value?

Questions (i) and (ii) are important to the extent that excessive and biased information can produce invalid estimates of value. If the researcher downplays or does not mention attributes that are important to some respondents, the study may either undervalue or overvalue the good (Bateman and Willis, 2001; Hanley *et al.* 2001; Diamond and Hausman, 1993; Boyle, 1989; Samples, Dixon and Gowen, 1986).

Hanemann (1994) counters this concern and argues that if a survey is to elicit peoples' preferences as if they were voting in a referendum, then prior knowledge is irrelevant. He suggests that given the difficulty in measuring revealed preferences for public goods, especially those that are national in scope (such as national parks), every source of information should be utilized to better understand human behavior and their corresponding values.

While Question (i) and (ii) are largely subjective and left to the discretion of the researcher, Question (iii) can be examined through the addition of debriefing survey questions which follow the valuation questions. As Arrow *et al* (1993) recommends: "it is often desirable to ask respondents to specify the reasons for their reported choices" (p.4506).

A debriefing question to determine why respondents were unwilling or unable to provide WTP responses for the CVM questions was asked of respondents as part of this research effort. Additionally, since the purpose of the overall survey was to gauge the current level of understanding and appreciation Canadians have for their national parks, no additional descriptive information about Canada's national parks was given to respondents to facilitate their responses to the CVM valuation or other survey questions. Thus, the results of this survey provide a baseline level of knowledge about the opinions and values that Canadians hold for their national park system. It is anticipated that the WTP values from future research efforts, containing more detailed national park information for respondents, will be compared to this baseline to evaluate how the type and level of information provided affects respondents valuation for Canada's system of national parks.

2.9 c) The Embedding Effect

Another main issue is the so-called 'embedding effect'. The term was first put forward by Kahneman after he conducted a CVM experiment which focused on the WTP of Ontario residents to preserve fish stocks in some lakes. The empirical results showed that the WTP to prevent the drop in fish populations in all Ontario lakes was just slightly higher than the WTP for fish stocks in only a small portion of the Province (Kahneman, 1986). According to Hanemann, the term and embedding combines three distinct notions: "the scope effect, the sequence effect, and the sub-additivity effect" (1994, p.34). These notions are discussed briefly below.

2.9 c) i) The Scope Effect

The scope effect exists when the respondents do not distinguish differences between the quantity or scope of the public good (Hanemann, 1994). For example, in a CVM study that looked at a program to prevent deaths of migratory waterfowl from exposure to waste-oil holding ponds, Desvouges *et al.* conducted brief interviews at shopping malls and found that: "the WTP did not increase when the level of the services increased: the WTP estimates for protecting 2000 birds were not statistically different than the WTP estimates for protecting 100 times as many birds" (1993, p.113).

Contrary to Desvouges findings, other CVM applications show that empirical evidence rejects the hypothesis that WTP does not vary significantly with scope (Carson, 1997). For example, Carson, Wilkes and Imber (1994) designed a CVM study to assess the WTP to prevent mining near a national park in Australia. The empirical results showed that the WTP for the prevention of the 'major' impact mining scenario was greater than the WTP for prevention of the 'minor' mining scenario.

Although the empirical results show mixed evidence with respect to the scope effect, Mitchell and Carson (1993) suggest that it can be minimized by designing the survey scenario to focus the respondents on the good which is of interest, and not to confuse the good with the general class of which it is a component. Following the NOAA Panel (U.S. Dept of the Interior, 1993), shopping mall interviews were also deemed an inappropriate method to engage the public for non-market valuation questionnaires.

2.9 c) ii) The Sequencing Effect

The 'sequence effect' or 'behavioral anchoring effect' exists when the respondents value a given public good differently if it is placed early in the list of public goods to be valued than if it is placed near the end (Payne, *et al.* 2000; Hanemann, 1994; Loomis *et al.* 1993). This effect presumes that each public good is a separate argument in the utility function and that they are placed in the survey question in order of their value or importance. Samples and Hollyer (1990) suggest that the sequence effect can be explained by further questioning of respondents by the interviewer.

2.9 c) iii) The Sub-additivity Effect

The 'sub-additivity effect' (also called the 'adding-up' or 'value aggregation' effect) exists when the respondents value a set of public goods differently when valued individually compared to when valued together. In other words, the value of a given public good is much larger when it is evaluated on its own compared to when it is evaluated as part of a more inclusive package of public goods (Hanemann, 1994).

In a well-known paper, Diamond *et al.* (1993) explored the sub-additivity effect using a CVM application that focused on the willingness to pay for the protection of one, two or three wilderness areas in the United States. They observed that the WTP value for three wilderness areas taken as a group ($47) was considerably lower than the sum of the individual WTP values when each wilderness area was valued separately ($120). A possible explanation could be that "WTP answers may also reflect a desire on the part of people to state their support for environmental issues" (Ibid, p.48).

Kahneman and Knetsch (1992) offered an alternative hypothesis to embedding. They proposed that WTP for public goods is also an expression of WTP to acquire "a sense of moral satisfaction, also known as the warm glow of giving"(Ibid, p.64).

According to these authors, these findings do not conflict with standard economic value theory. These responses can be explained in terms of an imperfect altruistic motivation of the individual consumer. The individuals' financial contribution to the public good enters into their utility function twice: once as a private good and once as a contribution to public good. An individual consumer contributes to the provision of a public good for two reasons: because they simply wants more of it and because they derives some private benefit (such as a feeling of prestige or well-being) from the simple act of contributing money to the good (Getzner, 2000; Andreoni, 1990). Thus, it seems plausible that the act of participating in a CVM market to assist in the supply of an environmental good could provide a mixture of private, warm glow benefits, and public services from the increased supply of the good. Therefore, there is no reason to doubt respondent answers because of the sub-additivity effect.

Epstein (2003) suggests that the sub-additivity effect can be explained, in part, by the failure to distinguish between average and marginal value. For example, it may well be that a person would pay a substantial sum of money for the preservation of a single park. But again, that judgment has to be set into contexts. The first issue is how many parks should be preserved and at what price? It is highly unlikely that someone who would pay \$100 to preserve one national park would also pay \$10,000 to preserve a hundred national parks. Or, that they would stick to that valuation if asked about the preservation of other things that compete for the same scarce resources. Epstein (2003) suspects that at least one rational response to these individual questions is to plead partial ignorance and the deference to experts. Thus, a respondent could say that he is prepared to commit \$500 per annum to parks, writ large, but would prefer for government and private professionals to decide which specific parks and park jurisdictions should receive the bulk of the funds. The respondents' budget constraint becomes a way to supply needed social input, without having to inject their own views into an area in which they feel ignorant as to the mix of activities in question.

This last observation shows the odd linkage between the individual and collective roles. In the ordinary case of subjective value, the respondent is asked to measure their personal subjective value for some good or service. They do not have to think of the gains and losses that their valuation will have with respect to some large population (Epstein, 2003).

For example, suppose one intends to ask the extent to which an individual values the preservation of a specific national park. The usual way to posit the question is to ask each respondent their WTP, and then to sum the values over all individuals. Thus, if a respondent would pay $100 for the preservation of one national park, aggregated across the number of households, that could easily transfer into a $310 million valuation for the Province of Ontario or an $840 million valuation for the nation. This aggregation is odd, to say the least, for it is doubtful that anybody would argue that we should pay $840 million from the public treasury to protect one national park, even if everyone announced his willingness to put their $100 dollars into the pot. It may well be that the valuations that one gets will be quite lower if the question was worded as: "What amount of public resources do you think should be spent on a given issue (i.e. preserving Canada's national parks)"? As noted by Diamond and Hausman (1993), a lot may turn on the way the question is framed.

The faulty assumption that respondents are able to separately value the use and non-use benefit categories of an environmental good may also help explain the sub-additivity effect. The error of assuming that respondents are aware, to the degree of precision desired by the researcher, of what motivates their value judgments is called "the fallacy of motivational precision" (Mitchell and Carson, 1989, p.288). These authors argue that although the utility that respondents receive from an environmental good may stem from all or some of the use and non-use benefit categories, the WTP is based on a holistic assessment rather than a conscious summing of several components to reach a total economic value.

This view of the valuation decision leads us to be skeptical of attempts to ask respondents to separately value the benefit categories or dimensions for a given environmental good. Indeed, this is even a challenging task for market goods. For example, most consumers, if asked to value each of the following aspects of a newly purchased home in an open-ended question format, would have difficulty saying with any degree of precision how much they are willing to pay for the house style, the front porch view, the master bedroom, the size of the garage, the hardwood doors, the living room fireplace, and the prestige of living in the neighbourhood.

On the basis of the arguments cited above, this thesis adopts a conservative valuation approach by estimating the surplus value accruing to Canadians from the Canadian national park system, rather than estimating and aggregating the value of individual national parks. As noted in the NOAA Panel recommendations regarding CVM design (Arrow *et al.* 1993) "A conservative design increases the reliability of the estimate by eliminating extreme responses that can enlarge estimate values wildly and implausibly" (p.4608).

2.10 OVERALL ASSESSMENT OF THE CONTINGENT VALUATION METHOD

Since markets do not always correctly approximate values, especially in the case of public goods, the only current alternatives to the CVM are expert decrees or seat-of-the-pants intuition - neither of which are necessarily a better alternative. As has been shown in this chapter, there is considerable evidence to show that CVM is capable of providing useful information about non-market values. While CVM is not the only method of assessing non-market values in monetary terms, it is the most flexible, and can be used to derive values for almost any environmental change. It is also the only method for eliciting non-use values. Although contingent values are still controversial, the goal of the CVM approach is to better understand environmental amenity values, and ensure that these values are more effectively considered in the making of economic and environmental policy. As noted by Elliot *et al.* in their critique of valuation methods for national parks: "It can be concluded that the contingent valuation approach remains the most effective valuation approach despite its imperfections" (2001, p.12).

2.11 SUMMARY

This chapter introduced the economic concept of value, its relevance to national parks, and some of the theoretical and practical issues involved in the application of the Contingent Valuation Method to estimate park values. The 'public good' attributes of national parks were explored as well as the management challenges arising from this characterization.

The chapter noted the consensus in the academic literature that the CVM is the only valuation approach capable of estimating the non-market and non-use values arising from the national parks. Hence, it was deemed most appropriate for this study.

The Marshallian and Hicksian demand curves and the corresponding theoretical measures of welfare change estimated by the CVM were derived and discussed in this chapter. It was noted that although the CVM does estimate the Hicksian welfare measures of compensating variation (CV) or equivalent variation (EV), a practical problem in using them is that the Hicksian demand curves are unobservable. Only Marshallian demand functions, and hence consumer surplus (CS), can be obtained from actual market data. It was also noted that when a purchase, such as a donation to a parks fund, accounts for only a small portion of a person's budget, the Marshallian measure is often a close approximation of the Hicksian measure. Thus, the Marshallian approximation of CS would be acceptable in most practical applications (Freeman, 2003).

It was shown that the Hicksian 'compensating' versions referred to the amount of compensation (received or paid) which would return the individual to their initial welfare position. The 'equivalent' versions referred to the amount of money that must be paid to the consumer to make them as well off as they could have been after the change in their welfare position (Young, 2005). In the context of this thesis, the correct welfare measure is the CV.

The chapter outlined the history, steps, question format types and analysis considerations involved in executing a CVM study. Based on Hanemann (1984) a utility-theoretic, linear, logit regression model was derived. The corresponding mean and median welfare measures were derived, debated and explained graphically.

This chapter also introduced some of the key issues and the current debate concerning CVM methodologies. Contentious issues examined included bid amount selection, the purchase of moral satisfaction, the embedding effect and possible biases arising from survey design. The intentions of this critique were twofold: (1) to inform the reader of the lack of unanimity within academic CVM circles and (2) to justify the manner in which the valuation questions included in this survey were designed.

The chapter concluded with a brief overall assessment of the CVM. This author concludes that, although contingent values are still controversial, there is too much evidence to the contrary to warrant dismissal of the method. It is hoped that this study will not only facilitate the understanding of the economic benefits from Canada's national parks, but also contribute to the testing and refinement of the CVM and future valuation approaches.

Chapter 3: CONTINGENT VALUATION STUDIES OF NATIONAL PARKS

3.0 INTRODUCTION

This chapter examines the contribution of CVM studies for a better understanding of the economic value of national parks. In so doing, it provides a practical comparison of different CVM designs and the corresponding results of these research efforts. A more detailed summary table of some of these studies is presented in Appendix 2.

3.1 STUDIES OF BOTH USE AND NON-USE VALUES

In recent years, there has been increasing use of the contingent valuation techniques to value national park environmental goods and services, in both developed and developing countries. Although many CVM studies have been done looking at the values for specific attributes of natural areas (i.e. wildlife, scenic views, recreation opportunities, etc.) few studies have been dedicated to estimating, in whole or in part, the Total Economic Value (TEV) for national parks at either the individual park or park system level.

3.1 a) Studies of National Park Systems

In a manner similar to this thesis, one study that estimated the surplus benefits citizens receive from their national park system, above and beyond their current public and private expenditures for national parks, was done by White and Lovett (1999). These authors conducted a dichotomous choice CVM interview survey with 344 visitors to

North York Moors National Park. Respondents were asked if they would be willing to pay additional taxes to help fund Britain's eleven national parks. A mean willingness to pay of about $272 per household per year was reported by the survey respondents.

Another study which examined the economic benefits of the national park system was done by Lee and Han (2002) for Korean National Parks. Like Canadian national parks, most funding for the Korean national parks comes from government appropriations. At the time of the study, only about 33% of Korean national park funding came from park revenue sources. By comparison, less than 15% of Canadian national park funding comes from park revenue sources (LeRoy and Green, 2005). Concern that government funding for national parks may be reduced if the economy slows down prompted the study to examine if Korean national parks could justify an increase in admission fees and/or taxes to ensure adequate funding. The study used admission fees and a tax increase as a proxy to measure the use and non-use values, respectively. For one tourist season, an interview format dichotomous choice CVM was conducted on visitors to five Korean national parks. These parks were selected because they were representative of the resources protected by other parks within the system. Estimated WTP values for the park admission fee (i.e. use values) ranged from US$5 to US$14 and US$11 to US$14 for increased taxes (i.e. preservation values). While use values for the parks seemed to be negatively-related to location for users, the preservation value tended to be positively related to the location of users and non-users. The authors concluded that because these values were significantly higher than the current admission fee of US$0.83 and per visitor management costs of US$3, park managers would be justified in raising admission fees if government funding for national parks was reduced.

3.1b) Studies of Individual National Parks

Although it only focused on one national park - as opposed to the entire system of national parks - a study by Rashev (2003) was very similar to this thesis project because it also estimated the net benefits that citizens receive from the combined recreational use and non-use values. Specifically, Rashev (2003) used both interview and internet survey approaches to conduct a CVM of Bulgarians to estimate the net benefits of the combined recreational use, option, existence and bequest values for Pirin National Park in Bulgaria. The results of the CVM showed no significant difference in WTP values based on survey type. The Park created an average consumer surplus of US$42 per Bulgarian visitor and about US$16 per Bulgarian non-visitor. Aggregated across all visitors and non-visitors, the Park generates a total consumer surplus of about US$50.6 million dollars of which US$47.4 million per year is from non-visitor (i.e. non-use) values and US$3.2 million per year is from Park visitors (i.e. recreation use values). Lack of sufficient income was the primary reason why some respondents gave no WTP value for the Park. Across both visitors and non-visitors, use values were less important than non-use values. Respondents who placed more importance on use values had significantly lower WTP values for both the entrance fee and tax contribution.

Another study that bore similarities to this thesis was done by Nunes (2002). This author also used a donation to a dedicated national park fund as the payment vehicle. As well, a double-bounded dichotomous choice CVM question with an open-ended follow-up question were used to elicit the combined surplus benefits that citizens receive from the use and non-use values that they hold for the park. The purpose of the study was to identify consumer preferences for the protection of the Portuguese Park 'Parque Natural Alenejano e Costa Vicentina'. The mean WTP estimates for the wilderness area and recreation area protection programs were about US$75 and US$58 per household/year. Based on these values, the author concluded that the welfare loss to Portuguese households associated with the commercial development of the recreation and wilderness areas of the park would be about US$104 million and US$136 million, respectively.

An effort to determine the Total Economic Value (TEV) of a national park was attempted by van Beukring *et al.* (2003) in Indonesia. The study was prompted due to the imminent threats of deforestation, poaching, unsustainable tourism and numerous activities in and around the Park. Using an "impact pathway approach", the study estimated the value of Leuser National Park based on the benefits it provides in terms of water supply, fisheries, flood and drought prevention, agriculture and plantations, hydro-electricity, tourism, biodiversity, carbon sequestration, fire prevention, non-timber forest products and timber. Values were estimated under three potential future scenarios: deforestation (i.e., the status quo), conservation (i.e,. no logging, eco-tourism maximized) and selective use (i.e., a mid-point between conservation and deforestation). Total economic values were estimated for the period between 2000 and 2030 at a 4% discount rate. As part of the analysis, a CVM study was done in 2000/2001 to estimate the recreation use value and the value of biodiversity conservation to park tourists. Results revealed that the Total Economic Value was highest under the conservation scenario

(US$9.5 billion), followed by selective use (US$9.1 billion) and deforestation (US$7.0 billion). Compared to deforestation, the conservation scenario benefited all categories of stakeholders, except for the elite logging and plantation industries. As well, it was shown that the economic benefits were most equally distributed under the conservation scenario.

A similar study to that of Beukring *et al.* (2003) was conducted by Thanakvaro (2003) of Ream National Park, Cambodia. It also sought to examine how management of the Park under three potential scenarios would affect different stakeholders. The 'ghost park' scenario was the worst case scenario. It envisioned full exploitation of the Park by the existing large scale commercial timber and fishing interests. Under this scenario, the Park ecosystem would collapse within two years and soil erosion and flooding would impoverish the 27 local communities within the Park. The second scenario was the 'dream park' scenario. It allowed only subsistence activities, improved Park management capacity, community outreach and environmental education, enhanced recreation opportunities, and participatory resources management for water and sanitation. The third scenario was the 'experimental park' case. It corresponded to the status quo level of Park management and ongoing problems of overfishing, unsustainable timber harvest, unsupported tourism development and minimal law enforcement. A household interview survey was conducted of a random stratified sample of 696 villagers. The questionnaire collected data regarding household socio-economic characteristics, fishing activities, farming activities, environmental attitudes, timber harvest and non-timber forest products collected in the Park. While market prices were used to determine the economic value of most of the Park benefits, three open-ended, interview format contingent valuation studies were done in different cities to provide data on Park visitors. Although the park only receives about 200 tourists, a total of 1,238 Cambodian and foreign tourists were surveyed in these locations to better assess Ream's tourism potential. Using a 10% discount rate, the results of the study indicated that the dream park scenario had the highest net present value (US$11.9 million). This compared with US$10.0 million for the ghost park scenario and US$9.8 million for the experimental park scenario. Although the dream park scenario exceeded the ghost park scenario by less than US$2 million, it conferred three times more benefit value to villagers compared with the ghost park. This is an important consideration since the local communities within the park are most dependent on sustainable use of the Park's resources for their traditional livelihoods. Given the uncertainties surrounding long-term protected area planning, and the relatively small differences between the net present value of the scenarios, the authors fear most Cambodian policy makers are likely to favour the immediate capturable benefits of development and succumb to the lobbying of commercial loggers and fishing fleets who stand the most to gain from the wanton exploitation of the Ream's resources. The authors echo the recommendations of Chapman (2003) and also conclude that international conservation financing is needed to help developing countries fund and manage their national parks to avoid environmental collapse.

Like many national parks, Borivli National Park is contending with three main threats: lack of funding, high levels of human use and illegal encroachment and deforestation. It is the highest visited national park in India and a primary source of drinking water for the Bombay (now Mumbai) metropolis. The environmental threats confronting Borivli National Park are intensified because it lies within the Bombay Metropolitan Region. The purpose of the study by Hadker *et al.* (1997) was to determine what residents of Bombay would be willing to pay to improve preservation efforts towards the Park. A double-bounded dichotomous choice interview CVM with an open-ended follow-up question was conducted and 494 completed surveys were obtained. The payment vehicle was a monthly increase in household costs for the next five years. If the respondent was unwilling to make any contribution, a debriefing question was asked to elicit the reason. After describing the current Park management scenario and a hypothetical improved Park management scenario, respondents were asked what they would be willing to pay per month for the next five years to obtain the improved Park management scenario. Attitudes of respondents, willingness to accept financial responsibility for environmental improvement, visitation frequency and the number of characteristics of the Park that the respondent deemed important were the best WTP predictor variables. The mean WTP value per person per month was US$0.55. When this value was aggregated across the comparable Bombay resident population, the WTP for the use and non-use values generated by the Park was US$6.5 million per year - or a net present value of US$27.3 million over 5 years. Since the expenditures on the Park were about US$0.5 million per year, the benefit-cost ratio of Borivli National Park was approximately 13:1. The authors concluded that the residents of Bombay were aware of the importance of the Park and were highly willing to pay in both cash and volunteer efforts to maintain and improve the Park environment.

Shecter *et al.* (1998) estimated the combined recreational use and non-use value for an Israeli national park after it had been devastated by fire. A telephone interview, dichotomous choice/open-ended format, CVM study was conducted on over 1,400 Israeli citizens. The objective of the survey was to examine how much respondents would be willing to pay for research, rehabilitation and preservation efforts to ensure a fire of similar magnitude would not occur again. The payment vehicle in this study was a contribution to a hypothetical 'Carmel National Park Fund'. The mean WTP to the Fund was about US$16 per person. When aggregated across the entire Israeli population, the authors conclude the combined recreational use and non-use value of the Park to be about US$246 million.

3.1c) Studies of Proposed National Parks

Jerrel (1995) conducted a single and double-bounded dichotomous choice CVM mail survey to estimate the WTP of California households for increased protection of 6.9 million acres of desert land. Using logit regression results, this study estimated the value that California residents have for three new national parks and 76 new wilderness areas in the Mojave Desert. The single and double-bounded CVM yielded annual household WTP values of US$84 to US$101, respectively. Aggregating these values across the State, the study suggests that California residents are willing to pay between US$177 million to US$448 million per year for enhanced desert protection.

Jacobsen *et al.* (2006) conducted a dichotomous choice CVM study of the WTP for the establishment of a national park in Denmark. Seven alternative park layouts were valued and seven corresponding survey versions were developed. The surveys were sent to a national sample of 1,932 Danish households and a local sample of 500 households in the areas of the proposed park. The overall survey response rates were 52% and 58% for the national and local surveys, respectively. Depending on the site, the data revealed a mean WTP for establishing a national park in the range of US$292 to US$358 per household for the national survey respondents and US$51 to US$154 for local survey respondents.

A combined travel cost and dichotomous choice CVM study by Mercer *et al.* (1995) was undertaken to estimate the potential benefits that would accrue to foreign tourists from a proposed new national park (Mantadia National Park) in Madagascar. Data for the study was collected from a CVM interview survey of visitors to the neighboring Perinet Special Forest Reserve and an 'expert opinion' telephone survey of US and European travel agents/tour operators specializing in nature holidays. The payment vehicle was an increase in travel costs to include a visit to the proposed new park. The CVM analysis used a logit model to estimate a mean WTP of US$61 per foreign visitor to visit the proposed park. The probability of a respondent voting 'Yes' to a bid amount for the development of Mantadia National Park was a function of the bid amount, nationality, type of payment, whether the respondent was a subscriber to a nature magazine, income and the number of vacation days per year. The authors concluded that if the same number of foreign visitors who visit the Perinet Reserve are assumed to visit the new park, the aggregated recreational value of the proposed Mantadia National Park for foreign visitors would be about US$240,000 per year.

3.2 STUDIES OF USE VALUES

Lack of reliable and sufficient funding for national parks, as well as a need to demonstrate that natural resources dedicated to parks are valued by society, are universal strategic issues facing national parks. Estimating the difference between what people are willing to pay to visit a national park and what they actually pay (consumer surplus estimate) is one way to better gauge the recreational use value of a park and the potential to adjust user fees. Thus, many national park CVM studies have focused primarily on estimating recreational use values.

For example, Thur (2003) conducted both dichotomous choice and payment card CVM studies to determine the WTP of scuba divers for access to the Bonaire National Marine Park in the Netherlands Antilles. The mean of the dichotomous choice estimates was approximately twice that of the mean of the payment card estimates (US$111 versus US$62 respectively) with the dichotomous choice model. The aggregate recreational value of the Park was estimated at US$3.1 million and US$1.7 million based on the payment card model.

In Costa Rica, Adamson-Badilla and Castillo (1998) conducted a CVM study of nationals and foreign visitors to the Manuel Antonio National Park. Depending on the model specification, the median WTP for entry into the Park ranged from US$12-$61 for foreign visitors and US$6 to $14 for nationals. The mean WTP was about US$12 for foreigners and US$6 for nationals. Given the entrance fee of US$6 for foreigners and about US$2 for nationals, the study concluded that Costa Rica loses about 50% of the economic value derived from visits to the Park.

Mathieu *et al.* (2003) conducted a study of tourists' WTP for visiting Marine National Parks in the Seychelles archipelago off the southeast coast of Africa. The marine parks are visited for non-extractive recreational use such as boating, snorkeling, scuba diving and swimming. On-site users and a more general population of tourists were surveyed in three parks during the 1998 tourist season. WTP was modeled as a function of the respondent's expectations of a visit to the Seychelles, motivations for park protection, general reason for WTP, country of origin and other socio-demographic information. The average per person WTP for a park admission fee was estimated at US$12.20. When compared to the actual admission fee of US$10, the study suggests a consumer surplus of US$2.20 per tourist per park visit. Aggregated across the total tourist population, the parks generated a consumer surplus of US$88,000 per year for these types of recreational uses. The authors concluded that, if necessary, park entrance fees could be increased to generate revenues for conservation of the parks without sharp reductions in visitation.

Another study of recreational use values was done by Navrud and Mungatana (1994) in Kenya. The authors estimated the recreational value of wildlife viewing, in particular, flamingo viewing in Lake Nakuru National Park. An interview format, open-ended CVM survey was done on a random sample of 185 visitors to the Park. Two types of valuation exercises were performed. The respondents were first asked to value the overall experience in the park and then to value the viewing of the flamingos. Two payment vehicles were used. To estimate the consumer surplus of a Park visit, the payment vehicle was an increase in trip expenditures. The payment vehicle for estimating the recreational value of viewing flamingos was a contribution to a hypothetical World Wildlife Fund dedicated to saving the flamingos. Based on the CVM survey results, the mean WTP for preserving the recreational quality of Lake Nakuru National Park (i.e. the consumer surplus) was about US$53 per visitor per year, or an aggregate value of US$7.2 million for all visitors. The value tourists derived from viewing flamingos in the Park was approximately US$22 per visitor per year, or an aggregate value of about US$3.1 million.

Several other CVM studies have estimated the consumer surplus accruing to national park tourists for the purpose of exploring entry fee policy options to increase park revenue. These include studies of national parks in Australia, Indonesia and Costa Rica by Herath *et al.* (2004); Walpole, *et al.* (2001) and Shultz, *et al.* (1998), respectively. As measured by their willingness to pay for entry to the park, these studies show that visitors received a consumer surplus that ranged from 138% to over 1100% more than the national park admission fee. In all cases, the authors concluded that, if desired, fees could be moderately increased to improve park funding without appreciable declines in visitation.

3.3 STUDIES OF THE OPPORTUNITY COSTS OF NATIONAL PARK ESTABLISHMENT

Some CVM studies of national parks have estimated the opportunity costs of national parks by estimating the amount that affected parties are willing to accept (WTA) as compensation for park development. For example, Kramer *et al.* (1995) used the CVM in Madagascar to value the cost to local communities of refraining from using the area of the Mantadia National Park for subsistence farming. Local residents were asked whether they would be willing to accept specified levels of compensation (denominated in units of rice, the local staple food) to forego access to the forests in the Park. Their responses were used to estimate the mean value per household of about US$108. A separate CVM survey of tourists showed they would be willing to pay about US$65 more for access to the park.

Agostini (1995) conducted a CVM study in Mozambique to determine what safari tourists to Kruger National Park would be willing to pay for an extension to the Park land base. A second pilot study was conducted to elicit the villagers willingness to accept compensation for being displaced into a buffer when the Park expansion was established. Of the median willingness to pay elicited from Park tourists ranged from US$48-$64 per year to extend the park. As for the villagers, many became angry when asked about compensation for being displaced. The villagers said they would have to be paid at least three times their annual harvest per year to preclude them from using the Park expansion as a food source.

A similar study was done by Shayamsundar and Kramer (1996) to elicit willingness to accept (WTA) compensation for foregone forest products by villagers around Mantadia National Park in Madagascar. The Mantadia National Park was established to preserve ecological amenities and restricts villagers' use of the forest land. A dichotomous choice contingent valuation method estimated the annual mean WTA to be 6.15 vata of rice (1 vata = 30 kilograms), or US$50 per household (in 1991 US dollars). Aggregated across the 729 households in the villages around Mantadia National Park, the total net present value of the welfare loss to villagers would be about

US$312,331 per year.

An interesting study of the opportunity cost of expanding a national park was conducted by Carson *et al.* (1994a) in Australia. A double-bounded, dichotomous choice CVM was done to compare the preservation value of adding the Kakadu Conservation Zone to Kakadu National Park as opposed to the benefits of using the land to develop a mine. A response rate of 62% (1,827 usable surveys) was achieved by this nation-wide interview survey of Australian households. The payment vehicle was an increase in taxes to offset the lost revenue that the mine would have generated. Using a discount rate of 5%, the study estimated the preservation value for adding the Kakadu Conservation Zone to the Park to be AUS$435 million. The estimated benefits of the mine operation were AUS$102 million. The authors concluded that the social welfare of Australians could be improved by preserving, not mining, the Kakadu Conservation Zone and incorporating it within Kakadu National Park.

Kosz (1996) examined the opportunity costs of establishing the Donau-Auen National Park on wetlands east of Vienna, Austria. The author conducted a cost-benefit analysis of three park designs based on the inclusion of private and public land for the park, modifications to the river channel to control river bed erosion, and the construction of hydroelectric power stations on some of the land earmarked for the park. An open-ended interview CVM survey was conducted on a sample of 962 Austrian households to determine the preferred park development option. The payment vehicle was a dedicated annual tax increase. The average WTP for the national park was US$37/person/year for the option where the entire 11,500 hectare wetland was dedicated to the national park

This amount fell to about US$14 and US$8/person/year when the park area was reduced to 9,700 ha. and 2,700 ha., respectively, to accommodate a hydroelectric power station. The results of the cost-benefit analysis suggested that the highest net present value (NPV) was for the smallest park (2,700 ha.) and largest hydro station. This scenario generated a NPV of $4.2 million. The NPV for the 9,700 ha. park and hydro station was US$1.8 million and for the 11,500 ha. If the entire 11,500 ha. wetland was converted to a national park, it yielded the lowest NPV of US$1.3 million. Respondents were also asked to divide their WTP contribution for the park into three categories: existence values, bequest values and option values, of which the respective percentages were 51%, 37% and 12%, respectively. A break-even analysis showed that a 20% increase in the respondents' WTP for the park alone (i.e. from US$37/person/year to US$44/person/year) would make the economic efficiency equal to that of the large hydro power/smallest park option in terms of the net present value. The main conclusion that the author notes from this project is that, contrary to some environmentalists' concerns, economic valuation can contribute substantially to making the decision-making process between resource development and conservation alternatives more transparent.

3.4 STUDIES OF NON-USE VALUES

Relatively few CVM studies of national parks have focused exclusively on estimating non-use values. However, Bateman and Langford (1997) examined non-users' values for protecting the Norfolk Broads National Park from the threat of saline flooding. A mail survey was conducted of a sample of households across Britain. Respondents were first asked if they would pay at least some extra amount in annual taxes in order to prevent flooding of the Norfolk Broads National Park; then they were asked an open-ended question about their annual WTP to prevent the flooding in annual taxes and as a lump-sum payment. In a manner similar to this thesis, a logit model was used by the authors to examine the factors determining the probability of a 'Yes' response to the first question. The study found that the respondents' WTP participation and payment amounts decreased with increased respondent residency distance from the Park. The question of the amount of extra taxes that respondents would be willing to pay per annum to ensure the preservation of the Park from flooding elicited a whole sample mean of about US$53 per household. As an alternative, these respondents would be willing to pay a one-time tax contribution of about US$117 per household. Since the respondent population was biased, no aggregation efforts were attempted. Despite the population bias, the study showed that 'present non-users' do clearly value the preservation of the Norfolk Broads National Park. Those respondents who refused to make any payment cited income constraints as the main reason. Very few respondents objected to the principle of valuing the preservation of the Park.

Manoka (2004) conducted an interesting cross-cultural existence value study to determine what citizens of Port Moresby, Papua New Guinea and Portland Maine, USA would be willing to pay to double the area of the world's tropical rain forest set aside for protection from five percent to ten percent. The payment vehicle was a one-time donation to a hypothetical United Nations 'Save the Rain Forest Fund' to preserve 110 million hectares of rain forest in national parks and nature reserves in 57 tropical countries. The

CVM mail survey was sent to a random sample of 1,000 households in each country. Half of the sample in each country received a dichotomous choice CVM questionnaire and the other half received an open-ended CVM survey. In general, the New Guinea citizens had higher existence values than their American counterparts. The mean WTP ranged from US$4 to US$9 for the New Guineans and from US$2 to US$4 for the Americans. Assuming that these estimates can be generalized to the broader population, the total estimated WTP ranged from about US$200 thousand to US$449 thousand for Port Moresby households and US$38 thousand to US$76 thousand for Portland households. Extrapolating these household values further, they translate to about US$5 million to US$10 million for Papua New Guinea and US$165 million to US$329 million for US households.

Another cross-cultural study of non-use values was performed on residents of the UK and Italy. Horton *et al.* (2002) conducted an open-ended interview CVM on a combined total of 407 persons in both countries. Respondents were asked how much they would be willing to pay each year to ensure the implementation of two national park programs: one covering 5% of Amazonia and the other 20%. The payment vehicle was an Economic Union-wide tax. Taking both counties together, respondents were WTP, on average, US$46 per household per year to fund the creation of a national park covering 5% of Amazonia or US$59 to fund a national park covering 20% of Amazonia. Aggregated across all households, an annual fund to conserve Brazilian Amazonia as national parks could yield about US$912 million in the UK and a similar amount in Italy. Based on these results, the authors suggest that international financial transfers for national parks from wealthy, developed counties to poorer nations, could be an effective initiative to ensure the protection of threatened areas of global significance.

Subade (2005) estimated the value Filipinos had for improved biodiversity conservation of the Tubbataha Reefs National Marine Park in the Philippines. A dichotomous choice interview/self-administered CVM was conducted in three cities and 120 barangays so as to be representative of the national population. A total of 1,600 persons were surveyed in each city and an overall response rate of 79% was achieved. The payment vehicle was a yearly contribution to a hypothetical 'Tubbataha Reefs National Marine Park Trust Fund' for biodiversity conservation for the next five years. The respondents' contribution to the Fund would be used to restore marine and plant biodiversity in the Park from 50% coral cover to 75% coral cover. About 40% of respondents were willing to make a contribution to the Fund. Based on the results of the personal interview survey, the WTP values per person for the next five years were: US14 for residents of Puerto Princesa City, US$10 for residents of Quezon City and US$7 for residents of Cebu City. The WTP values for the self-administered survey were about half as large as for the personal interview survey. The authors concluded that the aggregate social benefits to the general Filipino population for a 25% improvement in biodiversity of Tubbataha Reefs National Marine Park to be worth between US$2.6 million and US$5.0 million.

Barrick and Beazley (1990) conducted an open-ended CVM mail survey to examine the option and consumer surplus values for the Washakie Wilderness in northwest Wyoming, USA. The survey included both on-site users of the Wilderness and a representative sample of U.S. cities and rural areas. A total of 1,381 completed surveys were obtained for an overall response rate of about 52 percent. Respondents were told that the only way the Washakie could be maintained as a wilderness was for people to contribute to a fund for its protection. The baseline was the current condition of the Washakie Wilderness as a managed wilderness area. The magnitude of changes modeled were based on several scenarios in which varying levels of oil extraction activities were allowed in the area. The researchers calculated the collective benefits of Washakie visitors, and urban and rural populations by summing the mean consumer surplus and option values of the respective groups and multiplying by the relevant population. Thus, the study results indicated that the annual value of the Washakie Wilderness was approximately US$975 thousand for on-site users, US$2.6 billion for urban residents and US$958 million for rural residents. The authors concluded that option value is important in wilderness valuation and, although average economic values of off-site users was small (about US$19 per person per year), they account for a large part of the total economic value of wilderness because they are held by such a large number of persons.

Another study confirming the importance of non-use values to the total economic value of a natural park was done by Leon (1996) in the Canary Islands. A telephone survey, with a double-bounded, dichotomous choice CVM question and an open-ended follow up question, was used to estimate the benefits that accrue to the local population from preserving the landscape of a group of parks in the island of Gran Canaria. The payment vehicle was a contribution to a fund for the preservation of the landscape from housing development. A total of 493 completed surveys were obtained and a response rate of 86% was achieved. The results suggested that the majority of the adult population of Gran Canaria would be WTP about US$34 per person per year for the preservation of the park landscapes. The recreational use value amounted to only 15% of this preservation value. The author concluded that use non-use values are a relatively large component of the total economic value for unique and scarce environmental resources.

To date, only one study has been done to evaluate the non-use values accruing to Canadians from their national parks. Traunt (1996) conducted a double-bounded dichotomous choice CVM to estimate the existence values to Canadians for: (1) creating four additional national parks in the Northwest Territories and (2) for creating ten national parks to complete the national park system. The survey employed a telephone/mail technique and a payment vehicle of a one-time tax. Using WTP values as a measure of existence value, the study indicated Canadians had existence values of Cdn$244 and Cdn$279 for the four and ten park proposal respectively. While the WTP difference for the ten park proposal was larger than for the four park, it was not statistically significant. The factors that most influenced the respondents' WTP values were the bid amounts, the language spoken by the respondent, per capita income, and their opinion about whether each of Canada's 39 natural regions should be represented in the national park system.

3.5 SUMMARY

This chapter provided a review of CVM studies that focused on the use and non-use values flowing from various national parks around the world. The purpose was to provide examples of the practical information that CVM studies can provide to facilitate decisions regarding the allocation of park resources. A summary table that compares the key features and findings of some of the more important CVM studies reviewed is presented in Appendix 2.

This chapter provides a context for the results of this thesis within both the Canadian and international understanding of the societal importance of national parks. It clearly demonstrated the lack of Canadian national park valuation studies at both the park and park system level.

The literature reviewed for this chapter suggests that national parks worldwide are confronted with the same problems of conflicting management goals, external and internal human use pressures, chronic underfunding, and a lack of awareness for the value and importance of national park resources.

This chapter also showed that, as measured by WTP, people around the world have a significant appreciation for national parks. It demonstrated that the translation of this appreciation into monetary values is possible, and that the use of natural areas for national parks can be in the best economic interests of society.

Interestingly, most of the CVM studies of national parks have been done in developing rather than industrialized nations. This is likely due to the greater opportunity costs incurred by poorer nations when national park resources are not used as efficiently as possible. While lack of sufficient funding is a chronic problem for most national park jurisdictions, it is especially scarce in many developing nations. Hence, the emphasis of studies in these locations has often been to improve income generation and foreign exchange potential through enhanced tourism opportunities and user fees.

The examination of the national park CVM studies looked at in this Chapter provides a practical basis for the methodology and analytical approach taken by this research effort. The contribution and similarities of these national park CVM studies to this research effort will be noted in the subsequent chapters of this thesis.

Chapter 4. METHODOLOGY

4.0 INTRODUCTION

This chapter focuses on the design, implementation and analysis of the CVM questions from the 2005 Parks Canada National Public Opinion Poll. These questions were used as a measurement instrument for assessing the net value of the benefits that Canadians receive from their national park system. The chapter describes the rationale for the Poll design and details of the CVM component, including: the choice of the relevant sample, the method of payment, the amount and type of information provided to the respondents, the valuation question format and selection of the bid vector. This chapter also describes how this study addressed many of the concerns raised by the NOAA Panel with regard to CVM survey design.

The chapter concludes with a description of the regression equations and a summary of the empirical analysis used to interpret the survey responses. The survey regression analysis was primarily concerned with Canadians' value for national parks, as measured by the probability that respondents would be willing to make a contribution to a non-profit fund in support of the national park system. The contribution amount is regarded as the value of the *unaccounted for* use and non-use benefits that respondents receive beyond their current public and private expenditures for national parks. These WTP measures can be interpreted as the increase in the welfare of the average consumer when the project is carried out (Lehtonen et al., 2003).

In order to examine the influence of how respondents who agreed to pay an unspecified dollar amount compared to those who agreed to pay a specific bid amount, two measures of respondent's probability of willingness-to-pay (WTP), and were collected in the survey. They were used as the dependent variables for a series of regression models.

4.1 SURVEY DESIGN

It is important to note that this thesis research was part of a larger project examining Canadians opinions of national parks and national historic sites. The valuation of national parks was a significant but small portion of the overall questionnaire. This design imposed some constraints on the survey instrument used in this study. These will be noted where necessary.

4.1 a) Parks Canada 2005 National Public Opinion Poll

In 2001, the Parks Canada Agency developed an overall approach for external communications, entitled '*Engaging Canadians: Parks Canada's Strategy for External Communications*' (Parks Canada, 2001). The approach is intended to help all levels of the Agency plan, prioritize and undertake communication activities and product development (Parks Canada Agency, 2005b). The Engaging Canadians Strategy covers all of Parks Canada's external communications. As such, it involves hundreds of individual activities aimed at a broad array of audiences including visitors, corporate partners, stakeholders, the tourism industry, and Canadians in general. The Strategy includes objectives, desired outcomes, areas for improvement, priority messages, and audiences who are subject to some form of performance measurement and reporting. Although the Engaging Canadians document is called a strategy, it does not contain a detailed plan or method of how to achieve specific objectives or outcomes. Rather, it is a descriptive framework of current and potential communication activities and products linked to lists of audiences and desired outcomes.

As noted in the Engaging Canadians National Performance and Evaluation Framework: "Parks Canada has not defined what is meant by conservation values and ethics and does not systematically measure support for these concepts" (Ibid, 2005b, p.iii). Additionally, the Framework notes that Parks Canada does not have any systematic information on the extent or nature of emotional connections that Canadians have for heritage places or national systems. In order to address these and other gaps in visitor and non-visitor information, the Framework recommends that the External Relations Branch of Parks Canada Agency undertake a series of studies of specific audiences. The focus of these studies would be on the extent of shared values, awareness and understanding of the Parks Canada Agency and the national systems of protected natural and historic places. It was suggested that these studies start in 2005 with a planned public opinion survey of adult Canadians.

The Parks Canada 2005 National Public Opinion Poll was conducted to fulfill this Framework recommendation. As well, the Poll fulfilled the 'audience research' component of the 'foundation communication activities' listed in the Engaging Canadians document (Parks Canada, 2001).

In the winter of 2005, I was invited to contribute some economic valuation questions to the national parks component of the survey. The survey questions (see Appendix 3, Q19B, Q21X to Q27X) were designed to reveal the relative importance that Canadians place on the benefits generated by their national parks using monetary values as a metric for comparison. While only a small portion of the survey was dedicated to this purpose, the information gleaned from the analysis of these valuation questions is intended to help Parks Canada ensure that the underlying values and interests of all Canadians - both park visitors and non-visitors - will be better understood, quantified and available to inform national park management decisions.

4.1 b) Selection of Valuation Method: Why the Contingent Valuation Method is the preferred method for this research?

Since many Canadians do not visit Canada's national parks[5], and some of these parks receive few visitors, it is likely that the value Canadians hold for national parks is largely determined by non-use values. This seems like a rational hypothesis because, even though most Canadians do not often (if ever) visit a national park, they seem willingly to pay for them with their federal tax dollars. It could be argued that most taxpaying Canadians must obtain some kind of benefit from the national parks because otherwise they would be lobbying their elected officials to redirect tax dollars earmarked for national parks to other public uses such as health care, highways and education. To date, that has not been the case. Anecdotal evidence also suggests that Canadians receive significant non-use benefits from their national park system. For example, the wilderness landscapes protected by Canada's system of national parks is deeply entrenched in Canadian history, song, art, film, folklore and traditions. As well, numerous public opinion surveys have indicated that the wilderness values enshrined in the national park

[5] Parks Canada data still shows a decline of nine per cent in visits to national parks over the last decade. In the last five years, visits to national parks decreased in every province except Alberta, B.C. and Newfoundland and Labrador. Overall, about 12.2 million people visited the parks in 2005-06, compared to nearly 12.6 million in 2001-02-- a drop of three per cent (Jaimet, 2006).

system are a source of national pride, are the cornerstone of the Canadian tourism industry, and help define what it means to be 'Canadian' (Parks Canada Agency, 2005b).

Since it is imperative that non-use values be included along with use values to better estimate the total economic value of the national parks, and since the CVM is the only method for estimating these values and other non-market values, it was the preferred method for this study. The primary attraction of CVM is that it can measure the economic benefits of a wide assortment of beneficial (or adverse) effects in a way consistent with economic theory.

For the purposes of this research, the CVM is measuring the additional value of the benefits that Canadians receive in addition to those already available from their current expenditures on national parks. This value, as measured by Canadians willingness-to-pay, is equivalent to the *consumer surplus* or *compensating variation* measures of neoclassical economic theory.

4.1 c) Definition of the Good

The non-market good valued in this study was the value of the combined use and non-use net benefits that Canadians receive from their national park system above and beyond their current expenditures for national parks. This includes recreational use values, option values, existence values and bequest values. As noted previously, a combined estimate of these values has not been done in Canadian context. This same good definition was used by Rashev, 2003; Lee *et al.* 2002; Hadker *et al.* 1997 and Kosz, 1996, in their CVM studies of national parks.

While economic theory suggests that valuation done *at the margin* (i.e. for the last unit of a good procured, forfeited or consumed), this study examined the value that Canadians have for the national park system, rather than the value they hold for each of Canada's 43 national parks. As noted previously, other authors (i.e. Lee and Han, 2002; White and Lovett ,1999) have also done CVM studies of national parks at a system rather than individual park level.

In the case of this study, analysis was preformed at the system level for two reasons. Firstly, there were not sufficient financial resources to develop a more elaborate survey instrument or CVM survey dedicated to valuing the use and non-use benefits Canadians receive from the individual national parks. Since the National Public Opinion Poll was designed to collect respondent information at the park system level, the CVM valuation component was designed to be consistent with this level of aggregation. As well, since the CVM questions were restricted to only a small number of the total Poll questions, there was no opportunity to explore the economic benefits arising from each of the 43 national parks.

Secondly, given that respondents are likely unable to distinguish between the individual national parks and unable to accurately assign a net benefit value to each, *the margin* or *level for defining the good* that makes the most sense to the respondent is the park system level. Indeed, this broader valuation context may help avoid the 'sub-additivity' problems discussed previously because the hypothetical valuation scenario may seem more plausible to the respondent. As noted by the NOAA Panel recommendations for CVM design: "placing the choice problem in a broader context helps respondents to arrive at a realistic or conservative valuation" (U.S. Dept. of the Interior, p.4607).

The development of the survey instrument took about one year, starting in May 2004 and finishing in April 2005, the period in which the final version was used in the field. A copy of the final survey version is provided in Appendix 3.

4.1 d) The Survey Sample and Population

As noted previously, the valuation questions analyzed by this thesis were part of a larger research effort entitled the 2005 Parks Canada National Public Opinion Poll. The purpose of the Poll was to determine the broader interests and attitudes held by Canadians for their national parks and national historic sites. Hence, the whole Canadian adult population was deemed relevant to the survey. The target population for the survey instrument was the population of Canadians eighteen years of age or older.

The national polling company Environics© Research Group was contracted by Parks Canada to generate an appropriate sample for this telephone survey. Random digit dialing sampling methods were used to generate the survey sample. The sampling procedure took into account the regional differences of the populations within census subdivisions to generate a sample representative of the Canadian adult (over 18 years of age) population. Techniques to mitigate response bias included quotas for respondent stratification levels and phoning at various times of the week and hours of the day.

4.1 e) Survey Format

This survey utilized a telephone interview format. The NOAA Panel recommends face-to-face surveys as the most preferable and telephone interviews as the next most preferable CVM survey technique (U.S. Dept. of the Interior, 1993) due to the cost advantages and "centralized supervision" of the interview process. The Panel believes that: "it is unlikely that reliable estimates can be obtained with mail surveys" (Ibid. p.4608).

The greatest strength of the telephone format is its ability to produce results quickly. Large-scale national polling firms, such as the Environics© Research Group, use telephones and computer technology to conduct public opinion polls that can report the results with a much more rapid turnaround time than interview or mail survey formats. The use of Computer-Assisted Telephone Interviewing (CATI) technology to create a computerized survey instrument allows interviewers to read the survey questions from the screen and enter respondents' answers directly into the computer. This method allows questionnaires to be tailor made for individual respondents and facilitates the use of complex questionnaires as 'skip-patterns', that is, sections of the survey that are by-passed, are done automatically.

The use of a polling firm that utilized the CATI technology was especially useful for the 2005 Parks Canada National Public Opinion Poll. This was because a very large sample size was needed to maintain the desired level of statistical significance and allow for the desired levels of analytical stratification. As well, the use of a dichotomous choice CVM question with varying bid amounts was easily incorporated into CATI survey script.

There are several reasons why telephone surveys can produce results almost more quickly than other methods. First, interviewers who use the telephone can complete more interviews in a given time period. A good telephone interviewer can complete and check more than three 30-minute interviews during a three-hour calling period, but the same person doing face-to-face interviewing may only be able to complete one (Salant and Dillman, 1994).

Second, if the survey is conducted at a central facility equipped with a bank of telephones, a supervisor can immediately deal with any problems that arise. If a particular question in the survey causes problems, or a respondent wants to talk to someone other than the interviewer, the supervisor can respond quickly. The same problems occurring in email or face-to-face survey can delay the process by days or weeks, or result in the respondent deciding not to complete the survey.

In addition to quick turnaround, telephone surveys offer the advantage of greater interviewer control. In contrast to mail surveys, the interviewers can ask to speak with the person they want to answer the questionnaire, encourage the respondent to answer all the questions, and avoid the influence of others in the household or business. Additionally, both random digit dialing and add-a-digit dialing make it possible to access both listed and unlisted telephone numbers. For these reasons, telephone surveys have the benefits of a higher response rate and superior sample coverage over mail surveys.

According to Bateman *et al.* (2002), mail surveys of the general population tend to elicit the lowest response rates, sometimes in the order of 25-50 per cent, which would generally be considered unacceptable. Telephone surveys elicit responses in the order of

60-75 per cent, while face-to-face interview surveys achieve response rates of 70 per cent or higher.

The cost of the survey modes tends to be the inverse of their response rates. Face-to-face surveys are the most expensive and telephone surveys lies generally between face-to-face surveys and mail surveys (Salant and Dillman, 1994). Face-to-face surveys have higher labor costs than telephone surveys, because fewer interviews can be completed in a given time period (King and Mazzotta, 2003). The main cost components for a telephone survey are interviewer labor and long-distance telephone charges. Mail surveys have lower labor costs because respondents, rather than interviewers, fill out the questionnaires. They also do not entail long-distance phone charges. However, because multiple mailings are usually required to get a high response rate, and the data has to be extracted from the printed surveys to a computer database, mail surveys may take several months to complete. As well, mail surveys are more likely to result in 'self-selection bias' since a large portion of those who return the surveys are likely to be those interested in the topic of the survey. This may lead to unrepresentative samples (Bateman *et al.* 2002).

However, telephone surveys are not without weaknesses. One is that not all people have telephones. Hence, a subgroup of the population is automatically excluded from being surveyed. Other problems with telephone surveys have to do with their sensitivity to measurement error. Telephone interviews depend completely on what can be communicated vocally. To understand what is being asked, the respondent must concentrate on each word or phrase. In some cases, the complex nature of the good and the time required to adequately describe a good and its hypothetical market could result in an incomplete description of the policy issue. Also, questions in which the respondent is asked to rank a series of items are very difficult to administer over the phone. The same is true of questions that depend on maps or diagrams. Compounding the problem is that interviewers cannot observe a respondent's reactions for clues as to whether questions are understood (Dillman, 1978).

Another difficulty with telephone surveys is that they can easily be influenced by leading questions from the interviewer ("Don't you think that....?'), the interviewer's voice inflection, and by what the respondent thinks the interviewer wants to hear. This may result in 'yea-saying', that is, respondents accepting to pay the specified bid amounts to avoid the socially embarrassing position of having to say no.

To avoid the above interviewer effects, and to deal with the "What do I do now?" questions that inevitably arise from the interviewers, a knowledgeable supervisor on hand and constant monitoring of the interview process is critical to the success of the telephone survey. In terms of this study, these difficulties were minimized by using a reputable and dedicated polling firm that has a professionally trained and monitored interview staff.

4.1 f) The Valuation Problem

Given the length of time required by respondents to answer the broad scope of survey questions for which the survey was originally intended, there was very limited opportunity to include additional valuation questions. Therefore, the results of this study may not be as robust or detailed as the results could have been had the survey been completely dedicated to the economic valuation of the national parks. Due to the low-budget available, limited space within the survey instrument, and lack of time, the total economic value of Canada's national parks was not estimated. Instead, this study estimated the net benefits that Canadians receive from their national parks beyond their current expenditures (i.e. tourism expenditures to visit national parks, tax dollars for national parks and charitable contributions to national park related organizations).

4.1 g) Survey Development and Implementation

Between May, 2004 and March 2005, focus groups, pretests with respondents and one-on-one interviews were conducted to formulate an acceptable series of valuation questions to be included in the 2005 Parks Canada National Public Opinion Poll (See Appendix 3, Q19B and Q21X to Q27X). Respondents were encouraged to vocalize their thoughts and comments pertaining to the valuation question 'pilot' survey as they completed it. These comments were incorporated into subsequent survey design. Parks Canada and the Environics© Research Group made final modifications[6,7] to the valuation questions and incorporated them into the broader survey instrument.

The Environics© Research Group administered the final survey version to Canadian households during April, 2005. Their random digit dialing methods were used to generate the sample for this study. This technique utilizes a program which is updated regularly to reflect the changing Canadian demographic landscape. The program takes into consideration the regional differences of the population within census subdivisions to generate a sample representative of the Canadian population.

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[6] Although the NOAA Panel (U.S. Dept. of the Interior, 1993,p.4606) recommends use of a one-time surtax as a payment vehicle, and a referendum format for the hypothetical CVM market, these preferred CVM design features were not permitted by Parks Canada.

[7] Wording of some statements in Q19B was arbitrarily changed from normative to definitive statements.

4.2 THE SURVEY INSTRUMENT

4.2 a) General Survey Question Design

The 2005 Parks Canada National Public Opinion Poll consisted of sixty questions from which 367 variables were obtained. As noted previously, a copy of the complete questionnaire is available in Appendix 3.

The survey was broken down into six subsections. The first section of the survey is the introductory script used by the telephone interviewer to identify and initiate contact with a potential survey respondent. In order to identify and randomly select a prospective survey respondent, the interviewer asked to speak with the household member who was 18 years of age or older, and who had the most recent birthday. If this person was not available, an alternative time to call was arranged by the interviewer. If the person selected was not available during the days Environics© had dedicated to implementing the survey, an alternative household member with the next most recent birthday was selected.

The interviewer informed the respondent of their name, who was conducting the research, what the survey was about, how the respondents were selected, and assured them the survey was not being done for soliciting purposes. Lastly, the respondents were asked for their preferred language (French or English) for the interview. If asked, the interviewer could also inform the respondent of the approximate survey duration, the registration number of the survey and who they could call for further information or to register a complaint.

In Part A, the respondent was asked some broad, attitudinal questions regarding the importance of Canada's natural and cultural resources. This section also queried respondents regarding the level of responsibility they felt that the government and private sector should have for protecting and conserving these resources and the level of trust respondents had in the government and private sector to adequately achieve these stewardship tasks.

Part B of the survey asked a series of questions relating to the respondents familiarity and knowledge of what the Parks Canada Agency does and its logo, and what subjects or topics about the Agency respondents had heard of in the past year. This section also asked respondents about their level of support for government spending on conservation of natural areas and national historic sites.

Part C of the survey asked respondents about their national park visitation and visitor experience. It also examined the relative importance of the use and non-use benefits that respondents receive from their national parks and what respondents felt was the current greatest threat to Canadian national parks. This section also contained the CVM valuation questions. These are explained in more detail below. Lastly, this section asked some questions regarding the respondents' awareness and support for a new national park in Manitoba.

Part D of the questionnaire asked respondents about their visits and visitor experience at Canada's national historic sites. With the exception of the valuation and new national park questions, the question format and order in Part D of the survey was identical to that of Part C.

Part E of the survey asked respondents about their trust in various information sources to provide accurate information regarding Canada's national parks and historic sites. This section also asked survey participants to name any one of the United Nations World Heritage Sites found in Canada.

Part F questioned respondents about their outdoor recreation and culturally-related leisure activities. It also asked respondents about their affiliation with historical or nature-based organizations.

The final section of the survey (Part G) collected mainly demographic information about the respondents, including gender, education level, age, income, language of interview, nation of birth, number of children less than 16 years old living at home, income, dominant household language, and location of residence.

4.2 b) Hypothetical Scenario and Valuation Question Design

The valuation questions in this study used a very simplified contingent valuation approach to elicit the respondents' monetary values for their national park benefits. The first sentence of Q21X provided a brief description of the hypothetical scenario. Due to the time constraints imposed by the other questions in the Poll, and the information dissemination challenges of a telephone questionnaire format, the hypothetical scenario was designed to be as plausible, neutral and brief as possible.

A double-bounded, dichotomous choice question and open-ended question format were used and the 'method of payment' was a hypothetical contribution to a non-profit fund in support of national parks. The CVM question format and payment vehicle employed are not unique to this study. A similar question format was utilized by Nunes (2002a); Shecter *et al.* (1997); Hadker *et al.* (1997) and León (1996) in their CVM studies of national parks. Subade (2005); Manoka (2004) Nunes (2002a); Shecter *et al.*

(1997); León (1996); Navrud and Mungatana (1994); Barrick and Beasley (1990) also utilized a non-profit fund contribution as a payment vehicle for their CVM studies of national parks and protected natural areas. As León (1996) argues, a non-profit fund contribution introduces some neutrality when compared to taxes as payment vehicles, which may be perceived negatively by the population.

4.2 c) Selection of Bid Amounts for the Dichotomous Choice Questions

The use of a dichotomous-choice CVM question format involves the design of a range of bids, that is, a scheme that specifies, for each respondent, the initial bid and the respective follow-up bids. This involves deciding how many bids to use, the lowest and highest bid, how the bids should be spaced and what proportion of respondents should be offered each bid. Cooper (1993) showed that the range, number and intervals of the bids offered can affect the estimates of the value of the good. Alberini (1995), Kanninen, (1993, 1993a) and Duffield and Patterson (1991) demonstrated that formal methods of finding an optimal range and interval of bids can improve bid design.

One aspect that all the formal methods of bid design have in common is the assumption that the underlying distribution for the WTP is known with certainty. In reality, however, researchers typically derive this distribution from limited pretest data due to practical reasons of cost and time. Since pretesting on the value of the amenity is most often conducted with open-ended questions, the responses reported in the pretests are often much higher than those from closed-ended questions (Rollins *et al.* 1997). Thus if the underlying distribution for WTP is estimated from values that are biased to low or too high, the offer amounts generated by the theoretical optimal bid design method will miss the mean of the underlying true distribution and yield inefficient results. Ideally, several phases of pretesting should be conducted, whereby the first phase uses open-ended questions and subsequent phases used closed-ended questions. The offer amounts for the second and subsequent phases emanate from the first phase, but are repeatedly refined (Ibid, 1997; Wistowsky, 1995). Unfortunately, as in this study, such extensive pretesting is expensive and time-consuming, and therefore is not always an option for most CVM projects.

However, one of the advantages of using a double-bounded dichotomous choice question format, as employed in this study, is the double-bounded model's ability to adapt to an otherwise poor bid design because of the inclusion of a follow-up question (Kanninen, 1995). In the case of this research, this capacity is improved even further by the inclusion of an open-ended question to capture values beyond those of the bid amount range.

Given the very limited time and resources for pretesting the survey instrument, and given that statistical procedures involved with optimal bid design methods are not always associated with satisfactory results (Nunes, 2002), this study used a simplified and unique approach to selecting the bid amounts. The offer amounts were drawn from the actual distribution of dollar amounts that Canadians contribute to national parks through their federal income tax contributions. Appendix 4 provides a detailed description of the offer amount selection approach.

Programmers at Environics© were given detailed instructions on how to assign bid amounts to respondents. As well, during the survey pretest period, responses to the bid amounts were monitored to ensure that they were not unduly biased toward either end of the bid distribution.

4.3 DERIVATION OF WTP REGRESSION MODELS

In order to examine the influence of how respondents who agreed to pay an unspecified dollar amount compared to those who agreed to pay a specific bid amount, two measures of respondents' probability of willingness-to-pay (WTP) were collected in the survey. They were used as the dependent variables for a series of regression models.

4.3 a) REGRESSION MODEL 1: Willingness to Pay an Unspecified Amount (WTPun)

The dependent variable for this regression model was derived from the responses to Survey Question Q21X. This Question asked respondents a "Yes" or "No" question regarding their willingness to make a contribution of an unspecified amount to a hypothetical non-profit fund to support Canada's national parks (see Appendix 3, Survey Question Q21X).

Q21X: Research suggests that current funding is not sufficient to maintain the national parks. As a result, the natural areas and visitor services in the parks may deteriorate. If a non-profit fund was created to raise additional money to help the national parks, would you be willing to make a contribution?

01 – Yes	
02 – No	**SKIP TO Q.27X**
99 – Uncertain/DK/NA	**SKIP TO Q.27X**

The 'Yes' responses to Q21X were used as the dependent variable for the regression models called 'Probability of Willingness to Pay an unspecified amount' (WTPun). By not asking for a specific dollar contribution, this model sought to avoid the difficulties associated with starting/anchor point bias, different elicitation question formats, bid vector misspecification and commitment to a stated WTP amounts, on survey responses. The WTPun model was used to identify what variables were the best predictors for respondent simple 'agreement' to contribute to a non-profit national parks fund. The results of the WTPun model were later compared to a regression model to which respondents had agreed to contribute a specified dollar amount to the parks fund. Comparison of these two models would help determine the extent to which respondents who agreed to pay an unspecified dollar amount differed from those respondents who agreed to pay a specific bid amount.

4.3 b) REGRESSION MODEL 2: Willingness to Pay the Bid Amount (WTPbid)

The dependent variable for this regression model was calculated from the 'Yes' responses to bid amounts presented to respondents in the dichotomous choice questions (see Appendix 3, Survey Questions Q22X-Q24X). Only the respondents who answered 'Yes' to Q21X were directed to Q22X which asked if they would be willing to make a contribution of a randomly assigned bid amount ranging from $10-$80.

Q22X. Would you be willing to make a contribution of $___ to this fund?
RANDOMLY ASSIGN ONE OF THE FOLLOWING AMOUNTS: $10, $20, $30, $40, $50, $60, $70 or $80. IF RESPONDENT ASKS WHETHER THIS IS A YEARLY OR ONE-TIME CONTRIBUTION, INDICATE: It's your choice", THEN RECORD RESPONSE IN Q.26X and CONTINUE WITH Q.23X or Q.24X

01 – Yes
02 – No SKIP TO Q.24X
99 – Uncertain/DK/NA SKIP TO Q.24X

If respondents answered 'Yes' to Q22X, they were directed to Q23X and asked if they would be willing to contribute an amount that was $10 higher than the initial bid amount given in Q22X.

Q23X. (IF YES TO Q.22X BUT NOT AT $80 LEVEL - $80 LEVEL SKIP TO Q.25X) Would you be willing to contribute $ ___ to this fund?
INSERT AMOUNT THAT IS $10 HIGHER THAN ONE INCLUDED IN Q.22X)

01 – Yes
02 – No
99 – Uncertain/DK/NA

SKIP TO Q.25X

Conversely, if they answered 'No' or were uncertain, didn't know or didn't respond to Q22X, they were directed to Q24X and asked if they would be willing to contribute an amount that was $10 lower than the initial bid amount provided in Q22X.

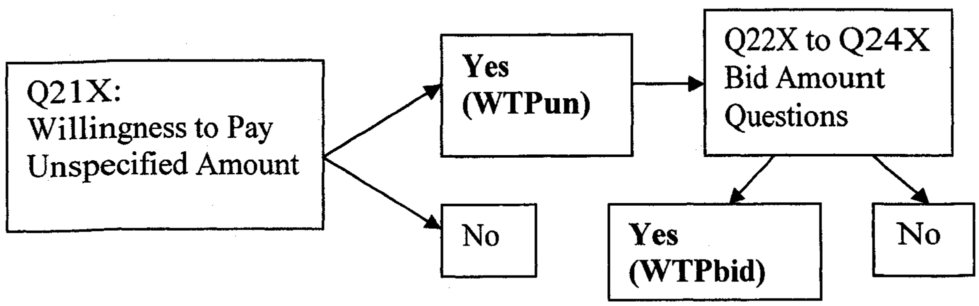
Q24X. (IF NO/DK TO Q.22X BUT NOT AT $10 LEVEL - $10 LEVEL SKIP TO Q.25X) Would you be willing to contribute $ ___ to this fund?
INSERT AMOUNT THAT IS $10 LOWER THAN ONE INCLUDED IN Q.22X)

01 – Yes
02 – No
99 – Uncertain/DK/NA

By offering a second chance for respondents to express a WTP value, the multiple-bounded question format provides narrower bounds on the respondents' WTP. The multiple-bounded question format yields more efficient results (i.e. smaller variance around parameter estimates and narrower confidence intervals around the welfare estimates) compared to a single-bounded question format for equally sized samples (Nunes, 2002a; Kanninen, 1995; Hanemann *et al.* 1991).

The previously described process to derive the WTP probability measures is shown in Figure 4.1.

Figure 4.1. Schematic of the Responses Used to Estimate the Regression Model Dependent Variables



4.3 c) Dichotomous Choice Valuation Follow-Up Questions

Following the closed-ended dichotomous choice questions, respondents were directed to Q25X and asked an 'open-ended question' regarding what would be the most they would be willing to contribute to the non-profit parks fund.

Q25X. What would be the most you would be willing to contribute to this fund?
RECORD AMOUNT

$______
99999 – DK/NA

The open-ended WTP elicitation format was utilized to help the subsequent analysis to better deal with the range and anchoring effects of the WTP values. As noted by Boyle *et al.* (1996), since the open-ended format tends to yield a smaller WTP value than other elicitation formats, it is preferable in studies that are seeking conservative estimates of value (such as this thesis). It is also suggested in the literature that the open-ended or closed-ended format are equally appropriate (Ibid, 1996; Tversky, 1988).

If they had not indicated previously, upon completion of the valuation questions, respondents were asked about the frequency of their stated contributions to the non-profit fund.

26X. Would this be a <u>one-time</u> or <u>yearly</u> contribution?

01 – One time
02 – Yearly
VOLUNTEERED
03 – Depends
99 – DK/NA

Those respondents who were unwilling to make or unsure of making a contribution were asked a debriefing question (see Appendix 3, Q27X) to explain their response. As Bateman et al (2002) points out, this type of question is important to identify invalid answers and to assess the credibility and meaningfulness of the hypothetical scenario presented in the survey.

27X (IF NO/UNCERTAIN IN Q.21X) Can you tell me why you would not, or are unsure, about making a contribution to this fund?
DO NOT READ – CODE ALL THAT APPLY

01 - I want to have national parks, but I don't want to pay for them.
02 - I will not use these areas myself, so I don't want to pay for them.
03 - I object to the way the question was asked.
04 - The dollar amount was too high.
05 - I think Parks Canada gets enough money.
06 - I did not have enough information to answer "yes".
07 - I already pay too much in taxes.
98 - Other (SPECIFY______________________________).
99 – DK/NA

4.4 THEORETICAL DETAILS OF THE BINARY LOGIT MODEL

Many of the CVM design concerns discussed in Chapter 2 revolved around the central concern that individuals are responding to CVM questions in a manner that is consistent with economic theory. In a similar manner, it is important that the analysis of data from CVM surveys continues this consistency.

Hanemann (1984) derived a logit model that is consistent with the economic assumption that experimental responses are the outcome of a utility-maximizing choice He calculated the welfare change attributed to a survey respondent while also accounting for the respondent's change in utility. Details of this model were discussed previously in section 2.7 b) i) of this thesis.

Following an approach similar to Hanemann (1984; Sellar, Chavas and Stoll, 1986; Freid et al. 1994 and Jaibi and Raa, 1998), in this study a utility-theoretic linear logit regression model was applied to respondents' WTP responses. For both regression models described in this study, the dependent variable was a 'Yes' or 'No' question. In statistical terminology, this is referred to as a dichotomous dependent variable. In the series of regression models that culminated in Model 1, the dependent variable was a 'Yes' or 'No' (Q21X) response to agreeing to pay an unspecified bid amount (WTPun) to the hypothetical parks fund. Conversely, in the series of regression models that culminated in Model 2, the dependent variable was a 'Yes' or 'No' response (Q22X to Q24X) to agreeing to pay the specified bid amount (WTPbid) to the hypothetical parks fund.

The calculations to determine the gain or loss in utility as expressed by the responses to dichotomous choice CVM questions are discussed below.

4.4 a) Derivation of the Logit Equation

As explained in Chapter 2 and Bateman *et al.* (2002), the cumulative density function for the probability of observing a particular value of WTP or less in the sample population is assumed to be a logistic function. The logistic curve (see Figure 2.8) is a non-linear function with WTP amounts ranging from $\mathbf{B = 0}$ to $\mathbf{B} = +\infty$. As the independent variable **B** increases, the logistic function $\mathbf{G_{WTPmax}(B)}$ approaches one (See Figure 2.8).

In the logit analysis with a dichotomous choice structure, such as questions (Q22X to Q24X), the dependent variable can be formulated from the respondents' responses to the bid amount questions. In this process, the 'Yes' responses are coded as one and 'No' responses are coded as zero. The logit models specified in this study predict the probabilities of 'Yes' responses as a function of the bid amount, **B**, and other explanatory variables such as income, language spoken at home and feelings about why national parks are important. The probabilities are then used to estimate the mean ($\mathbf{WTP_{mean}}$) and median ($\mathbf{WTP_{median}}$) values of respondents' maximum WTP.

Logistic regression (also called binary logistic regression) is regression applied to a dichotomous dependent variable, where the dependent variable is not the raw data values, but instead is the probability odds of the event of interest occurring. The general equation for a logistic regression

The general equation for logistic regression is:

$$\mathbf{\ln(\mathit{Odds}) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_k X_k),} \text{ where } \mathbf{\mathit{Odds}} = \frac{\mathbf{Pr(event)}}{\mathbf{1\text{-}Pr(event)}} \qquad \text{(Eq.4.4.1)}$$

where the terms on the right are the standard terms for the independent variables and the intercept in a regression equation. However, on the left-hand side is the natural log of the odds, and the quantity ln(Odds) is called a 'logit'. Equation 4.4.1 is derived as follows:

Let $\mathbf{Pr^Y}$ be the probability that an individual will contribute to the national parks fund $(\mathbf{NPF_i}) = \mathbf{1}$.

Recall from Chapter 2 that: $\mathbf{Pr^Y = F_\eta(\Delta v) = (1 + e^{-\Delta v})^{-1}}$ (Eq.2.7.9)

If we let $\mathbf{\Delta v = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_k X_k}$

Then:

$$\mathbf{Pr^Y = Pr\,(NPF = 1) = \frac{e^{(\alpha + \beta 1X1 + \beta 2X2 + \ldots.\beta kXk)}}{1 + e^{(\alpha + \beta 1X1 + \beta 2X2 + \ldots.\beta kXk)}}} \qquad \text{(Eq.4.4.2)}$$

$$= \mathbf{\frac{1}{1 + e^{-(\alpha + \beta 1X1 + \beta 2X2 + \ldots.\beta kXk)}}} \qquad \text{(Eq.4.4.3)}$$

and

$$\mathbf{Pr^N = Pr\,(NPF = 0) = 1 - \frac{1}{1 + e^{-(\alpha + \beta 1X1 + \beta 2X2 + \ldots.\beta kXk)}} = \frac{e^{-(\alpha + \beta 1X1 + \beta 2X2 + \ldots.\beta kXk)}}{1 + e^{-(\alpha + \beta 1X1 + \beta 2X2 + \ldots.\beta kXk)}}} \qquad \text{(Eq.4.4.4)}$$

The 'odds' can be defined as the ratio of the probabilities. In this example, the odds ratio is the probability of a 'Yes' response divided by the probability of a 'No' response. Thus,

$$\mathbf{\frac{Pr^Y}{Pr^N} = \frac{Pr^Y}{1 - Pr^Y} = \frac{1}{e^{-(\alpha + \beta 1X1 + \beta 2X2 + \ldots.\beta kXk)}} = e^{\alpha + \beta 1X1 + \beta 2X2 + \ldots.\beta kXk}} \qquad \text{(Eq.4.4.5)}$$

The log of the odds ratio is a linear function of the explanatory variables $\mathbf{X_k}$.

Taking the log of both sides yields:

$$\mathbf{\ln\left[\frac{Pr^Y}{1 - Pr^Y}\right] = \ln\left(e^{\alpha + \beta 1X1 + \beta 2X2 + \ldots.\beta kXk}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots.\beta kXk}$$

(Eq.4.4.6)

Thus, we obtain the general equation (Eq.4.4.1) for a logistic regression:

$$\mathbf{ln}(\boldsymbol{Odds}) = \boldsymbol{\alpha} + \boldsymbol{\beta}_1\mathbf{X}_1 + \boldsymbol{\beta}_2\mathbf{X}_2 + \ldots\ \boldsymbol{\beta}_k\mathbf{X}_k) \qquad \text{(Eq.4.4.1)}$$

Note that there is a relationship with the independent variables $\mathbf{X}_k$ and the logistic regression, but not in the original probabilities. The parameter $\boldsymbol{\beta}_k$ is the change in the log of the odds ratio per unit change in the $\mathbf{X}_k$ variable. Since we're interested in the probability of an event, such as the probability of a 'Yes' or 'No', the general form of the logistic equation expressed as a probability equation is:

$$\mathbf{Pr(event)} = \frac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots \beta_k X_k}}{1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots \beta_k X_k}} \qquad \text{(Eq.4.4.7)}$$

$$= \frac{1}{1 + e^{-(\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots \beta_k X_k)}} \qquad \text{(Eq.4.4.8)}$$

Note that the general form of the logistic equation (Eq.4.4.8) is equivalent to Eq.4.4.3. This equation cannot be estimated with the 'least-squares method' commonly used in statistics. Instead, the parameters of the model are estimated using a 'maximum likelihood' technique. Coefficients were derived that made the observed survey values most 'likely' for the given set of independent variables. This was done through computer iterations of the model using Maximum Likelihood Estimation. The computer software used for the logistic analysis was SPSS® (Statistical Package for the Social Sciences), versions 12.0 and 14.0.

Predictions about the probability values for and individual case can be made by substituting the derived regression coefficients and appropriate data for the surveyed person of interest into Eq.4.4.8. If the predicted probability is greater than .5, the SPSS®

logit model would assign the individual to the 'Yes' category of survey respondents for that particular question.

A more detailed discussion of this statistical approach and its application to models for valuing environmental goods can be found in Bateman, et al.,2002; Bateman and Willis, 1999; Freemann, 1993; Mitchell and Carson, 1989).

4.4 b) Empirical Specification of the Regression Models

Some authors (Haab and McConnell, 2002; Cameron and Quiggin, 1994 and Hanemann, 1991a) posit that responses to the second question in a double-bounded CVM question might be correlated with the responses to the first question. One reason for this possible correlation is that the sample of respondents to the lower and higher WTP bid amounts are selected according to their response to the first question. This poses a sample selection problem in estimation of WTP values. However, as Greene (1992) suggests, it is a straightforward matter to allow for this possibility by using bivariate probit estimation procedures.

Typically, the differences between the probit and logit models are slight and not about their content. Both distributions are symmetric, but the logit has thicker tails. However, despite the fairly significant difference in the tails, the distributions typically yield similar ratios of parameter estimates (Haab and McConnell, 2002).

Both logit and probit models are appropriate whenever modeling of two alternatives occur (Hoetker, 2007). Consider the archetypical use of the logit model - a survey respondent deciding whether or not to make a contribution to a non-profit fund for national parks. Let $\mathbf{Pr^Y}$ be the probability that an individual 'i' is willing to pay some amount as a donation to the non-profit national parks fund. Thus, $\mathbf{Pr^Y = NPF_i = 1}$.

Recall from Chapter 2 that the individual's maximum WTP satisfies:

$$\mathbf{u(0,y;s) = u(1,y\text{-}WTP_{max};s)} \qquad \text{(Eq.2.7.19)}$$

where $\mathbf{(WTP_{max})}$, the individual's maximum WTP donation to the national parks fund and $\mathbf{G_{WTPmax}(.)}$ is the cumulative density function (cdf) of $\mathbf{WTP_{max}}$. If $\mathbf{G_{WTPmax}(.)}$ is assumed to be logistic (or standard normal in the case of the probit model), and WTP is assumed to be non-negative, then:

$$\mathbf{Pr(E>X) = (1 + e^{-(a + BX)})^{-1}} \qquad \text{(Eq.2.7.9)}$$

In other words, $\mathbf{Pr^Y = (1 + e^{-\Delta v})^{-1}}$

Thus, for any survey respondent:

$$\mathbf{Pr^Y = (1 + e^{-\Delta v})^{-1}}$$

where $\Delta v = \boldsymbol{\alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_k X_k}$

and: $\mathbf{X_1}$ = **Bid Amount**
$\mathbf{X_2}$ = **Children**
$\mathbf{X_3}$ = **Language**
$\mathbf{X_4}$ = **Gender**
$\mathbf{X_5}$= **Education**
$\mathbf{X_6}$ = **Income**
..
$\mathbf{X_{55}}$ = **Donation to Conservation Organization**

It is worth noting that positive coefficients ($\boldsymbol{\beta i}$) mean that the $\mathbf{Pr^Y}$ increases with that variable (Hoetker, 2007).

For both the logistic and bivariate probit models, the mean and median are given in Hanemann *et al.* (1991) as:

$$\text{mean WTP} = \mathbf{WTP^+ = -1/\beta_1 (ln (1 + e^{\Delta v})} \qquad \text{(Eq.4.4.9)}$$

and

$$\text{median WTP} = \mathbf{WTP^* = -\Delta v/ \beta_1} \qquad \text{(Eq.4.4.10)}$$

4.5 METHOD OF ANALYSIS

Given the large number of variables in the survey database (367 variables), there was a need for a systematic approach to organize and examine the influence of these variables. Fifty six independent variables were examined as variables that might affect willingness to pay values. These included variable types recommended by the NOAA Panel including income, prior knowledge, visitation, attitudes toward the environment, attitudes toward big business, distance to the site, understanding of the task, belief in the scenarios and willingness to perform the task (U.S. Dept. of the Interior, 1993). The subset of 56 variables were used in the regression analysis and were grouped into demographic, socioeconomic, locational, park knowledge, park visitation and attitudinal categories. For each category, regression equations were run using the two measures of willingness-to-pay as the dependent variables. Thus, a total of twelve regression equations were estimated.

The variables from the twelve regression equations that had the highest level of statistical significance were selected for inclusion in the two overall regression models. Thus, the number of independent variables was reduced from 56 variables to 27 variables for each model. Due to their importance as predictor variables in other CVM studies (see Appendix 2), the variables for age, income, household language and education were included in the final regression models, regardless of their significance level. As a check to ensure most of the significant variables were included in the final regression models, they were compared to *computer logic only* regression models generated using various forward and backward stepwise methods to determine which variables to include in the equation.

One challenge with logistic regression is that estimated parameters do not have immediate interpretation. An approach used by this study to help interpret the final regression equation parameters, was to consider an 'average' observation for all independent variables except for the independent variable of interest. By assigning average values to all but one independent variables, they were held constant for the analysis. Hence, the impact of changes in the independent on the dependent variable can be more readily apparent and practically understood by the researcher and thesis reader.

This marginal analysis was applied to all variables in the final regression models. The results are presented as a series of bar graphs for discrete choice questions and line graphs for continuous response data.

According to Champ *et al.* (1997), CVM data describe true WTP better if absolutely certain 'Yes' votes are coded as supporters of the project. Therefore, in the models described in this study, only absolutely certain answers supporting the question statement (i.e. 'Very Important' responses) were coded as 'Yes' responses. In addition, only those respondents who favoured increased spending for national parks and were willing to pay for it were included in the analysis.

In order to better reflect the response of the Canadian population, all regression analysis was done with the national weighting factor applied to the data.

4.6 SUMMARY

This chapter described the rationale and implementation of the 2005 Parks Canada National Public Opinion Poll of which the CVM valuation questions explored by this thesis were an integral part. The non-market good being valued was unaccounted for use and non-use benefits Canadians receive from their national park system. The hypothetical payment vehicle was an annual or one-time contribution to a non-profit fund dedicated to Canada's national parks.

The national polling company Environics© Research Group used a telephone interview format to administer the survey. The sample was stratified and weighted to be representative of the Canadian population.

The chapter described why the CVM approach was deemed most appropriate for this study and the details of the Poll sampling scheme, telephone interview survey mode and valuation question format. The limitations on the CVM questions resulting from being part of a broader survey instrument were also discussed.

The next section of the chapter broadly described the questionnaire sub-sections with particular emphasis on the CVM questions which form the basis for this thesis. The valuation questions from this section were used as dependent variables for two regression models. For both regression models, the dependent variable was a 'Yes' or 'No' question. In the series of regression models that culminated in Model 1, the dependent variable was a 'Yes' or 'No' (Q21X) response to agreeing to pay an unspecified bid amount (PWTPun) to the hypothetical parks fund. Conversely, in the series of regression models that culminated in Model 2, the dependent variable was a 'Yes' or 'No' response (Q22X to Q24X) to agreeing to pay the specified bid amount (PWTPbid) to the hypothetical parks fund.

Like responses to CVM questions, it is important that the analysis of data from CVM surveys also be consistent with economic theory. The next section of Chapter 4 demonstrated this consistency by linking the mathematical equations of economic theory of utility developed in Chapter 2 to the those of the statistical logit model. The interpretation of regression coefficients from the logit model was also discussed.

The chapter concluded with a broad description of the method of analysis used to identify the best WTP predictor variables for the final regression models. Chapter Five is dedicated to present and discuss the results of this analytical approach in more detail.

Chapter 5. RESULTS AND DISCUSSION

5.0 INTRODUCTION

This chapter is divided into three sections. The first section is descriptive in nature and summarizes the responses of the surveyed population. It examines the similarity in question responses and characteristics between the Canadian population, the overall surveyed population and the sub-sample of persons asked the WTP valuation questions.

The second section of this chapter is the statistical analysis of the data. It presents and discusses the statistical importance of the preliminary and final regression models. As well, both parametric and non-parametric estimates of overall willingness to pay are estimated.

The final section of this chapter provides a marginal analysis to all the regression variables that were found to be the most statistically significant in the final regression models. Since the dependent variable in the regression models is a binary variable, the estimated regression parameters from the logistic regression models do not have an obvious interpretation. For this reason, a marginal analysis for those variables deemed most statistically significant in the final regression models was done to clarify the interpretation of the estimated regression parameters.

5.1 THE DATASET

As noted in Section 4.1a), the valuation questions examined in this study were part of the much larger Parks Canada 2005 National Public Opinion Survey which examined Canadians opinions of national parks and historic sites. Thus, the valuation questions were asked of only a sub-sample of those persons who participated in the 2005 Survey.

Environics©, a professional public opinion research company, conducted the 2005 Survey on behalf of Parks Canada during April 2005. The telephone survey successfully interviewed 6,082 Canadians of which a random sub-sample of 1,308 were asked the CVM valuation questions (See Appendix 3: Survey Questions Q19B, Q20X to Q27X). The unweighted CVM survey sub-sample was comprised of 529 'No' responses and 779 'Yes' responses.

A fully representative sample of the population will have no sample bias. To compensate for over or under sampling of the 2005 Survey population, Environics©/Parks Canada developed national weighting factors. With the national weights applied, the CVM sub-sample data set consisted of 1,598 responses of which 629 were 'No' responses and 969 were 'Yes' responses. This weighted data set was used for all subsequent regression analysis.

A comparison of the CVM survey sub-sample, the 2005 Survey and the 2001 Canadian Census data is provided in Table 5.3. It appeared that non-respondents were randomly distributed throughout the surveyed populations and no systematic bias was detected. Therefore, both the 2005 Survey and CVM survey sub-sample were deemed representative of the general Canadian population with no indication of sample bias.

5.1 a) Incomplete Responses

Of the 1,308 respondents asked if they would be willing to make a contribution to the non-profit fund for national parks, (see Appendix 3, survey question Q21X), 188 responded with a 'Don't Know' response. This represents about 14% of the survey cases which is considered acceptable. According to Mitchell and Carson:

> "in CV surveys, however, non-response rates of 20-30 percent for WTP elicitation questions are not uncommon where (1) the sample is random and therefore includes people of all educational and age levels, (2) the scenario is complex, and (3) the object of valuation is an amenity (such as air visibility) which people are not accustomed to valuing in dollars. Up to a certain point, these higher levels of non-response to WTP questions are acceptable or even desirable. It is unrealistic to expect that 95 percent of a sample will be willing and able to expend the effort necessary to arrive at a well-considered WTP amount for certain types of amenities. Given the choice between having someone offer an unconsidered guess at an amount or having them say they don't know how much it is worth to them, the latter behavior is preferable, provided appropriate procedures to compensate for the resulting item non-response are used"(1989, p.267).

The approach taken by this study to deal with the Q21X item non-response respondents was the same as taken by Carson et al. (1992). The 'Don't Know' responses were converted to 'No' responses to provide more conservative WTP estimates.

One of the challenges of close-ended CVM questions is the problem of 'yea-saying'- that is, respondents agree to pay the offered amount even though it may not represent their true WTP (Gunning-Traunt, 1996). Blamey *et al.* (1999) cite two reasons for this behavior. Firstly, the respondent may feel saying 'Yes' to a WTP bid is the socially desirable response - especially for in-person or telephone interviews. Secondly, it may be a strategic behavior. For example, if a respondent has a valuation of $30 and is asked to pay $80, then he may still say 'Yes', since that is the only way he can register an environmental vote and he knows the $80 will not be collected from him (Bateman *et al.*, 2002).

Hanemann *et al.*(1991) suggests that one test to examine for the presence of yea-saying in a double-bounded dichotomous choice CVM is to examine the proportion of 'Yes' responses to the initial and higher follow-up bid amount question. If yea-saying is not present, respondents should be less likely to say 'Yes' to the higher follow-up bid than would be expected on the basis of their responses to the initial bid.

Table 5.1 shows how the 'Yes' responses to Q21X were distributed among the bid amount questions (Q22X, Q23X and Q24X). In accordance with the Hanemann *et al.* (1991) suggestion presented above, given that the number of 'Yes/Yes' responses and 'Yes/No' responses are quite different (294 observations versus 193 observations), it appears that 'yea-saying' may not be a problem.

Table 5.1. Breakdown of 'Yes' Responses to Q21X (Respondents Who Were Willing to Contribute to the National Parks Fund)

Q22X	Q23X	Q24X	N
Yes	Yes	-----	294
Yes	No	-----	193
Yes ($80)	-----	-----	52
No	----	Yes	65
No	-----	No	167
No ($10)	-----	-----	8
Total			**779**

Table 5.2 provides a more complete breakdown of the responses to the initial, upper and lower bound willingness to pay questions in the survey. A 'Yes' response to the initial bid amount question (Q22X) was followed by a $10 higher bid amount question (Q23X). Conversely, if a 'No' response was given to the initial bid amount question (Q22X), it was followed by a $10 lower bid amount question (Q24X). The results from this table were used to estimate the nonparametric mean and median values.

Table 5.2. Breakdown of Responses to Double-Bounded CVM Question (Q22X)

Bid Amount	Q22X.Q24X No,No	Q22X,Q24X No,Yes	Q22X,Q23X Yes,No	Q22X,Q23X Yes,Yes	Total
$10	9[1]	-----	27	80	116
$20	5	17	54	59	135
$30	9	16	54	49	128
$40	40	13	24	54	131
$50	29	11	22	40	102
$60	35	9	30	41	115
$70	33	10	28	42	113
$80	48	8	-----	73[2]	129
Total					969

[1] 'No' to Q22X only because no lower bid amount than $10 for Q24X
[2] 'Yes' to Q22X only because no higher bid amount than $80 for Q23X

5.2 STATISTICAL ANALYSIS PROGRAM

The statistical analysis for the preliminary models was done using the Statistical Package for the Social Sciences (SPSS©) version 14.0. The analysis of the final WTPbid model was done using LIMDEP© version 8.0. A bivariate probit model was estimated to account for the conditional probabilities of the double-bounded WTP questions. Using linear specifications, explanatory variables were included in the regression models as described in Hanemann (1984). Both packages used maximum likelihood estimation to derive the model parameters.

5.3 DESCRIPTIVE STATISTICS OF REGRESSION VARIABLES

The size and complexity of the 2005 Parks Canada National Public Opinion Survey makes a complete analysis of the resulting data set beyond the scope of this study. The descriptive statistics described below are limited to those 2005 Survey questions that were used as independent variables in the regression models to predict the survey respondent's willingness to make a contribution to the hypothetical national parks fund.

The exact survey question and response categories from which the variables were derived can be found in Appendix 3. The descriptive statistics for all the survey questions, pertaining to the entire survey population, can be found in the Parks Canada document 'Release I of Canadians Perceptions of Parks Canada 2005 – National Findings, (Parks Canada Agency, 2006b).

Given that 56 independent variables were used to predict willingness to pay, there was a need to organize and examine the influence of these variables in a methodical manner. Hence, the independent variables were grouped into demographic, socioeconomic, residence, national park knowledge, visitation and attitudinal categories.

As noted previously, in order to provide conservative estimates and ensure a large enough number of observations to permit meaningful statistical analysis, missing values, 'Don't Know' and other unclear responses were recoded as 'No' or equivalently negative responses. For Q19B, response categories were reduced to 'Strongly agree' and 'All others' to highlight real differences in agreement with each statement and address the lack of variability across the original response categories.

The explanatory variable categories, variable names, their definitions and summary statistics are presented in Table 5.3.

Table 5.3. Definitions and Descriptive Statistics of Explanatory Variables

Variable Category and Name	Definition	Average CVM Survey Value* (N = 1,598)	Average 2005 Survey Value* (N = 6,082)	Average 2001 Canadian Census Value** (N = 11.6 million households)
Demographic				
Q48. Age	Average age of respondent in years	Median ^ = 45.0 yrs. Average = 46.7 yrs.	Median^ = 46.0 yrs. Average = 46.6 yrs.	Median^ = 43.0 yrs Average = 45.8 yrs.
Q51. Children < 16 yrs old living at home	1 = Yes 0 = No	31.5% 68.5%	31.8% 68.2%	28.2%*** 71.8%***
Q52. Household language	1 = English 2 = French 3 = Other	71.6% 22.5% 5.9%	71.9% 22.5% 5.6%	67.5% 22.0% 10.5%
Q59. Gender	1 = male 0 = female	49.8% 50.2%	49.0% 51%	49.0% 51.0%
Socioeconomic				
Q47. Education	1 = < high school 2 = high school 3 = college/some university 4 = university degree/ graduate/ professional school	12.4% 15.8% 40.3% 31.5%	12.0% 17.2% 38.5% 32.4%	31.3%^^ 14.1%^^ 39.2%^^ 15.4%^^
Q53. Income	1 = < $39,999 2 = $40,000 to $74,999 3 = $75,000 to $100,000 4 = > $100,000	31.1% 45.4% 12.6% 10.9% Median = $57,500 Average = $55,677	31.4% 44.6% 12.6% 11.5% Median = $57,500 Average = $55,943	42.5% 31.3% 12.7% 13.5% Median = $46,752 Average = $58,360
Residence				
Q56. Region of Residence	1 = Maritimes 2 = Quebec 3 = Ontario 4 = Manitoba/Saskatchewan 5 = Alberta 6 = B.C./Territories/ Nunavut	6.8% 26.4% 35.6% 6.5% 9.5% 15.2%	7.6% 24.1% 38.0% 7.0% 9.9% 13.4%	7.6% 24.1% 38.0% 7.0% 9.9% 13.4%
Q58. Community size	1 = City/Metropolitan Area 2 = Town 3 = Rural	57.9% 20.6% 21.6%	58.5% 20.0% 21.5%	64.3% 15.4% 20.3%

* weighted values **Statistics Canada, (2001). ^ for persons > 18 yrs. of age. ^^ for persons > 15 yrs. of age *** children < 17 yrs. of age.

Table 5.3. Definitions and Descriptive Statistics of Explanatory Variables (continued)

Variable Category and Name	Definition	Average CVM Survey Value* (N = 1,598)	Average 2005 Survey Value* (N = 6,082)
National Park Knowledge			
Q9Aa. Exposure to Parks Canada information	1 = A lot 2 = Some 3 = A little 4 = Nothing	18.5% 31.6% 34.4% 15.5%	17.3% 33.9% 33.7% 15.0%
Q9Ab.Exposure to information about Canada's national parks	1 = A lot 2 = Some 3 = A little 4 = Nothing	23.2% 33.2% 31.7% 12.0%	22.1% 36.6% 29.9% 11.4%
Q9Ad. Exposure to information about Canada's national marine conservation areas	1 = A lot 2 = Some 3 = A little 4 = Nothing	10.4% 20.5% 31.9% 37.3%	8.9% 21.0% 33.1% 37%
Q16A. Name of last national park visited	1 = can recall 2 = can't recall 3 = not applicable	40.5% 5.0% 54.5%	39.9% 5.4% 55.5%
National Park Visitation			
Q13A. Visit	0 = No 1 = Yes	15.5% 81.5%	18.1% 81.9%
Q14A. Last visit	1 = < 3 years ago 2 = > 3 years ago 3 = never visited	51.0% 30.0% 19.0%	50.5% 30.5% 19.0%
Q17A. Frequency of national park visits	1 = Frequently 2 = Occasionally 3 = Rarely 4 = Other	18.3% 38.9% 19.7% 23.1%	16.7% 39.8% 20.9% 22.6%
Attitudes Regarding National Parks and Natural Areas			
Q1Aa. Level of agreement that Canada protect natural areas and the environment	1 = Strongly agree 2 = Somewhat agree 3 = Somewhat disagree 4 = Strongly disagree	91.3% 8.6% .1% .1%	90.0% 9.5% .3% .2%
Q1Ab. Level of agreement that Canada protect its lakes and oceans	1 = Strongly agree 2 = Somewhat agree 3 = Somewhat disagree 4 = Strongly disagree	93.2% 6.2% .4% .2%	93.0% 6.6% .3% .1%
Q1Ac. Level of agreement with concern about threats to Canada's natural areas and the environment	1 = Strongly agree 2 = Somewhat agree 3 = Somewhat disagree 4 = Strongly disagree	58,6% 35.3% 3.9% 2.1%	58.2% 35.3% 4.5% 2.0%
Q2Ba. Federal government responsibility for protection of natural and wilderness areas	1 = A lot 2 = Some 3 = A little 4 = None	83.3% 12.8% 1.8% 2.1%	83.8% 13.5% 1.5% 1.1%

Table 5.3. Definitions and Descriptive Statistics of Explanatory Variables (continued)

Variable Category and Name	Definition	Average CVM Survey Value* (N = 1,598)	Average 2005 Survey Value* (N = 6,082)
Attitudes Regarding National Parks and Natural Areas (continued)			
Q2Bb. Provincial/territorial responsibility for protection of natural and wilderness areas	1 = A lot 2 = Some 3 = A little 4 = None	82.5% 14.0% 2.0% 1.5%	82.2% 15.5% 1.4% .9%
Q2Bc. Private industry responsibility for protection of natural and wilderness areas	1 = A lot 2 = Some 3 = A little 4 = None	57.7% 32.9% 4.7% 4.7%	60.1% 31.5% 5.5% 2.9%
Q2Bd. Local community responsibility for protection of natural and wilderness areas	1 = A lot 2 = Some 3 = A little 4 = None	62.6% 31.8% 4.0% 1.7%	62.5% 33.7% 3.4% .5%
Q2Be. Not for profit/conservation group responsibility for protection of natural and wilderness areas	1 = A lot 2 = Some 3 = A little 4 = None	54.0% 36.5% 6.3% 3.3%	58.1% 34.6% 5.7% 1.6%
Q2Bf. Individual Canadian responsibility for protection of natural and wilderness areas	1 = A lot 2 = Some 3 = A little 4 = None	60.5% 33.8% 4.0% 1.7%	62.5% 33.0% 3.8% .6%
Q5Aa. Trust in federal government as protector /steward of Canada's natural and cultural heritage	1 = Trust a great deal 2 = Trust somewhat 3 = Trust a little 4 = Don't trust at all	13.8% 50.6% 25.1% 10.6%	12.3% 49.5% 26.7% 11.4%
Q5Ab. Trust in provincial /territorial government as protector /steward of Canada's natural and cultural heritage	1 = Trust a great deal 2 = Trust somewhat 3 = Trust a little 4 = Don't trust at all	11.0% 52.8% 28.4% 7.8%	11.2% 51.3% 27.1% 10.3%
Q5Ac. Trust in private sector companies as protector /steward of Canada's natural and cultural heritage	1 = Trust a great deal 2 = Trust somewhat 3 = Trust a little 4 = Don't trust at all	5.6% 32.6% 39.0% 22.8%	4.6% 32.1% 37.8% 25.5%
Q5Ad. Trust in not for profit/conservation group as protector /steward of Canada's natural and cultural heritage	1 = Trust a great deal 2 = Trust somewhat 3 = Trust a little 4 = Don't trust at all	44.8% 40.7% 11.1% 3.4%	45.7% 40.5% 10.3% 3.6%
Q5Ae. Trust in Parks Canada as protector /steward of Canada's natural and cultural heritage	1 = Trust a great deal 2 = Trust somewhat 3 = Trust a little 4 = Don't trust at all	52.8% 36.7% 7.3% 3.2%	52.2% 37.0% 7.2% 3.5%
Q6Aa. Level of support for federal tax dollars to complete national park system	1 = Strongly support 2 = Somewhat support 3 = Somewhat oppose 4 = Strongly oppose	45.4% 40.9% 4.4% 9.3%	46.1% 39.5% 5.0% 9.4%

Table 5.3. Definitions and Descriptive Statistics of Explanatory Variables (continued)

Variable Category and Name	Definition	Average CVM Survey Value* (N = 1,598)	Average 2005 Survey Value* (N = 6,082)
Attitudes Regarding National Parks and Natural Areas (continued)			
Q6Ab. Level of support for federal tax dollars to maintain existing national park system	1 = Strongly support 2 = Somewhat support 3 = Somewhat oppose 4 = Strongly oppose	69.8% 26.8% 1.8% 1.6%	69.3% 25.8% 2.6% 2.2%
Q7B. Level of support for increasing government funding for conserving natural/wilderness areas in Canada's national parks	1 = Strongly support 2 = Somewhat support 3 = Somewhat oppose 4 = Strongly oppose	53.7% 36.4% 5.9% 4.0%	54.7% 36.4% 6.2% 2.7%
Q18Ba. Impression of national parks as fun/dull	0 = Dull 1 = Fun	12.5% 87.5%	7.1% 92.9%
Q18Bb. Impression of national parks as hard/easy to get to	0 = Hard to get to 1 = Easy to get to	27.8% 72.2%	20.7% 79.3%
Q18Bc. Impression of national parks as poor/good value	0 = Poor value 1 = Good value	10.3% 89.7%	5.3% 94.7%
Q18Bd. Impression of national parks as relevant/not relevant to you	0 = Not relevant to you 1 = Relevant to you	19.3% 80.7%	16.5% 83.5%
Q18Be. Impression of national parks as memorable/forgettable	0 = Forgettable 1 = Memorable	10.0% 90.0%	6.0% 94%
Q18Bf. Impression of national parks as artificial/authentic	0 = Artificial 1 = Authentic	11.5% 88.5%	5.8% 94.2%
Q18Bg. Impression of national parks as unique/common	0 = Common 1 = Unique	27.3% 72.7%	21.9% 78.1%
Q19Ba. Agreement that national parks improve well-being of local communities (Use value: commercial)	1 = Strongly agree 0 = All others	62.8% 37.2%	64.1% 32.6%
Q19Bb. Agreement that national parks are meant to be enjoyed by future generations as much as by people today (Non-use value: bequest value)	1 = Strongly agree 0 = All others	90.1% 9.9%	90.3% 9.7%
Q19Bc. Agreement that I would miss national parks if they were gone (Use and Non-use values)	1 = Strongly agree 0 = All others	70.6% 29.4%	70.2% 29.8%
Q19Bd. Agreement that every Canadian should visit a national park at least once in their lifetime (Non-use value: bequest value)	1 = Strongly agree 0 = All others	82.4% 17.6%	84.1% 15.9%
Q19Be. Agreement that national parks provide recreation opportunities (Use value: personal)	1 = Strongly agree 0 = All others	87.2% 12.8%	87.9% 12.1%
Q19Bf. Agreement that national parks provide a place to study nature (Use value: science/education)	1 = Strongly agree 0 = All others	82.3% 17.7%	81.8% 18.2%
Q19Bg. Agreement that national parks protect/improve the environment (Use value: ecological services)	1 = Strongly agree 0 = All others	75.4% 24.6%	77.3% 22.7%

Table 5.3. Definitions and Descriptive Statistics of Explanatory Variables (continued)

Variable Category and Name	Definition	Average CVM Survey Value* (N = 1,598)	Average 2005 Survey Value* (N = 6,082)
Attitudes Regarding National Parks and Natural Areas (continued)			
Q19Bh. Agreement that national park existence is important even if no one ever visits them (Non-use value: existence value)	1 = Strongly agree 0 = All others	67.8% 32.2%	69.8% 30.2%
Q19Bi. Agreement that national parks create local business opportunities (Use value: commercial)	1 = Strongly agree 0 = All others	74.2% 25.8%	74.3% 25.7%
Q19Bj. Agreement that I want to visit the national park of my choice in the future (Non-use value: option value)	1 = Strongly agree 0 = All others	80.8% 19.2%	82.1% 17.9%
Q45Ba. Volunteer time with wilderness/nature protection organization	1 = Yes 0 = No	11.4% 88.6%	12.3% 87.7%
Q45Bb. Donate money to wilderness/nature protection organization	1 = Yes 0 = No	22.5% 77.5%	24.9% 75.1%
Q45Bc. Participate as member in wilderness/nature protection organization	1 = Yes 0 = No	10.7% 89.3%	11.2% 88.8%
Q45Bd. Subscribe to magazine from wilderness/nature protection organization	1 = Yes 0 = No	14.5% 85.5%	16.3% 83.9%

5.3 a) Discussion of Explanatory Variable Descriptive Statistics

It is clear from Table 5.3 that for most of the variables noted, both the weighted 2005 Parks Canada National Public Opinion Survey population and the sub-sample used for the CVM survey were reasonably representative of the Canadian population. The average age, gender and proportion of families with young children for both the 2005 Survey and CVM survey populations was very similar to that of the Canadian population. However, the Canadian population had a higher proportion of non-French/English speaking households (10.5%) compared to 5.6% for the 2005 Survey and 5.9% for the CVM survey populations.

In terms of community size, the surveyed populations very closely mirrored these characteristics of the broader Canadian population. About 60% of the survey respondents lived in large urban centers with the remaining 40% of respondents evenly divided between town and rural communities.

Compared to the Census data, the 'Region of Residence' variable distribution for the CVM survey respondents also approximated that of the nation. Respondents from Ontario and Quebec accounted for just over 60% of the CVM survey population. Respondents from the Maritime and Manitoba/Saskatchewan regional categories each represented less than 7% of the total CVM survey sample. These results are similar to those of found in Parks Canada's own analysis of the regional data (Parks Canada Agency, 2006b).

In comparison to the Canadian population, both the 2005 Survey and CVM sub-sample populations had a significantly larger proportion of persons with some university/college education (about 15% versus 32%, respectively). As well, the 2005 Survey and CVM survey populations had a higher proportion of persons in the $40,000 to $74,000 income category. Compared to the Canadian population, the larger proportion of 2005 Survey and CVM respondents in the second income bracket can perhaps be explained by the following two reasons. Firstly, the higher education level of 2005 Survey and CVM survey respondents may have qualified them for higher paying careers, and thus, larger household incomes. Secondly, to maintain sample size, the missing values for income were replaced with the mean income value which falls in the second income bracket.

The proportion of respondent answers to the park knowledge, visitation and attitudinal questions of both populations reported was very similar for both 2005 Survey and CVM survey respondents. As noted also by Parks Canada (2006b), while less than

16% of respondents reported having no exposure to information regarding national parks or Parks Canada in the past year, about 37% reported having no exposure to Canada's national marine conservations in the past year.

About 82% of both 2005 Survey and CVM survey respondents reported previously visiting a national park. Approximately 51% of these visits for both 2005 Survey and CVM survey populations occurred less than 3 years ago. These findings were also observed by Parks Canada's internal analysis of the survey data (Parks Canada Agency, 2006b). Roughly 17% of survey respondents considered themselves 'frequent' national park visitors.

About 40% of respondents were able to recall the name of the last national park they visited. A further breakdown of the data revealed that the three most cited parks previously visited were Banff, Algonquin and Jasper parks. About 24% of 2005 Survey and 26% of CVM respondents cited Banff National Park as the last national park they visited. Interestingly, about 9% of 2005 Survey and 7% of CVM respondents mistakenly cited Ontario's Algonquin Provincial Park as the last national park they visited. Roughly 8% of the 2005 Survey and 10% of the CVM respondents reported Jasper National Park as the last national park they visited.

Based on the responses to many of the survey questions, the attitudes regarding national parks and natural areas was very similar for both the 2005 Survey and CVM sub-sample populations. For many attitudinal questions, respondents expressed strong opinions and feelings. For example, over 90% of both 2005 Survey and CVM respondents 'Strongly agreed' that it is important for Canada to protect its natural areas, environment, lakes and oceans. As well, about 58% of respondents from the 2005 Survey and CVM populations 'Strongly agreed' that they were concerned about threats to Canada's natural areas and the environment. These findings were identical to those reported in Parks Canada's analysis of the 2005 Survey data (Parks Canada Agency, 2006b). Table 5.4 summarizes what the CVM survey participants thought were the greatest threats currently confronting Canadian national parks.

Table 5.4. Perceived Greatest Threats to Canada's National Parks

National Park Threat	Average CVM Survey Value (N = 1,289)	Average 2005 Survey Value (N = 3,545)
Environmental pollution	23.3%	19.8%
Lack of financial resources	**12.1%**	**13.6%**
Encroachment from outside park	11.6%	13.2%
Commercial activity/tourism in the park	6.6%	7.1%
Resource extraction	6.1%	6.6%
Overuse/human damage (litter, etc.)	6.0%	5.5%
Lack of public interest/concern	5.3%	5.2%
Government mismanagement	4.9%	5.0%
Fire	4.4%	4.2%
Big business/industry	2.3%	3.0%
Loss of natural habitat	1.8%	1.6%
Lack of political support	1.4%	1.6%
Human activity (general)	1.1%	1.3%
Other	5.9%	6.0%
Don't know	5.8%	6.3%
Total	100%	100%

Table 5.4 shows that the responses of both the 2005 Survey and CVM sub-sample were very similar. Overall, the responses in Table 5.4 suggest that Canadians are aware of the main threats and challenges facing the national parks.

Pollution was quoted by the largest number of respondents as the greatest threat to national parks, as it was in a similar Parks Canada public opinion poll conducted in 2002 (Parks Canada Agency, 2006b). Interestingly, in both surveyed populations, the lack of financial resources was cited as the second greatest threat confronting the national parks. However, if one take the position of Parks Canada (Ibid, 2006b) that the threat of pollution is more related to the broader environment than to national parks, and hence, 'discounts' pollution as a threat, the lack of financial resources could be interpreted as the perceived greatest threat to Canada's national parks.

It is worth noting that the perception of the 'Lack of financial resources' as a threat to Canada's national parks almost doubled in size (from 6% to 11%) as compared to the results for the same question reported in the 2002 Parks Canada National Public Opinion Survey (Ibid, 2006b). This was the largest increase in the status of any of the perceived threats from the 2002 Survey. Otherwise, the responses were very similar from 2002 to 2005.

As indicated by the responses to Q2Ba to Q2Bf, respondents in both the 2005 Survey and CVM populations acknowledged that all public and private jurisdictions have 'A lot' of responsibility for the protection of natural and wilderness areas. However, as indicated by the responses to Q2Ba and Q2Bb, over 82% of both the CVM and 2005 Survey respondents believed that the majority of the responsibility for the protection of natural areas and the environment should rest with the federal and provincial governments. These findings are consistent with those reported by Parks Canada (2006b).

Respondents of both the 2005 Survey and CVM sub-sample populations ranked Parks Canada as the most trusted protector of Canada's natural and cultural heritage. Roughly 52% of respondents from both 2005 Survey and CVM populations stated they trusted Parks Canada 'a great deal' with this responsibility. By comparison, trust in non-profit conservation groups, the federal and provincial governments and the private sector was about 45%, 13%, 11% and 5%, respectively. As noted by Parks Canada (2006b), in spite of the low level of trust in the federal government as a protector/steward of the 2005 Survey respondents have considerable trust for the federal agency of Parks Canada to protect Canada's natural legacy.

In terms of appropriating tax dollars for national parks, about 46% of both the 2005 Survey and CVM respondents strongly supported the use of federal tax dollars to complete the national park system. As well, about 70% of both 2005 Survey and CVM survey respondents strongly supported the use of federal tax dollars to maintain the existing national parks. These findings are identical to those reported by Parks Canada in their analysis of the 2005 Survey data (Parks Canada Agency, 2006b). Relative to 2002, respondent support for completing and maintaining the national park system increased by 9% for each of these funding needs (Ibid, 2006b).

As indicated by the descriptive statistics for Q7B, about 54% of the CVM and 2005 Survey populations strongly supported increasing government funding for conserving natural areas in Canada's national parks. Unclear question wording may have influenced the responses to this question and helps explain the discrepancy between the responses given for Q7B and Q6Aa. For example, the wording of Q7B has two interpretations. The question could be interpreted as increasing government funding for conservation of natural and wilderness areas within existing national parks. Alternatively, Q7B could be interpreted as using additional government funds to create new national parks to protect natural and wilderness areas that are currently unprotected.

Based on the responses to Q18Ba to Q18Bg, both 2005 Survey and CVM survey respondents had positive impressions regarding Canada's national parks. About 84% of the 2005 Survey and 81% of the CVM respondents felt Canada's national parks were relevant to them. Additionally, about 94% of the 2005 Survey and 90% of the CVM respondents regarded Canada's national parks as 'authentic', 'memorable' and a 'good value'. Interestingly, about 78% of the 2005 Survey and 72% of the CVM respondents felt that Canada's national parks were 'unique' and easily accessible.

Questions Q19Ba to Q19Bj used the level of respondent agreement with various statements to gauge the underlying importance of national park-related use and non-use values. As noted previously, response categories were reduced to two categories ('Strongly agree' and 'All others') because of the lack of variability across the original response categories.

As a reflection of the importance of the commercial use values arising from Canada's national parks, about 74% of both 2005 Survey and CVM respondents strongly agreed that national parks create local business opportunities. As well, 64% of respondents to the 2005 Survey and 63% of the CVM respondents strongly agreed that national parks improve the well-being of local communities. Conversely, as an indication of non-commercial (personal) use values arising from the national parks, about 87% of both 2005 Survey and CVM survey respondents strongly agreed that national parks provide outdoor recreation opportunities like hiking and camping.

In terms of other types of use values, about 82% of both 2005 Survey and CVM respondents strongly agreed that national parks provide educational value as places to learn and understand nature. As well, about 77% of 2005 Survey and 75% of CVM respondents strongly agreed that national parks provide ecological service values.

As evidence in support of the importance of bequest value, about 90% of both 2005 Survey and CVM respondents strongly agreed that national parks are meant to be enjoyed by future generations as much as by current generations. Another indicator in support of bequest value was that approximately 84% of 2005 Survey and 82% of CVM respondents strongly agreed that every Canadian should visit a national park at least once in their lifetime.

About 70% of the 2005 Survey and 68% of the CVM respondents strongly agreed that the existence value of national parks was important to them. Approximately 70% of both the 2005 Survey and CVM respondents 'Strongly agreed' that they would miss national parks if they were gone. As a measure of the relative importance of option value, about 82% of the 2005 Survey and 81% of the CVM respondents 'Strongly agreed' that they wanted to be able to visit the national park of their choice in the future.

The percentages presented above for Q19Ba to Q19Bj mirrored those reported by Parks Canada (2006b).

The type of respondent affiliation with a nature/wilderness organization was also very similar for both the 2005 Survey and CVM survey populations. About 12% of 2005 Survey and 11% of the CVM populations volunteered some of their time for a nature/wilderness organization. About 11% of both the 2005 Survey and CVM respondents reported participating as a member with a nature/wilderness organization. Approximately 25% of the 2005 Survey and 23% of the CVM respondents donated money to this type of organization. Lastly, about 16% of the 2005 Survey respondents and 15% of the CVM respondents subscribed to a wilderness/nature-related publication. The response proportions presented above for the type of respondent affiliation with a nature/wilderness organization are identical to those reported by Parks Canada (Ibid, 2006).

In conclusion, the above discussion of the summary statistics presented in Table 5.3 and 5.4 indicate that the survey responses and characteristics of the sub-sample of 2005 Survey respondents used for the CVM survey was very similar to the overall 2005 Survey population. As well, for the characteristics noted, the 2005 Survey population closely mirrored that of the broader Canadian population and the findings of Parks Canada's internal analysis of the 2005 Survey data. Hence, the results from the analysis of either the 2005 Survey or CVM sub-sample can be used to make inferences about the general Canadian population.

5.3 b) Reasons for Not Contributing to the National Parks Fund

If respondents to either the WTPun or WTPbid models did not agree to make a contribution to the national parks fund, they were asked "why"? Table 5.5 summarizes the respondent's reasons given in Q27X. This question also checked the 'believability' of the valuation scenario. It confirmed that, despite the brevity of the CVM valuation component of the 2005 Parks Canada Public Opinion Survey, respondents understood the hypothetical scenario, had sufficient information to make their decision, and did not object to the method of payment.

Table 5.5. Reasons for Saying 'No' to Willingness to Pay Proposals *n=678*

Reason	Percent of Responses
Personal financial concerns/cannot afford it	22.7
I already pay too much in taxes.	17.8
I did not have enough information to answer 'Yes'	10.7
Should be funded by the Government	10.3
Too many charities compete for my money/give money elsewhere	7.0
Do not trust funds would be used correctly	6.2
Don't Know / No Answer	5.4
I want to have national parks, but I do not want to pay for them	3.3
I think Parks Canada gets enough money.	3.1
Should be pay as you go	3.0
I will not use these areas myself, so I do not want to pay for them.	3.0
The dollar amount was too high.	2.5
Depends on who is running it	2.1
Not important to me/not interested	1.6
Funding not needed	1.2
I object to the way the question was asked.	< 0.1
Should be run by private companies	< 0.1
Total	**100%**

Table 5.5 indicates that about 11% of respondents felt that they did not have enough information to answer 'Yes' to making a contribution to the national parks fund and less than .008% of respondents objected to the way the question was asked. Thus, it can be concluded that the CVM questions were perceived as believable and reasonable answers were likely provided.

The main reason why respondents were not willing to make a contribution to the non-profit fund in support of parks was because they could not afford it. This reason was cited by about 23% of these respondents. The perception that respondents were already paying too much in taxes, and that additional park funding should be found within existing government budgets, were also a popular reasons for why respondents refused to contribute to the parks fund. Less than .003% of respondents did not contribute to the national parks fund because they believed national parks should be run by private companies.

5.4 REGRESSION ANALYSIS RESULTS

Multivariate regression analysis was performed on the survey data in order to better understand the determinants of the WTP values. The advantage of using a multivariate regression approach, rather than reporting only the descriptive statistics and cross-tabulations, is that the resulting regression equation simultaneously considers the overlapping effects of multiple variables as well as the main effects for each variable. Moreover, this approach is more time efficient and permits more robust interpretation.

In terms of this study, for the WTPbid regression models, the correlation between the first and second WTP questions ranged from .363 to .544. Hence, a bivariate probit model was used to estimate the regression equations. The fact that the correlation coefficient is < 1 indicates that the random WTP component for the first question is not perfectly correlated with the random component of the second question. Since the WTPun regression models did not explore WTP dollar values, a simple logit model was used to estimate these regression equations.

5.4 a) Preliminary Regression Models

The variables within each category were evaluated for their statistical significance using logit regression methods. The regression models for each variable category were used as 'preliminary' regression models to help determine which variables would be included in the final regression models. In order to ensure the best possible final models, only those variables from the preliminary regression equations that were significant at the $p < .05$ level of statistical significance were included in the final regression models. The preliminary regression models are shown in Tables 5.6 to 5.13. Given the large number of preliminary regression models used to derive the final regression models, a detailed discussion of the regression results is limited to the final models.

Table 5.6. Baseline Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified Bid Amount (WTPbid)

VARIABLES	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Constant	0.4320* (8.47)	0.3002* (9.13)
Number of observations (N)	**1308**	**779**
- 2 Log likelihood	**2142.719**	**2495.440**
McFadden's Adjusted Pseudo- R^2	**0**	**0**
Chi-square	**0**	**0**

*1%,**5%, ***10% significance level

Table 5.7. Bid Amount Variable Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified Bid Amount (WTPbid)

BID AMOUNT VARIABLES	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Constant	Not Applicable	1.659* (13.26)
Bid Amount	Not Applicable	-0.034* (-13.00)
Bid10	Not Applicable	-1.752* (-6.37)
Bid80	Not Applicable	2.260* (14.44)
Number of observations (N)		**779**
- 2 Log likelihood		**2093.052**
McFadden's Adjusted Pseudo- R^2		**.164**
Chi-square		**402.388**

*1%,**5%, ***10% significance level

Table 5.8. Demographic Variable Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified (WTPbid) Amount

DEMOGRAPHIC VARIABLES	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Constant	0.713* (2.57)	2.104* (9.58)
Bid Amount		-0.035* (-13.28)
Bid10		-1.665* (-6.55)
Bid80		2.323* (15.09)
Age	-0.006*** (-2.00)	-0.007* (-2.73)
Gender	0.051 (0.49)	0.169** (2.32)
Household Language		
• English	0.022 (0.10)	-0.088 (-0.65)
• French	-0.450*** (-1.88)	-0.741* (-4.87)
Children < 16 yrs. of age at home	0.266** (2.20)	0.087 (1.05)
Number of observations (N)	**1,308**	**779**
- 2 Log likelihood	**2114.304**	**2025.598**
McFadden's Adjusted Pseudo- R^2	**.017**	**.194**
Chi-square	**28.685**	**469.842**

*1%,**5% , ***10% significance level

Table 5.9. Socioeconomic Variable Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified Bid Amount (WTPbid)

SOCIOECONOMIC VARIABLES	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Constant	0.676* (4.05)	2.049* (12.14)
Bid Amount		-0.035* (-12.82)
Bid10		-1.729* (-6.62)
Bid80		2.235* (14.28)
Income		
• < $39,999	-0.090 (-0.470)	-0.323** (-2.46)
• $40,000 to $74,999	-0.278 (-1.54)	-0.317* (-2.61)
• $75,000 to $100,000	-0.208 (-0.96)	-0.185 (-1.24)
Education		
• < high school	-0.493* (-2.79)	-0.225*** (-1.69)
• high school	0.088 (0.53)	-0.033 (-0.28)
• college/some university	-0.033 (-0.26)	-0.183** (-2.13)
Number of observations (N)	**1,308**	**779**
- 2 Log likelihood	**2128.420**	**2076.280**
McFadden's Adjusted Pseudo- R^2	**.008**	**.172**
Chi-square	**14.299**	**419.16**

*1%,**5% , ***10% significance level

Table 5.10. Residence Variable Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified Bid Amount (WTPbid)

RESIDENCE VARIABLES	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Constant	.859* (4.97)	1.652* (10.00)
Bid Amount		-0.035* (-13.17)
Bid10		-1.647* (-6.14)
Bid80		2.268* (14.62)
Region Categories		
• Maritimes	.300 (1.20)	0.097 (0.630)
• Quebec	-.515* (-3.10)	-0.246** (-2.17)
• Ontario	.112 (.70)	0.288* (2.74)
• Manitoba/Saskatchewan	-.525** (-2.18)	0.029 (0.16)
• Alberta	.179 (.82)	0.529* (3.68)
Community Size		
• Central Metropolitan Area	-.333** (.24)	-0.073 (-0.80)
• Town	-.627* (-3.85)	-0.302* (-2.65)
Number of observations (N)	**1,308**	**779**
- 2 Log likelihood	**2096.675**	**2039.336**
McFadden's Adjusted Pseudo-R^2	**.023**	**.187**
Chi-square	**46.04**	**456.104**

*1%,**5% , ***10% significance level

Table 5.11. Park Knowledge Variable Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified Bid Amount (WTPbid)

KNOWLEDGE VARIABLES	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Constant	1.122* (5.67)	1.774* (9.43)
Bid Amount		-0.034* (-12.70)
Bid10		-1.761* (-6.82)
Bid80		2.236* (14.50)
Level of exposure to information about Parks Canada	1.129*** (-1.77)	-0.167* (-3.51)
Level of exposure to information about Canada's national parks	-0.308* (4.16)	0.063 (1.33)
Level of exposure to information about Canada's national marine conservation areas	0.092 (1.59)	0.027 (0.69)
Recollection of name of last national park visited		
• able to recall name	0.226** (2.04)	0.151** (2.00)
• unable to recall park name	-0.043 (0.18)	-0.117 (-0.76)
Number of observations (N)	**1,308**	**779**
- 2 Log likelihood	**2084.954**	**2072.884**
McFadden's Adjusted Pseudo R^2	**.030**	**.175**
Chi-square	**57.765**	**422.556**

*1%,**5% , ***10% significance level

Table 5.12. Park Visitation Variable Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified Bid Amount (WTPbid)

VISITATION VARIABLES	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Constant	0.092 (0.79)	1.385* (9.07)
Bid Amount		-0.034* (-12.83)
Bid10		-1.708* (-5.96)
Bid80		2.269* (14.48)
Visit	-0.379 (0.59)	0.015 (0.07)
Last Visit		
• < 3 years ago	1.062 (1.53)	0.529** (2.31)
• > 3 years ago	0.990 (1.44)	0.512** (2.25)
Visit Frequency	*+	
• frequently	0.312 (1.03)	0.015 (0.07)
• occasionally	-0.361 (-1.29)	-0.255 (1.21)
• rarely	-0.472 (-1.64)	-0.367*** (-1.67)
Number of observations (N)	**1,308**	**779**
- 2 Log likelihood	**2103.831**	**2067.126**
McFadden's Adjusted Pseudo R^2	**.021**	**.176**
Chi-square	**38.888**	**428.314**

*1%,**5% , ***10% significance level

+ overall effect was significant at the 1% level

Table 5.13. Attitudinal Variable Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified Bid Amount (WTPbid)

ATTITUDINAL VARIABLES	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Constant	2.012* (3.37)	1.199** (2.46)
Bid Amount		-0.035* (-12.61)
Bid10		-1.693* (-5.80)
Bid80		2.363* (13.18)
Level of agreement that Canada protect natural areas and the environment	0.002 (0.01)	-0.100 (-0.57)
Level of agreement that Canada protect its lakes and oceans	-0.165 (-0.78)	0.202 (1.35)
Level of agreement with concern about threats to Canada's natural areas and the environment	-0.121 (-1.30)	-0.043 (-0.53)
Federal government responsibility for protection of natural and wilderness areas	-0.002 (-0.01)	-0.074 (-0.74)
Provincial/territorial responsibility for protection of natural and wilderness areas	0.110 (0.75)	-0.059 (-0.55)
Private industry responsibility for protection of natural and wilderness areas	-0.042 (-0.51)	0.051 (0.95)
Local community responsibility for protection of natural and wilderness areas	0.210*** (1.91)	0.131 (1.62)
Not for profit/conservation group responsibility for protection of natural and wilderness areas	-0.089 (-1.02)	-0.011 (-0.17)
Individual Canadian responsibility for protection of natural and wilderness areas	-0.255** (-2.45)	0.059 (0.76)
Trust in federal government as protector /steward of Canada's natural and cultural heritage	0.088 (0.91)	-0.013 (-0.19)
Trust in provincial /territorial government as protector /steward of Canada's natural and cultural heritage	-0.025 (-0.24)	-0.054 (-0.80)
Trust in private sector companies as protector /steward of Canada's natural and cultural heritage	-0.071 (-1.04)	0.022 (0.47)
Trust in not for profit/conservation group as protector /steward of natural and cultural heritage	-0.040 (-.53)	0.026 (0.48)
Trust in Parks Canada as protector /steward of Canada's natural and cultural heritage	-0.086 (-1.06)	0.027 (0.46)
Level of support for federal tax dollars to complete national park system	-0.322* (-4.81)	0.005 (0.10)
Level of support for federal tax dollars to maintain existing national park system	-0.050 (-0.49)	-0.040 (-0.61)
Level of support for increasing government funding for conserving natural/wilderness areas in national parks	-0.288* (-3.56)	-0.035 (-0.54)
Impression of national parks as fun/dull	0.172 (0.86)	-0.041 (-0.23)

*1%,**5% , ***10% significance level

Table 5.13. (continued): Attitudinal Variable Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified Bid Amount (WTPbid)

ATTITUDINAL VARIABLES (continued)	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Impression of national parks as hard/easy to get to	0.059 (0.45)	0.060 (0.63)
Impression of national parks as poor/good value	0.235 (1.05)	-0.400** (-2.03)
Impression of national parks as relevant/not relevant to you	-0.255 (-1.57)	-0.049 (-0.38)
Impression of national parks as memorable/forgettable	-0.306 (-1.26)	0.329** (1.99)
Impression of national parks as artificial/authentic	-0.031 (-0.15)	-0.079 (-0.48)
Impression of national parks as unique/common	0.496* (3.67)	0.256** (2.31)
Agreement that parks improve well-being of local communities (Use value: commercial)	-0.220 (-1.61)	-0.091 (-0.98)
Agreement that parks are meant to be enjoyed by future generations as much as by people today (Non-use value: bequest value)	-0.247 (-1.00)	-0.766* (-3.55)
Agreement that I would miss national parks if they were gone (Use and Non-use values)	0.416* (2.85)	0.228** (2.03)
Agreement that every Canadian should visit a national park (Non-use value: bequest value)	-0.140 (-0.79)	0.470* (3.41)
Agreement that national parks provide recreation opportunities (Use value: personal)	-0.231 (-1.10)	0.238 (1.41)
Agreement that national parks provide a place to study nature (Use value: science/education)	-0.301 (-1.63)	-0.162 (-1.15)
Agreement that national parks protect/improve the environment (Use value: ecological services)	0.105 (0.71)	0.045 (0.39)
Agreement that park existence is important even if never visited (Non-use value: existence value)	-0.066 (-0.48)	0.031 (0.31)
Agreement that national parks create local business opportunities (Use value: commercial)	0.181 (1.25)	0.083 (0.75)
Agreement that I want to be able to visit the national park of my choice in the future (Non-use value: option value)	0.519* (2.72)	0.347** (2.29)
Volunteer time with wilderness/nature protection organization	-0.341 (-0.66)	0.467* (3.09)
Donate money to wilderness/nature protection organization	0.554* (3.42)	0.038 (0.39)
Participate as member in wilderness/nature protection organization	0.476*** (1.87)	-0.066 (-0.43)
Subscribe to magazine from wilderness/nature protection organization	-0.103 (-0.53)	-0.029 (-0.22)
Number of observations (N)	**1,308**	**779**
- 2 Log likelihood	**1941.743**	**1989.817**
McFadden Pseudo- R^2	**.129**	**.235**
Chi-square	**200.976**	**505.623**

*1, **5%,***10% significance level

5.4 b) Final Regression Models

Table 5.14 presents the final regression models for this study. Only those variables from the preliminary regression equations that were significant at the $p < .05$ level of statistical significance were included in the final regression models.

As noted previously, variables such as age, income and education have been shown to be important WTP predictors in other CVM studies (see Appendix A, 'Independent Variables' column). For this reason, regardless of their level of significance in the preliminary regression models, the variables for income, age, household language and education were included in both the WTPun and WTPbid final models.

As was done for each of the preliminary regression models, various measures indicating the 'goodness of fit' for the final WTPun and WTPbid models are shown toward the bottom of Table 5.4.9. For the WTPbid final model, the parametric mean and median WTP estimates are provided and the Krinsky and Robb 90 and 95 per cent confidence levels[7, 8] are also shown.

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[7] One can explain a 95 percent confidence interval as follows. If a very large number of equal-sized samples were taken randomly from the Canadian population, and confidence intervals were generated for each sample, then 95 per cent of the confidence intervals would contain the 'true' average WTP (i.e. the average WTP for the entire population of Canadian residents).

[8] The Krinsky and Robb confidence intervals are based upon the parameter estimates of the best fitting model. Economic theory suggests these parameter estimates will themselves be distributed as a multivariate normal distribution (Bateman *et al.* 2002). The means of this distribution are given by the parameter estimates, and the variance and covariances of this distribution are given by the variance-covariance matrix of the parameters. The Krinsky-Robb method uses a random number generator to make repeated draws from this distribution and uses each draw as a set of possible values for the parameters from which a mean, the sample variance and median are calculated. Usually, about a thousand or more such draws are made. By ranking the draws in ascending (or descending) order, the 95% confidence interval around the mean can be obtained by omitting 2.5% of the observations from both tails of the distribution. A detailed description of the method can be found in Haab and McConnell (2002) and Creel and Loomis (1991).

Table 5.14. Final Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified Bid Amount (WTPbid)

VARIABLES	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Constant	2.693* (5.04)	2.164* (5.42)
Bid Amount		-0.036* (-13.14)
Bid $10		-1.648* (-6.47)
Bid $80		2.387* (14.72)
Age	-0.009** (-2.25)	-0.008* (-3.01)
Gender		0.193** (2.42)
Children < 16 yrs. of age at home	0.243*** (1.83)	
Household Language		
• English	-0.213 (-0.839)	-0.066 (-0.39)
• French	-0.330 (-1.07)	-0.736* (-3.80)
Income Categories		
• less than $40,000	0.013 (.06)	-0.152 (-1.09)
• $40,000 to $75,000	-0.150 (-0.75)	-0.180 (-1.41)
• $75,000 to $100,000	-0.155 (-0.67)	-0.143 (-0.94)
Education		
• < high school	-0.243 (-1.20)	-0.092 (-0.66)
• high school	0.184 (1.00)	-0.018 (-0.15)
• college / some university	-0.007 (-0.05)	-0.180** (-1.99)
Region Categories		
• Maritimes	0.298 (1.10)	0.154 (1.00)
• Quebec	-0.186 (-0.66)	0.309 (1.59)
• Ontario	0.157 (0.89)	0.451* (3.83)
• Manitoba/Saskatchewan	-0.423 (-1.63)	0.034 (0.19)
• Alberta	-0.020 (-0.08)	0.490* (3.30)

*1%,**5% , ***10% significance level

Table 5.14. (continued): Final Logit Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and a Specified Bid Amount (WTPbid)

VARIABLES (continued)	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Community Size		
• Central Metropolitan Area	-0.354** (-2.28)	-0.056 (-0.55)
• Town	-0.640* (-3.66)	-0.161 (-1.33)
Level of exposure to information about Parks Canada		-0.092** (-2.18)
Level of exposure to information about Canada's national parks	-0.232* (-3.74)	
Recollection of name of last national park visited		
• able to recall name	-0.081 (-0.55)	-0.298*** (-1.83)
• unable to recall park name	-0.062 (-0.23)	-0.480** (-2.30)
Last Visit		
• < 3 years ago		0.410** (2.28)
• > 3 years ago		0.114 (0.86)
Visit frequency:		
• frequently	0.307 (1.38)	
• occasionally	-0.120 (-0.71)	
• rarely	-0.164 (-0.94)	
Individual Canadian responsibility for protection of natural and wilderness areas	-0.239* (-2.66)	
Level of support for federal tax dollars to complete national park system	-0.288* (-4.50)	
Level of support for increasing government funding for conserving natural/wilderness areas in national parks	-0.257* (-3.30)	
Impression of national parks as poor/good value		-0.302 (-1.59)
Impression of national parks as memorable/forgettable		0.235 (1.40)
Impression of national parks as unique/common	0.325** (2.54)	0.218** (2.16)
Agreement that national parks are meant to be enjoyed by future generations as much as by people today (Non-use value: bequest value)		-1.003* (-5.01)
Agreement that I would miss national parks if they were gone. (Use and non-use values)	0.151 (1.07)	0.181*** (1.77)

*1%,**5% , ***10% significance level

Table 5.14. (continued): Final Regression Models for Probability of Willingness to Pay an Unspecified Amount (WTPun) and Willingness to Pay a Specified Bid Amount (WTPbid)

VARIABLES (continued)	WTPun β_k Coefficient (t-value)	WTPbid β_k Coefficient (t-value)
Agreement that every Canadian should visit a national park at least once in their lifetime (Non-use value: bequest value)		0.519* (3.88)
Agreement that I want to be able to visit the visit the national park of my choice in the future (Non-use value: option value)	0.200 (1.26)	0.395* (2.77)
Volunteer time with wilderness/nature protection organization		0.261** (2.15)
Donate money to wilderness/nature protection organization	0.409* (2.82)	
Number of observations (N)	**1,308**	**779**
- 2 Log likelihood	**1910.855**	**1903.468**
McFadden's Adjusted Pseudo- R^2	**.124**	**.254**
Chi-square	**231.864**	**591.972**
Mean Willingness to Pay		**$53.32**
95% Confidence Interval		($47.00 - $59.57)
90% Confidence Interval		($48.00 - $50.61)
Median Willingness to Pay		**$48.88**
95% Confidence Interval		($41.54 - $55.90)
90% Confidence Interval		($42.90 - $54.83)

*1%,**5% , ***10% significance level

5.4 c) Discussion of Regression Results

For both the preliminary and final WTPbid regression equations, the bid amount variables were significantly different from zero (at the 1% level of significance). As indicated by the t-values, the variables for the bid amount and the 10$ bid amount (Bid Amount and Bid10) had a highly significant and negative effect on the probability of a respondent saying 'Yes' to making a contribution to the national parks fund. Conversely, the variable for an $80 bid amount (Bid80) had a positive effect on the probability of a respondent saying 'Yes' to making a contribution to the national parks fund. As expected, with the exception of the $80 bid amount, across the range of bid amounts, as the amount of the bid increased, the respondent was less likely to agree to making a contribution to the fund. The fact that the Bid80 (and Bid10) variables were statistically significant suggests the presence of an 'end effect'. This effect is due to the fact that there was no further reduction (increase) in 'Yes' responses because the bidding process stopped (began) at $80 ($10).

In both the demographic category and final regression models, the coefficient on the 'Age' variable was negative and statistically significant at the .10 level or better. The negative sign indicates that older respondents were less willing to agree to make either an unspecified or specified contribution to the national parks fund. While the 'Age' variable in the WTPun preliminary regression for demographic variables exceeded the .05 cutoff level for variable inclusion in the final WTPun regression model, it was included in the final WTPun regression model. This was done because the CVM literature suggests that variables such as age, education, household language and per capita income may affect individual WTP responses (See Appendix 2, 'Independent Variables'). Thus, these variables were included in the final WTPbid and WTPun regression models regardless of their statistical significance in the preliminary regression models.

The variable 'Gender' had a positive coefficient and was statistically significant at the .05 level in both the demographic and final WTPbid regression models. This indicates that men were WTP a higher amount to the national parks fund than women. The 'Gender' variable was not deemed statistically significant for the WTPun demographic model. Hence, in this case, male respondents were no more likely to agree to contribute an unspecified amount to the national parks fund than women.

The 'Household Language' variable was significant for both the WTPun and WTPbid demographic models at the .10 level and .01 level, respectively. However, household language was not statistically significant for the final WTPun regression model. Thus, for the WTPun model, household language had no significant bearing on whether a respondent would agree to pay an unspecified bid amount to the national parks fund.

However, the opposite was true for the WTPbid model. In the final bid model, the 'Household Language' variable was highly significant ($p < .01$). The negative sign on both the 'English' and 'French' categories implies that non-French or non-English speaking households were willing to pay more to the parks fund than respondents from English or French-speaking households. The largest negative coefficient was related to the French-speaking household category. This implies that French-speaking households had a lower WTP amount than either the English-speaking or 'Other' household language categories. The lower WTP for national parks among French-speaking households is consistent with the findings of Gunning-Traunt's study (1996) which examined the existence value for national parks in the Northwest Territories.

The variable indicating a household with children less than 16 years of age living at home was statistically significant only for the PWTun demographic and final models. The positive coefficient for this variable suggested that households with children less than 16 years of age were more likely to agree to paying an unspecified amount to the parks fund than respondents from households without young children living at home. In the case of the WTPbid model, there was insufficient statistical evidence to support the notion that the presence of children living at home influenced the amount of money the respondent was WTP to the national parks fund.

Interestingly, the demographic variable for household income was not found to be statistically significant in either the WTPun or WTPbid final models. Thus, income was not a significant determinant of whether a respondent would agree to make a specified or unspecified contribution to the national parks fund. This finding is consistent with those of some park CVM studies (Mathieu, 2003; Lee and Han, 2002; Hadker, 1997; Bateman and Langford, 1997; Richer, 1995) yet contradicts those of others (Rachev, 2003; Nunes, 2002a; Gunning-Traunt, 1996; and Kosz; 1996).

The variable 'Education' was statistically significant at the .05 or lower level in both the WTPun and WTPbid models of the demographic category of regression equations. However, in the final regression models, the 'Education' variable was statistically significant ($p \leq .05$) only for the WTPbid regression model. For the WTPbid final model, the negative sign on the categorical variables for education suggests that, compared to the base case of a 'university/graduate school' education, respondents in all the other education categories were WTP a lower amount to the non-profit national parks fund. While intuitively it may seem a reasonable assumption that better educated persons are WTP more for environmental goods like national parks, this finding is at odds with those of Gunning-Traunt (1996) who found that education level was negatively correlated with respondents WTP for creating national parks in Canada's far north.

In terms of the residence category of preliminary regression models, the variable 'Region Category' was statistically significant at the .05 or lower level for both the WTPun and WTPbid models. However, in the final regression models, the 'Region Category' variable was only statistically significant in the WTPbid model. With 'British Columbia/North' as the base categorical variable, the coefficients on the other regional variables were all positive. This finding suggests that respondents from the 'British Columbia/North' regional category were WTP less to the parks fund than respondents from all other regions of Canada.

The size of the community in which the respondents resided was shown to be a statistically significant variable in the residence category of preliminary regressions. In these regression equations, the variable 'Community Size' was significant at the .05 level for both the WTPun and WTPbid models. However, in the final regression models, 'Community Size' was statistically significant only in the WTPun model. Thus, for the WTPbid final model, 'Community Size' had no effect on the amount that respondents were WTP to the national parks fund. In the case of the WTPun model, the variable for community size was statistically significant at the .05 level. For this model, the negative coefficients implied that, relative to the base category of 'Rural' community size, respondents who resided in cities or towns had a lower probability for agreeing to pay an unspecified dollar amount to the national parks fund. Based on this regression result, it appears rural residents have a higher value for national parks than their urban counterparts. However, as noted by the results of the WTPbid final model, this higher valuation did not translate into a higher WTP dollar amount.

In the park knowledge category of preliminary regressions, the variables for 'Level of exposure to information about Parks Canada' and 'Recollection of the name of the last national park visited' were statistically significant in both the WTPun and WTPbid models at the .10 level or better. However, in the final regression models, these variables were only statistically significant in the WTPbid model. The negative coefficient suggests that, compared to the base category of respondents who visited a national park outside of the years 2003/04, those respondents who visited a national park in 2003/04 and were/were not able to recall the name of the last national park visited - had a lower WTP value.

The variable 'Level of exposure to information about Canada's national parks' was not significant for the WTPbid regression models. However, this variable was highly significant ($p \leq .01$) in the WTPun final and park knowledge category regression models. In the case of the WTPun models, the negative sign on this variable's coefficient suggests that the probability of a respondent being WTP an unspecified amount to the national parks fund decreased with less exposure to information about Canada's national parks.

Interestingly, the variable 'Level of exposure to information about Canada's national marine conservation areas had no significant effect on the Park Knowledge and final WTPun and WTPbid regression models.

Visitation frequency and time since last visit to a national park were also examined by this study. In the WTPun visitation category model, the overall significance of the categorical variable 'Visit frequency' was very high ($p \leq .01$). Hence, it was included in the final WTPun model where it proved not to be statistically significant. The variable 'Visit frequency' was only significant at the .10 level in the WTPbid visitation model, thereby precluding it from inclusion in the final WTPbid model. Thus, in both the bid and unspecified WTP final regression models, 'Visit frequency' was not a significant predictor variable.

The variable examining the years since the respondent had last visited a national park was statistically significant for only the WTPbid preliminary and final models. The positive coefficient on the 'Last Visit' categories suggest that, when compared to the base category 'Never visited', respondents who had previously visited a national park were willing to pay more to the non-profit parks fund. The largest coefficient, and hence, the largest WTP amount to the fund, was expressed by respondents who had visited a national park less than three years ago.

The extensive question format of the 2005 Survey provided a wide variety of attitudinal variables for the WTP regression analysis component of this study. In the case of the WTPun attitudinal model, only 7 of the 38 attitudinal variables were statistically significant at the .05 level and included in the WTPun final regression model. Similarly, 8 of the 38 attitudinal variables made it into the WTPbid final model.

For the WTPun final model, the attitudinal variables for acknowledging individual Canadian responsibility for wilderness protection, supporting increased tax dollars to complete the national park system and increased government funding for conserving wilderness areas in national parks were all significant at the .01 level and had negative coefficients. The coding of the possible responses to these questions and the negative coefficients suggests that the respondent's willingness to contribute an unspecified amount to the national parks fund decreased as their level of support/agreement to the specific attitudinal question decreased.

Lastly, for the WTPun final regression model, the variable indicating past donations to a wilderness/natural areas protection organization was shown to be a highly significant ($p \leq .01$) predictor of whether a respondent would agree to contributing some unspecified amount to the national parks fund. The positive coefficient associated with this variable suggests that respondents who had previously donated money to a wilderness/natural areas protection organization have a higher probability of agreeing to contribute some amount to the national parks fund.

In the case of the WTPbid final model, the attitudinal variables related to the non-use values of bequest and option values were the most significant ($p \leq .01$) predictors of WTP a specific dollar amount. The positive coefficients on the bequest value-related variable for 'agreement that every Canadian should visit a national park' and the option-value related variable for 'agreement that I want to visit a national park in the future' suggest that respondents who strongly agreed with these statements were willing to pay more to the national parks fund than those who felt less strongly about the statements.

However, this was not the case for the bequest value-related variable for the 'Level of agreement that national parks are meant to be enjoyed by future generations as much as by people today'. The negative coefficient associated with this variable indicated that respondents who strongly agreed with this statement would be WTP less than those respondents who felt otherwise about this statement. A thorough exploration of the data revealed that there were no obvious errors in data coding or data entry that accounted for this negative coefficient. One possible explanation is the large proportion of observations in the 'Strongly agree' category (90.1%) and the small proportion of responses in the 'All others' category (9.9%) for this variable. The comparatively small number of observations in the 'All others' category (158 versus 1,440 observations in the 'Strongly agreed' category) may have skewed the results data towards higher WTP amounts. An alternative explanation for these results is that the wording of the statement may have been interpreted differently by some respondents. For example, some respondents may have felt this question asked them about their level of agreement with a particular distribution of park benefits between current and future generations - rather than the broader notion that national parks be available for future generations to enjoy.

Interestingly, only 3 of the 38 attitudinal variables were common to both the WTPun and WTPbid final regression models. Of these three variables, only the variable examining the impression of national parks as 'Common/unique' was statistically significant in both final models at the $p \leq .05$ level. The positive coefficient associated with this variable suggested that, for the WTPun or WTPbid final models, the probability of WTP or WTP amount was higher for those respondents who perceived national parks as 'Unique' instead of 'Common'.

The fact that the most statistically significant predictor variables were considerably different for the WTPun and WTPbid final regression models is worth noting. This result suggests that the factors that motivate a respondent to agree with the intention of making a contribution to the parks fund and the factors that motivate a respondent to agree to a specified dollar contribution to the fund may be quite different. Such a finding may have implications for future public opinion surveying regarding national park management options. For example, the level of commitment for agreeing to pay an unspecified dollar amount for something is an 'unconstrained' decision in the same way that that stating the 'level of importance' of something is also an unconstrained decision. In both cases, the respondents are not obliged to limit or prioritize their decisions. A respondent can agree to pay for everything and state that everything is 'very important' to them. Such indiscriminant information from survey respondents is of little practical use to park managers looking to use limited park resources in a manner that reflects the priorities and values of the surveyed population. It can be argued that the use of specific bid amount WTP questions may help evoke a higher level of commitment from respondents than broader intention-to-pay or level of importance questions. As well, specific bid amount questions may increase the believability of a decision scenario and remind respondents that no decision is without cost. In so doing, the bid amount WTP questions may provide a comparable and more precise metric for park managers to gauge public opinion regarding park management alternatives.

5.4 d) Measures of Regression Model Fit

In Ordinary Least Squares (OLS) regressions, it is common to provide a measure of how well the model fits the data, such as R^2. Unfortunately, no direct equivalent exists for logit/probit models. Although a plethora of pseudo-R^2 measures have been proposed, these measures have different formulae and assume different values for the same model. Hoegel (2007) notes that many authors simply report that a model has a pseudo-R^2 without identifying which pseudo-R^2 they are reporting. Without that information, the reader cannot interpret the meaning of the measure nor compare it to similar models in other papers.

It is also worth noting that the pseudo-R^2 measures do not correspond to the 'percent of variance explained', as does R^2 in an OLS regression approach. For example, McFadden's pseudo-R^2 indicates the percent increase in the log-likelihood function (Ibid, 2007).

In this study, the McFadden's adjusted pseudo-R^2 is reported. Its values range from 0 to 1 and it is 'adjusted' to reflect the number of regressors in the regression equation. It mirrors the adjusted R^2 in OLS by penalizing a model for including too many predictors. If the regressor variables in the model are effective, then the penalty will be small relative to the added information of the predictors. However, if a model contains predictors that do not add sufficiently to the model, then the penalty can decrease the value of the adjusted pseudo-R^2 statistic.

In this study, the McFadden's adjusted pseudo-R^2 statistic suggested an improved fit of the final regression models compared to the preliminary regression models. For the WTPun models, it increased from a low value of .008 for the socioeconomic regression model to .124 for the final model. Similarly, for the WTPbid models, the McFadden's adjusted pseudo-R^2 statistic increased from .164 for the bid amount regression model to .254 for the final regression model.

The chi-square value is also presented as an indication of model fit. It is a statistical test of the null hypothesis that the coefficients for all the terms in the regression model are zero. Its value is simply the difference between the base model containing only the constant and final -2LL. Although not shown, the omnibus test of all preliminary and final regression model coefficients indicated a significance level of at least $p \leq .03$. Since the significance level for the regression models was shown to be so low, we can reject the null hypothesis and conclude that the set of variables improves the prediction of log odds for all the regression models.

Another indicator of regression model fit is given by the -2 Log likelihood value. The probability of the observed regression results, given the parameter estimates, is known as the likelihood. It is customary to use -2 times the natural log of the likelihood

(-2 Log likelihood or -2LL) as a measure of model fit because it has ties to the chi-square distribution. A good model that has a high likelihood translates to a small value for -2LL. For a perfect fit, -2LL would be equal to zero.

Thus, the smaller log-likelihood values for the final regression models in this study suggests that they were better at explaining the relationship between the surveyed population and the propensity to make a specified or unspecified contribution to the national parks fund than the preliminary regression models. For example, in the case of the WTPun model, the log-likelihood value fell from 2142.719 for the restricted base model to 1910.855 for the final regression model. For the WTPbid model, the log-likelihood value fell from 2495.440 for the restricted base model to 1903.468 for the final regression model.

5.4 e) Comparison of Parametric and Nonparametric WTP Values

In order to avoid the implicit assumptions and complexities of the WTP distribution from parametric WTP models, researchers have developed simpler, nonparametric methods of eliciting WTP values. These approaches make no assumptions about the WTP distribution and calculate WTP values directly from the data.

The parametric approach is based on the assumption of a parametric distribution of WTP values. However, since the true WTP distribution is unknown, the distribution assumption may have a significant error if it is mis-specified (Terawaki, 2003). In the single-bounded CVM question format, Kriström (1990) first noted this point and suggested the nonparametric method by applying the estimator developed by Ayer *et al.* (1955). Since the nonparametric estimator is represented by a closed and simple form, this method has the advantage of not requiring the complex calculation for optimization like the parametric approach, and therefore has the advantage of being a more convenient and 'practical' method.

In the case of applying the nonparametric approach to double-bounded CVM questions, it is usual to apply the Turnbull estimator (Duffield, 1991; McFadden, 1994; Carson et. al., 1994; Haab and McConnell, 2002). However, unlike the single-bounded question format, the nonparametric estimator in the double-bounded question format is not represented by a closed form because of the left and right censored data intervals. Hence, this more complex question format requires an elaborate computer calculation in the same way as the parametric approach. Accordingly, this method is also not very convenient. To resolve the complexity of the double-bounded nonparametric estimate of WTP, Terawaki (2003) proposed a closed form nonparametric estimator.

The parametric WTP results of the final regression model and the Turnbull, 'minimal legal' and Terawaki nonparametric estimators are presented below in Table 5.15. As well, for comparison purposes, the results of the first WTP question (Q22X) were analyzed as though it was a single-bounded CVM question and both parametric and nonparametric WTP estimates calculated.

Table 5.15. Comparison of Willingness to Pay Estimates

WTP Question Format	Parametric Mean	Parametric Median	Nonparametric Mean	Nonparametric Median
Double-Bounded (Q22X,Q23X,Q24X)	$53.32[1] ($47.00 - $59.57)*	$48.88[1] ($41.54 - $55.90)*	$57.80[2] ($55.59 - $60.01)*	$53.33[2]
			$58.99[3] ($56.58 - $61.40)*	$64.77[3]
			$35.13[4]	
Single-Bounded (Q22X)	$50.23[1] ($28.65 - $76.53)	$35.15[1]	$54.42[2] ($50.08 - $58.04)*	$47.21[2]
Open-Ended (Q25X)	$69.65 ($62.60 - $76.70)*	$50.00 ($42.95 - $57.05)*		

[1] Hanemann *et al.* (1991)
[2] Turnbull Estimate with Pooling (Haab and McConnell, 2002)
[3] Terawaki Estimate (Terawaki, 2003)
[4] Minimal legal willingness to pay (Harrison and Kriström, 1995)
* 95% Confidence Interval

Table 5.15 suggests that, regardless of the approach taken to estimate the mean or median WTP values of the double-bounded CVM question, the values are fairly robust and there exists considerable confidence interval overlap between the estimation approaches.

If the double-bounding questions are ignored, the mean and median results for the single-bounded CVM question are still quite similar to those of the double-bounded question format. The confidence intervals for the double-bounded model are also tighter than for the single-bounded model. This finding is consistent with those expected by Bateman et al., (2002) and Haab and McConnell (2002) and the results reported in Hanemann *et al.* (1991).

The higher mean and median values for the open-ended question format suggests that the bid amount range for the close-ended CVM questions was biased to the lower end of the respondents WTP distribution. This lower range bias was also reflected in the calculation of the non-parametric WTP measures. At the higher bid amounts, results had to be 'pooled' to maintain a monotonically decreasing WTP function.

5.4. f) Comparison of Variation Explained by Independent Variables

Table 5.16 compares the independent variables in each model for their ability to explain the variation in the dependent variable. The higher the percentage of variation they can explain, the more important they are as a predictor variable.

For the WTPun final model, the 'Level of support for increasing government funding for completing the national park system' was the most important predictor variable. This variable explained 19% of the WTPun final model variation. The next most important variables were those for 'Level of support for increasing government funding for conserving natural areas in national parks', the 'Level of exposure to information about Canada's national parks' and the respondent's perception of the 'Individual Canadian's responsibility for protecting wilderness areas'. Each of these variables accounted for 16% of the WTPun final model's variation.

As noted previously, the predictor variables for the WTPbid final model were quite different than for the WTPun final model. The variable 'Bid amount' accounted for 30% of the WTPbid final model's variation. The second and third most important predictor variables were the 'Level of agreement that national parks are meant to be enjoyed by future generations as much as by generations today' and the variable 'Household language'. These variables explained 14% and 8% of the WTPbid final model's variation.

Table 5.16. Normalized Regression Model Variation Explained by Statistically Significant (p < .05) Variables

VARIABLES	WTPun	WTPbid
Bid Amount		30%
Age	11%	6%
Gender		3%
Household Language		8%
Education		2%
Region Categories		6%
Community Size	7%	
Level of exposure to information about Parks Canada		4%
Level of exposure to information about Canada's national parks	16%	
Recollection of name of last national park visited		2%
Years since last visit		6%
Individual Canadian responsibility for protection of natural and wilderness areas	16%	
Level of support for federal tax dollars to complete national park system	19%	
Level of support for increasing government funding for conserving natural/wilderness areas in national parks	16%	
Impression of national parks as unique/common	7%	3%
Agreement that national parks are meant to be enjoyed by future generations as much as by generations today (Non-use value: bequest value)		14%
Agreement that every Canadian should visit a national park (Non-use value: bequest value)		7%
Agreement that I want to visit a national park in the future (Non-use value: option value)		5%
Volunteer time with wilderness/nature protection organization		4%
Donate money to wilderness/nature protection organization	8%	
TOTAL REGRESSION MODEL VARIATION	100%	100%

5.4. g) Ranking of Predictor Variables

Tables 5.17 and 5.18 present the ranking of the WTP predictor variables from the final regression models. The selection was based on each variable's level of statistical significance (T-values) and the variation explained by each variable (see Table 5.16).

Table 5.17. Ranking of the Predictor Variables for the WTPun Final Model

Variables
Level of support for using tax dollars to complete the national park system*
Level of exposure to information about Canada's national parks*
Community Size*
Level of support for increasing government funding for wilderness conservation in Canada's national parks*
Donating money to nature/wilderness organization*
Perceived responsibility of individual Canadians for protection of wilderness areas*
Impression of parks as unique or common*.
Age**

**1%, **5% statistical significance level*

Table 5.18. Ranking of the Predictor Variables for the WTPbid Final Model

Variables
Bid Amount*
Level of agreement that national parks are meant to be enjoyed by future generations (Non-use value: Bequest Value)*
Level of agreement that every Canadian should visit a national park at least once in their lifetime (Non-use value: Bequest Value)*
Region Categories*
Household Language*
Age*
Level of agreement that I want to be able to visit the national park of my choice in the future (Non-use value: Option Value)*
Gender**
Recollection of name of last national park visited**
Years since last visit to a national park**
Level of exposure to information about Parks Canada**
Impression of national parks as unique/common**
Volunteering time to a nature/wilderness organization**
Education level**

**1%, **5% statistical significance level*

As shown above, both models are considerably different in terms of the ranking of their independent variables. For the WTPun model which predicts the probability of an individual agreeing to pay an unspecified amount to the national parks fund, use and/or non-use variables do not appear in the rankings. The most noteworthy predictor variables are attitudinal variables that relate to the level of support for government funding for national parks, the perceived responsibility of the individual for protection of wilderness, and the impression of national parks as common or unique.

For the WTPbid model, which predicts the WTP amount of an individual to the national parks fund, the variables relating to non-use values were among the best predictors of willingness to pay. This finding implies that respondents who expressed a willingness to make a contribution of a specified amount were motivated to do so largely for 'non-use value' reasons. It appears that variables relating to 'use values' were not a very important motivation for respondents to agree to pay a specified bid amount. Rather, the underlying values prompting the willingness to pay the bid amount were the value of being able to pass national parks on to future generations and maintain them for all Canadians to visit (bequest value), and the value for the option of a future visit (option value).

It is worth noting that 'non-use' or 'passive' use values are synonymous with the value of maintaining ecological integrity in the national parks. These values are implied in the protection aspect of the Parks Canada mandate. The importance of bequest and option value-related variables as WTP predictors may be interpreted as an indication of support for Parks Canada's efforts to maintain the ecological integrity of the national parks.

Lastly, demographic and socioeconomic variables were more important predictor variables for the WTPbid final model than for the WTPun final model. As indicated in Table 5.16, these variables explained 11% of the WTPun variation and 19% of the WTPbid variation.

5.5 GRAPHICAL INTERPRETATION OF REGRESSION RESULTS

While the nonlinear nature of logit/probit[9] models is intuitively appealing, it also complicates the interpretation of the results because the estimated parameters do not have immediate interpretation. Researchers often merely report on the significance and sign of the logit coefficients (Bowen and Wiersma, 2004). Although this is the most common approach, failure to provide any interpretation of effect size precludes the reader of important information (Hoetker, 2007).

The approach used by this study to help interpret regression parameters is that advocated by Long (1997). It sets all but the independent variable of interest at their mean value and examines how changes to the value of the independent variable of interest affects the probability (or dollar amount) of the WTP dependent variables. This approach is also advocated by Hoetker (2007) who found, in his review of 157 journal articles describing the use of logit or probit models, that 64.9% of the articles offered no interpretation of the magnitude of a variable's affect.

Long (1997) and Hoetker (2007) recommend graphic presentations to provide a richer understanding of the regression variables' effects. Following the recommendations from these authors, this study used graphs and marginal analysis to explain the regression variables that were statistically significant at the $p \leq .05$ in the final regression models. The results are presented below in the approximate order of the importance of each predictor variable as listed in Table 5.17 and 5.18.

[9] For simplicity, I will refer to logit models hereafter. Except as noted, probit models are identical.

5.5. a) MODEL 1 : Willingness to Pay an Unspecified Amount (WTPun) *n=1,598*

Figure 5.1. Probability of Willingness to Pay Unspecified Amount (WTPun) versus Support for Federal Tax Spending to Complete the National Park System*

**1% statistical significance level, (% of CVM survey population)*

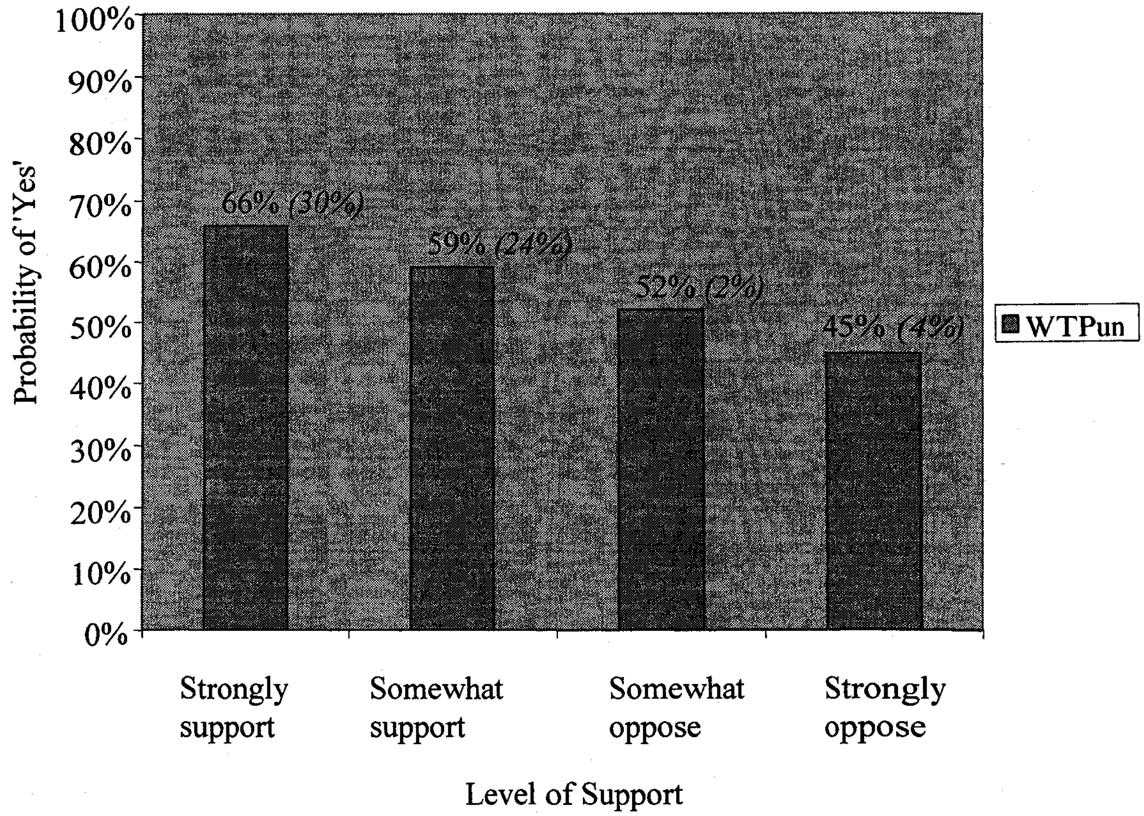


Figure 5.1 suggests that of those respondents, who strongly supported the spending of federal tax dollars to complete the national park system, about 66% (or 30% of the CVM population) were willing to make a contribution to the national parks fund. Approximately 45% of those respondents who were strongly opposed to spending tax dollars for completing the system of national parks in Canada (or about 4% of the CVM population) were also willing to make a contribution to the national parks fund. These findings suggest that most respondents supported the idea of completing the national park system and acknowledged the need for private and

public funding to achieve this goal. In total, about 60% of the CVM respondents to this question were willing to make a contribution to the national parks fund.

Figure 5.2. Probability of Willingness to Pay Unspecified Amount (WTPun) versus Level of Exposure to Information About the National Parks of Canada in the Previous Year*

**1% statistical significance level, (% of CVM survey population)*

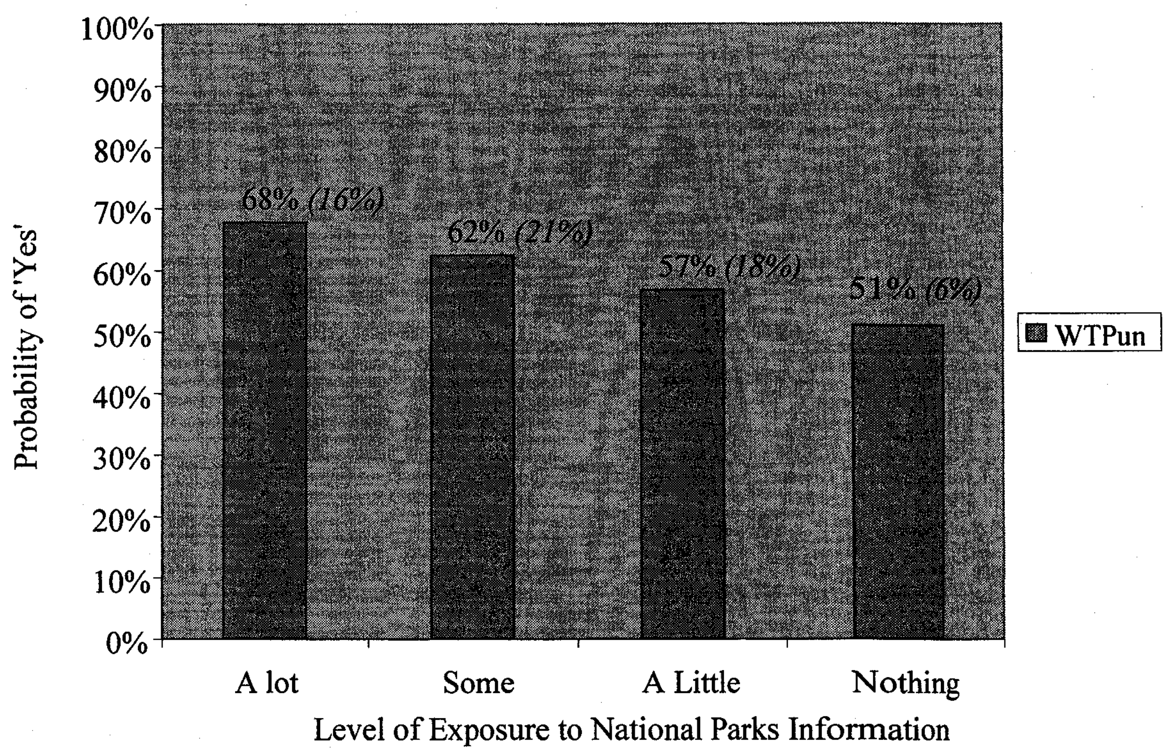


Figure 5.2 examines the influence of respondents seeing, hearing, reading or talking about the national parks of Canada in the past year on the probability of them agreeing to pay an unspecified bid amount. Respondents who had 'A lot' of information exposure regarding the National Parks of Canada had the highest probability (68%) of agreeing to say 'Yes' to an unspecified amount (WTPun). This group accounted for 16% of the total CVM survey respondents.

Only about 12% of the CVM respondents reported receiving no exposure to information about the national parks of Canada in the past year. Interestingly, 52% of this group of respondents agreed to pay the unspecified bid amount. This finding suggests an appreciation for national parks – and recognition for the need for ongoing financial support for national parks – even if no recent information regarding national parks is obtained by the respondent.

Figure 5.3. Probability of Willingness to Pay Unspecified Amount (WTPun) versus Community Size*

**1% statistical significance level, (% of CVM survey population)*

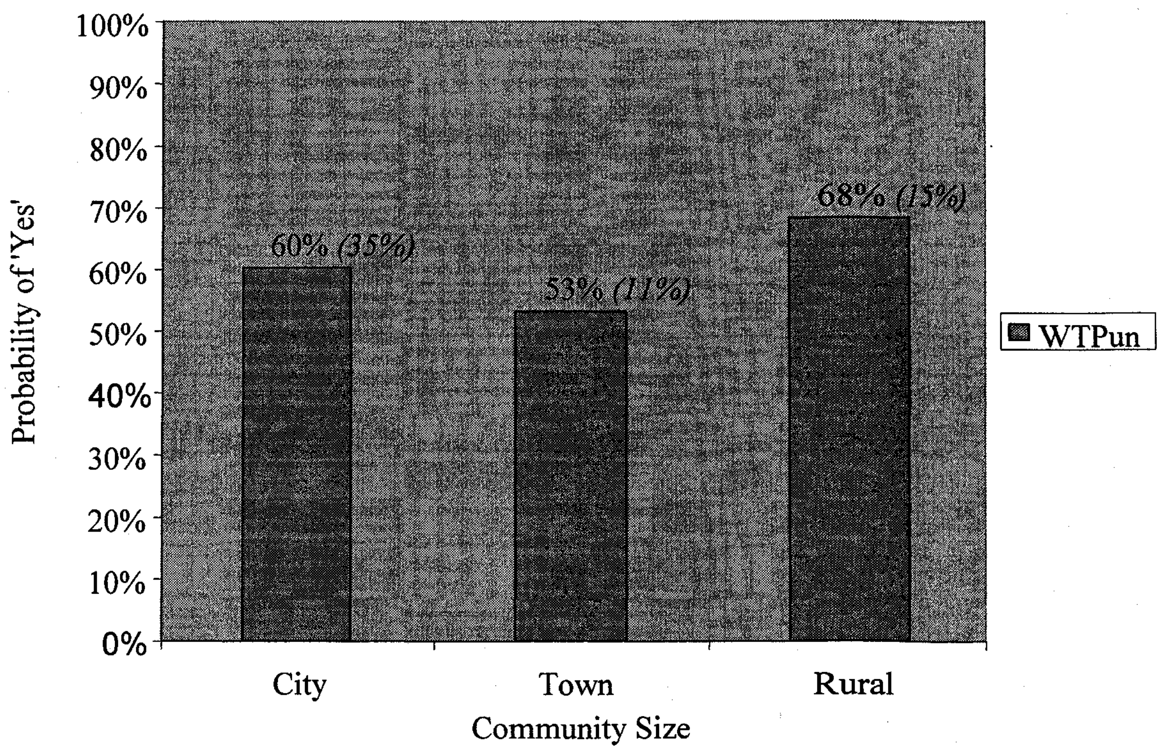


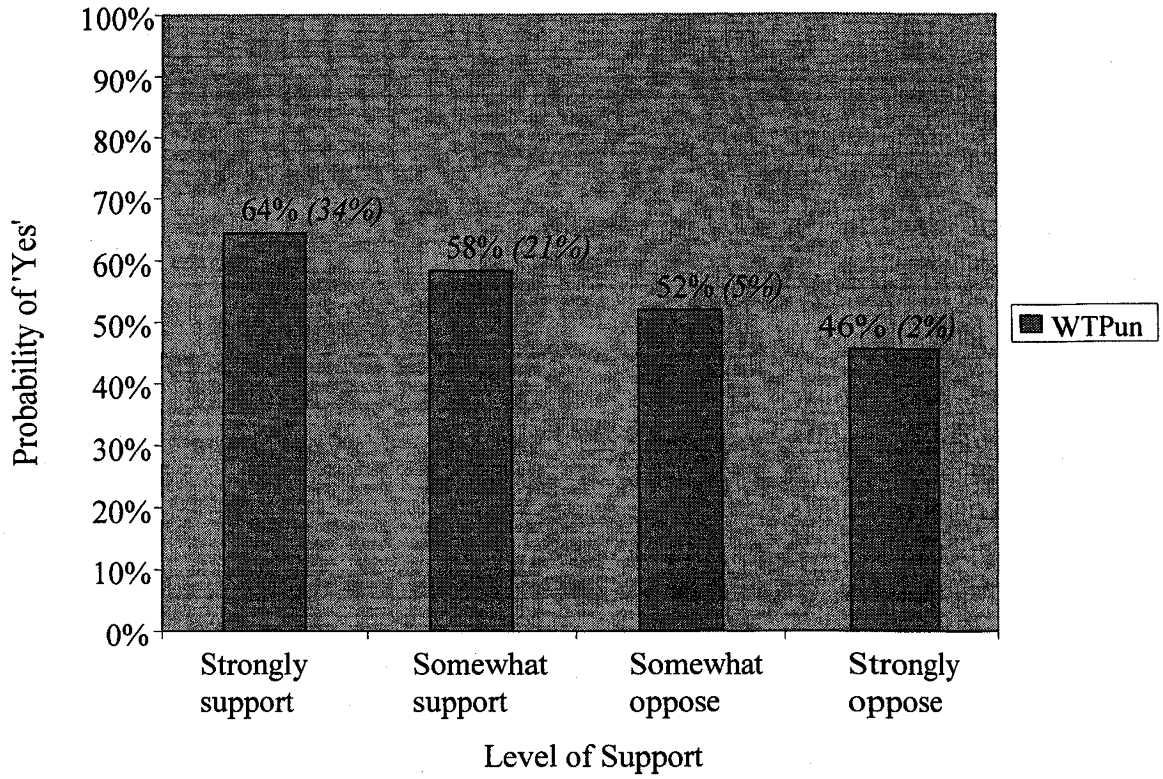
Figure 5.3 shows the influence of community size on the probability of agreeing to pay an unspecified amount. Contrary to some popular thought, respondents who lived in rural communities had the highest probabilities (68%) of agreeing to

contribute an unspecified amount to the national parks fund. Respondents living in towns had the lowest probabilities for agreeing to contribute to the parks fund (53%). Rural and town residents who agreed to make an unspecified contribution to the parks fund accounted for 15% and 11% of the total CVM survey population, respectively. One possible explanation for the higher probability for rural residents to make a contribution to the national parks fund may be because persons residing in the countryside have a greater aesthetic appreciation for nature - as expressed by their place of residence and WTP to support national parks. Alternatively, they may value national parks more because they regard the parks as an important resource or source of employment.

Further exploration of this unique demographic may be warranted by Parks Canada to better target efforts to improve and maintain public support for Canada's national parks.

Figure 5.4. Probability of Willingness to Pay Unspecified Amount (WTPun) versus Support for Increasing Government Funding for Conservation of Wilderness in Canada's National Parks*

**1% statistical significance level, (% of CVM survey population)*



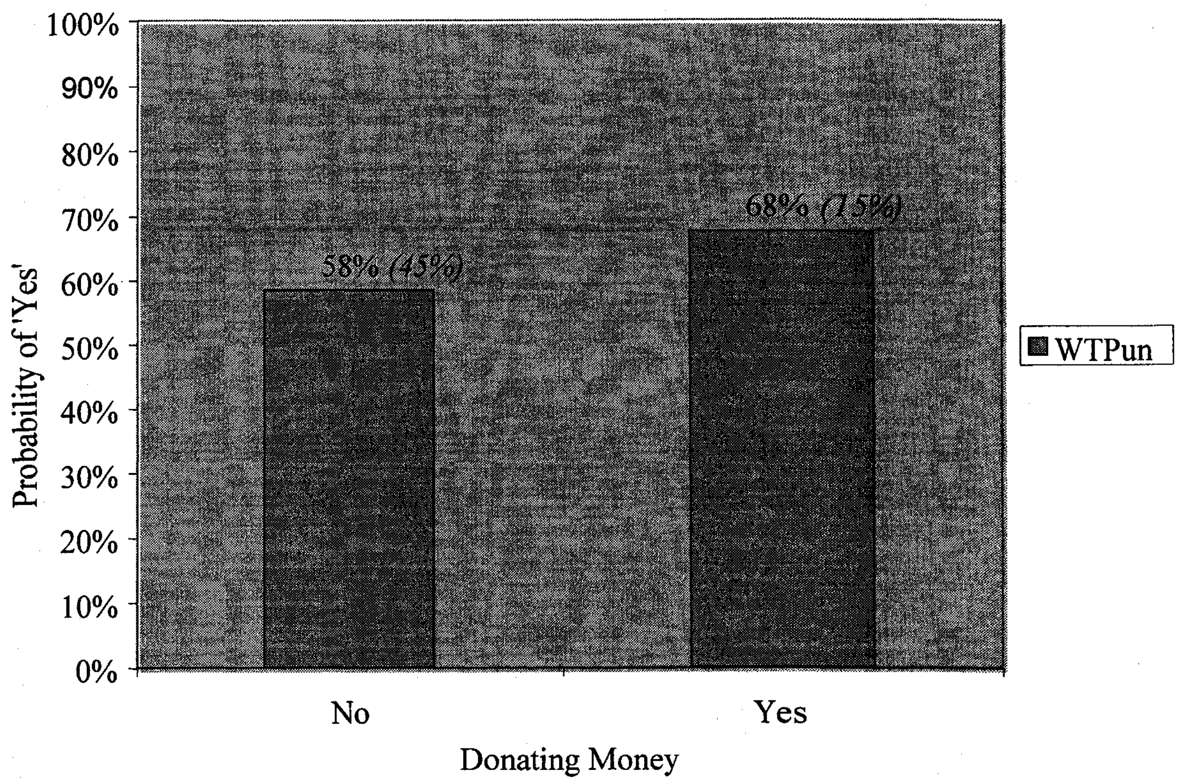
According to the descriptive statistics presented previously, about 90% of respondents supported (and 54% strongly supported) increasing government funding for conserving natural/wilderness areas in Canada's national parks.

Figure 5.4 explores the relationship between respondents' willingness to support increasing government funding for conserving wilderness in national parks versus the probability of agreeing to make a contribution to the non-profit parks fund (WTPun). The results indicate that 64% of respondents who strongly supported increasing government funding for conserving natural/wilderness areas in Canada's national parks were willing to make a contribution to the national parks fund. This group is equivalent to about 34% of the total CVM survey population.

The results in Figure 5.4 are very similar to the findings described in Figure 5.1. A possible explanation for this similarity is that respondents may have believed these questions are asking essentially the same thing – support for public funding for conserving natural/wilderness areas within a completed national park system. These findings suggest an appreciation for national parks and national park funding and a willingness of respondents to commit both public and personal funding to these national park funding priorities.

Figure 5.5. Probability of Willingness to Pay Unspecified Amount (WTPun) versus Donating Money* to Wilderness Protection Organization*

**1% statistical significance level, (% of CVM survey population)*



As shown in Figure 5.5, respondents' involvement with organizations relating to the protection of natural/wilderness areas also influenced the probability of making an unspecified contribution to the hypothetical national parks fund (WTPun). Persons who were already donating money to a wilderness protection organization had a significantly higher probability (68%) of agreeing to make an unspecified contribution to the non-profit parks fund compared to those respondents who were not making any financial contributions to wilderness advocacy groups. In terms of the overall CVM survey, 45% of the 78% respondents currently not making a contribution to a wilderness/nature organization agreed to contribute to the national parks fund. As well, 15% of the 22% of respondents currently giving to a wilderness/nature organization agreed to contribute to the national parks fund.

According to the CVM results, about 60% of respondents would be willing to contribute to the national parks fund. However, as noted in the descriptive statistics, only about 23% of respondents reported donating money to a wilderness/nature protection organization. The difference between these two values does not necessarily imply that the proportion of respondents willing to contribute to the national parks fund is overstated. Firstly, the proposed national parks fund is quite different than existing nature/wilderness organization funds, so contribution rates may also be expected to be quite different. For example, unlike other environmental causes, many respondents have first-hand experience/knowledge/appreciation with Canada's national parks and hence are familiar with the national parks 'good'. This familiarity and appreciation may be reflected in a higher level of willingness to contribute to the national parks fund. Secondly, as also noted in the descriptive statistics, since Parks Canada is regarded as the most trusted protector/steward of Canada's natural heritage (even more than other wilderness/nature protection organizations), it is likely that a higher proportion of respondents would be willing to contribute to the Parks Canada national parks fund. Without more supportive evidence, it would be unjustified to assume that only the responses to the WTP survey questions were untruthfully reported as compared to the responses given to the other survey questions.

Figure 5.6. Probability of Willingness to Pay Unspecified Amount (WTPun) versus Feelings About Individual Canadians Responsibility for Wilderness Protection*

**1% statistical significance level, (% of CVM survey population)*

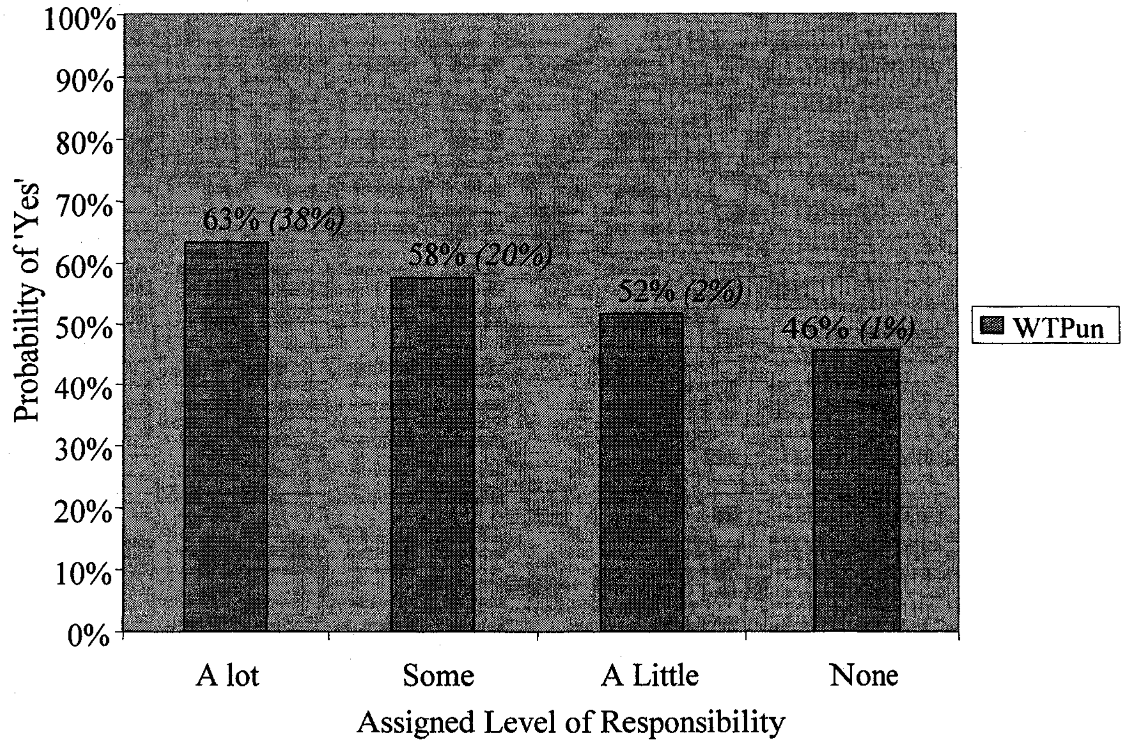


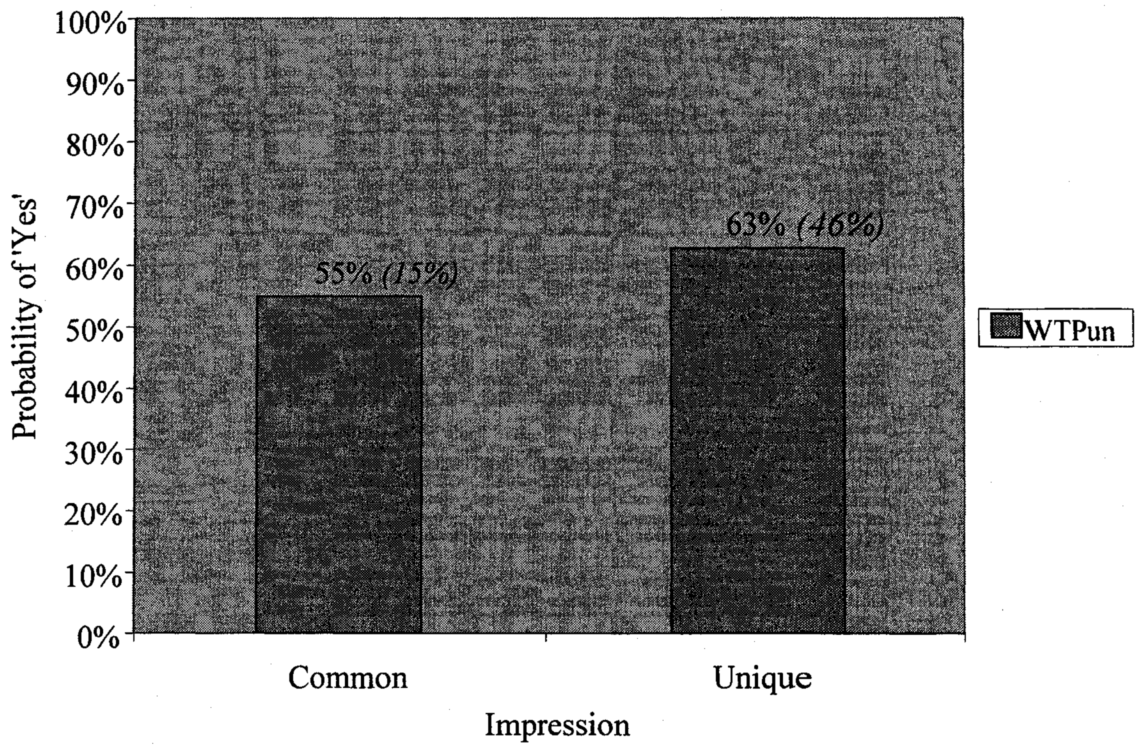
Figure 5.6 explores the relationship between the respondent's feelings about the responsibility that individual Canadians should have for the protection of natural and wilderness areas and the probability of them agreeing to make a contribution to the non-profit parks fund. Respondents who felt individual Canadians should bear 'A lot' of the responsibility had the highest probability (63%) of agreeing to make an unspecified contribution to the national parks fund. This group accounted for about 38% of the CVM survey respondents.

According to the descriptive statistics, only 1.7% of the CVM survey respondents felt individual Canadians should not be responsible for the protection of natural/wilderness areas. Respondents in this category had the lowest probability (46%) of agreeing to make an unspecified contribution (WTPun) to the national parks fund and comprised about 1% of the overall CVM population.

In total, about 61% of respondents to this question were willing to make a contribution to the national parks fund.

Figure 5.7. Probability of Willingness to Pay Unspecified Amount (WTPun) versus Common/Unique Impression of Canada's National Parks*

**1% statistical significance level, (% of CVM survey population)*



As shown in Figure 5.7, respondents who felt national parks were 'unique' had a higher probability (63%) of being willing to pay an unspecified amount (WTPun) than respondents who felt national parks were common (55%). The respondents who felt that national parks were 'Common', but were willing to make a contribution to the national parks fund, represented 15% of the overall CVM survey population.

Conversely, respondents who regarded national parks as 'Unique' and were willing to make a contribution to the national parks fund, comprised 46% of the total CVM population.

It is worth noting that the 'Common/Unique' variable was the only one of the 2005 Survey's six 'impression' variables that was found to be statistically significant for predicting willingness to pay an unspecified dollar amount. This finding suggests that Parks Canada should promote the unique characteristics of the national parks to encourage more visitor and citizen support.

Figure 5.8. Probability of Willingness to Pay Unspecified Amount (WTPun) versus Respondent Age**

***5% statistical significance level*

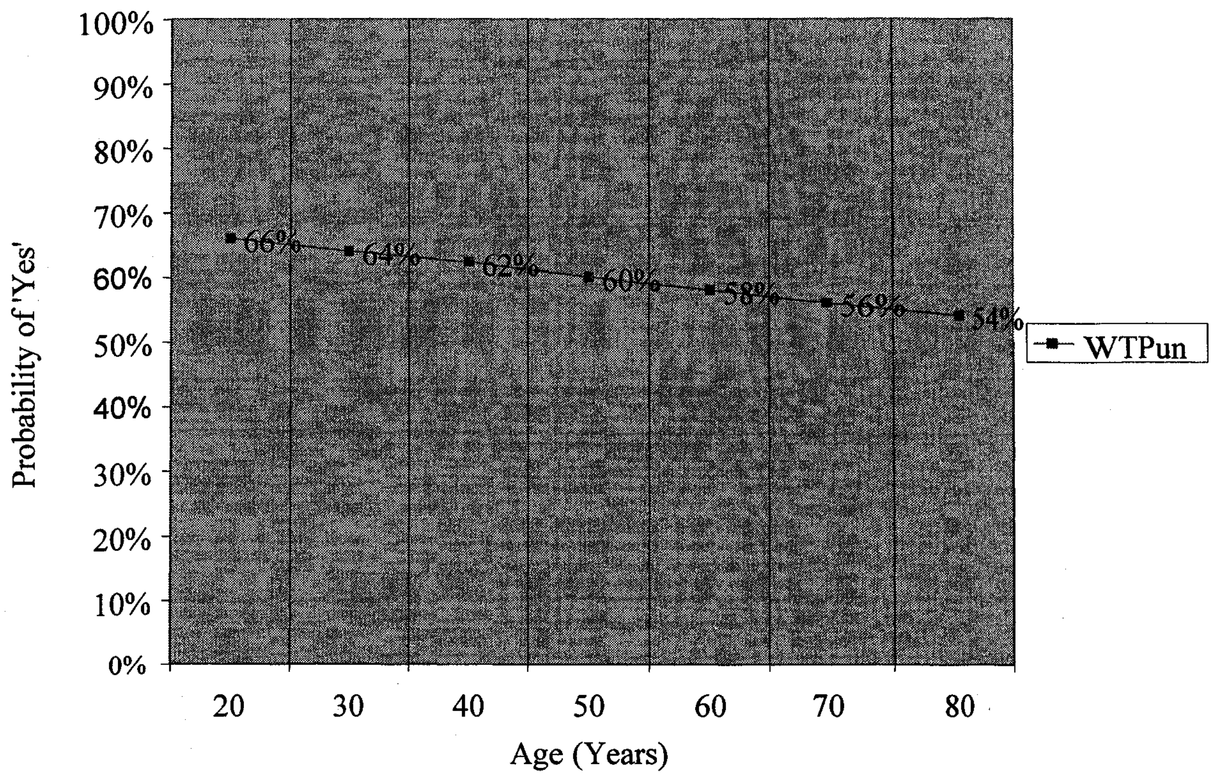


Figure 5.8 suggests that respondents' willingness to pay an unspecified dollar amount to the national parks fund decreased by 2% per decade as they got older. This linear decline was very similar to that for respondents asked to pay a specified bid amount (see Figure 5.14). Tests for the non-linear effect of age made no difference to the relationship between age and the probability of contributing to the national parks fund.

The higher probability of willingness to pay for younger respondents could be due to several reasons. For example, it could reflect younger respondents' value for the option of visiting a national park at some future date (option value). Secondly, it may express the possibility that younger respondents have a greater environmental awareness and appreciation for national parks than older respondents. Also, older Canadians may be on small/fixed incomes or less physically able/interested in visiting a national park.

Whatever the reason, the potential impact of this result is worthy of further investigation by Parks Canada since Canadian demographics suggest an increasingly aged population. If older Canadians are less willing to provide private financial support to their national parks, this may also imply a potential reduction in national parks as a public funding priority in the future.

5.5. b) MODEL 2 : Willingness to Pay a Specified Bid Amount (WTPbid) *n=1598*

Figure 5.9. Willingness to Pay a Specified Bid Amount (WTPbid) versus Bid Amount*

**1% statistical significance level*

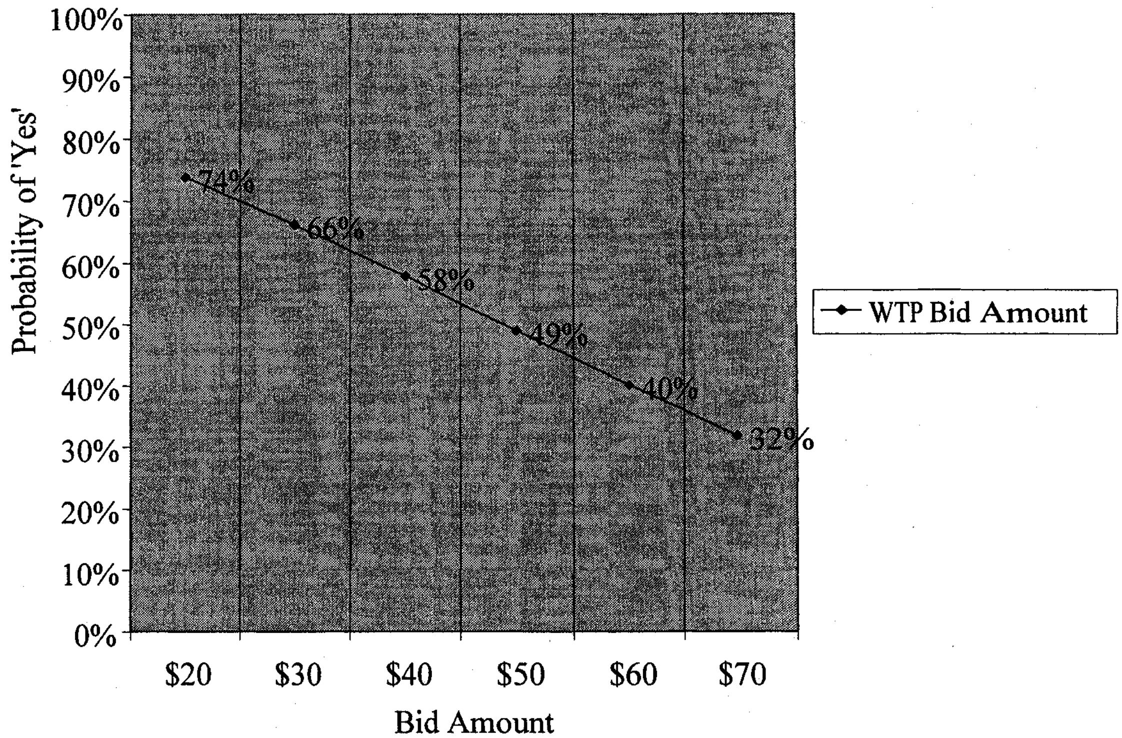


Figure 5.9 shows that, across most of the bid range, the probability of a respondent agreeing to pay a specified bid amount decreased as the bid amount increased. The probability of a respondent agreeing to pay a specified bid amount fell by about 8.4% with each ten dollar increase in the bid amount.

As noted previously, the 'Bid amount' variable explained 30% of the variation in the WTPbid final model and proved to be the most important predictor of the dollar amount respondents would be willing to pay to the national parks fund. The importance of the 'Bid amount' variable is consistent with that of other park-related CVM studies including Bandara and Tisdell, (2002); Lee and Han (2002); Nunes (2002);Gunning-Traunt (1996) and Hanemann *et al.* (1991).

Figure 5.10. Willingness to Pay a Specified Bid Amount (WTPbid) versus Agreement that National Parks are Meant to be Enjoyed by Future Generations as Much as By Generations Today (Bequest Value)*

**1% statistical significance level, (% of CVM survey population)*

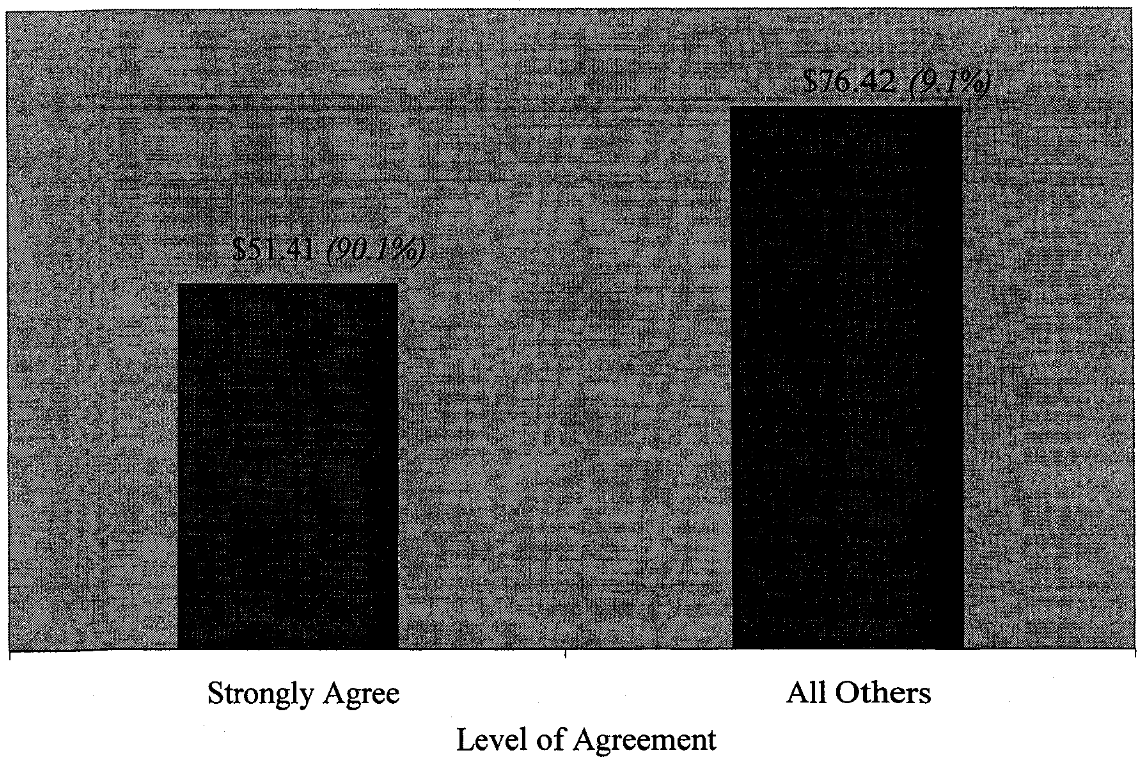


Figure 5.10 suggests that respondents who strongly agreed with the statement that ' national parks are meant to be enjoyed by future generations as much as by people today ' would be willing to pay less to the national parks fund than those respondents who felt otherwise about this statement. This finding seems contrary to what was expected and observed for other similar variables. As noted previously, a thorough exploration of the data revealed that there were no obvious errors in data coding or data entry that accounted for this anomaly.

As mentioned in the discussion of the WTPbid final model regression results, one possible explanation is the large proportion of observations in the 'Strongly agree' category (90.1%) and the small proportion of responses in the 'All others' category (9.9%) for this variable. These proportions translate to 158 observations for the 'All others' category and 1,440 observations for the 'Strongly agree' category. The comparatively small number of observations in the 'All others' category suggests that they may be more biased towards the upper end of the WTP distribution.

An alternative explanation for the larger WTP for the 'All others' category is that the wording of the problem statement may have been interpreted differently by some respondents. For example, some respondents may have felt this statement referred to their level of agreement with the notion that future generations are entitled to inheriting national parks at the same level of environmental quality as they are today - and are not damaged by current generations. Other respondents may have agreed that national parks should be available to future generations, but disagreed that the parks need to be left to future generations at the current level of environmental quality. Regardless of the interpretation, this variable was the second best predictor variable for the WTPbid model and reflects the importance of the 'bequest values' that Canadians hold for their national parks.

Figure 5.11. Willingness to Pay a Specified Bid Amount (WTPbid) versus Agreement that Every Canadian Should Visit A National Park At Least Once In Their Lifetime (Bequest Value)*

**1% statistical significance level, (% of CVM survey population)*

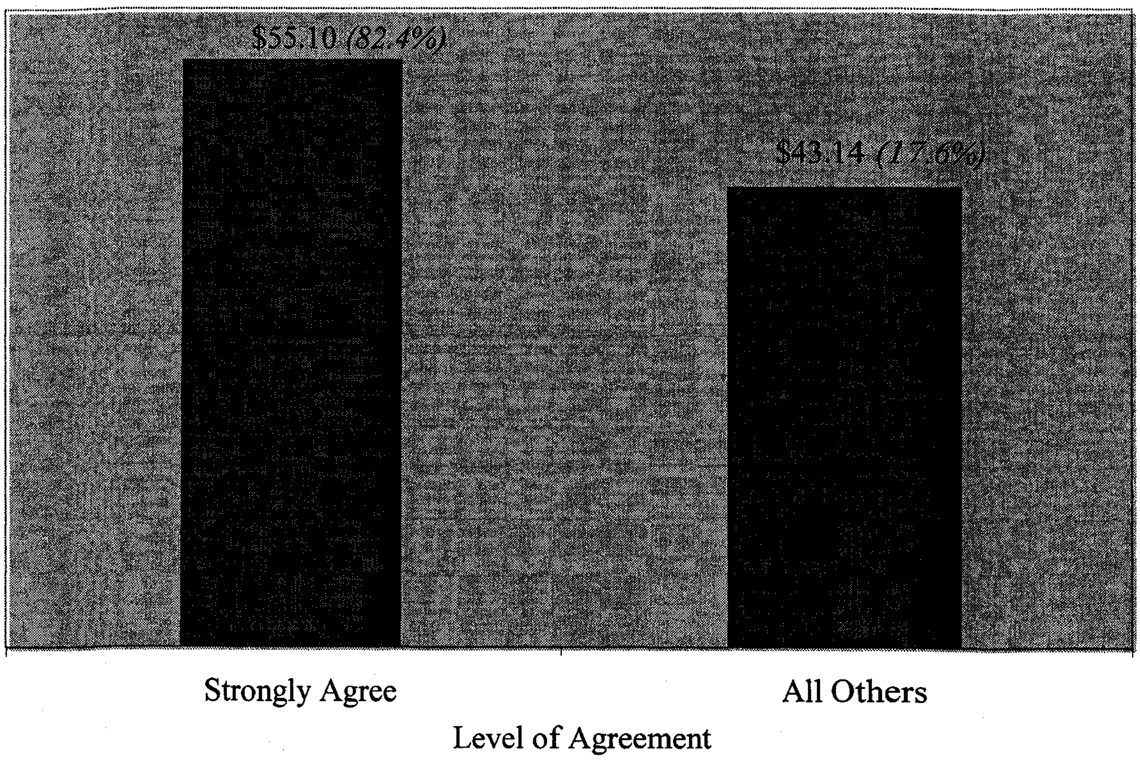


Figure 5.11 shows that respondents who strongly agreed that every Canadian should visit a national park in their lifetime were willing to contribute more to the national park fund than respondents in all other response categories combined. Specifically, respondents who strongly agreed with the statement were willing to contribute about $55 compared to approximately $43 for the other respondents. The higher WTP suggests a desire to pass along national parks to current and future generations. Hence, these findings can be explained, in part, by the 'bequest' values held by respondents for the national parks.

As indicated by the descriptive statistics, respondents who felt strongly that every Canadian should visit a national park in their lifetime accounted for about 82% of the CVM survey population.

Figure 5.12. Willingness to Pay a Specified Bid Amount (WTPbid) versus Regional Category*

**1% statistical significance level, (% of CVM survey population)*

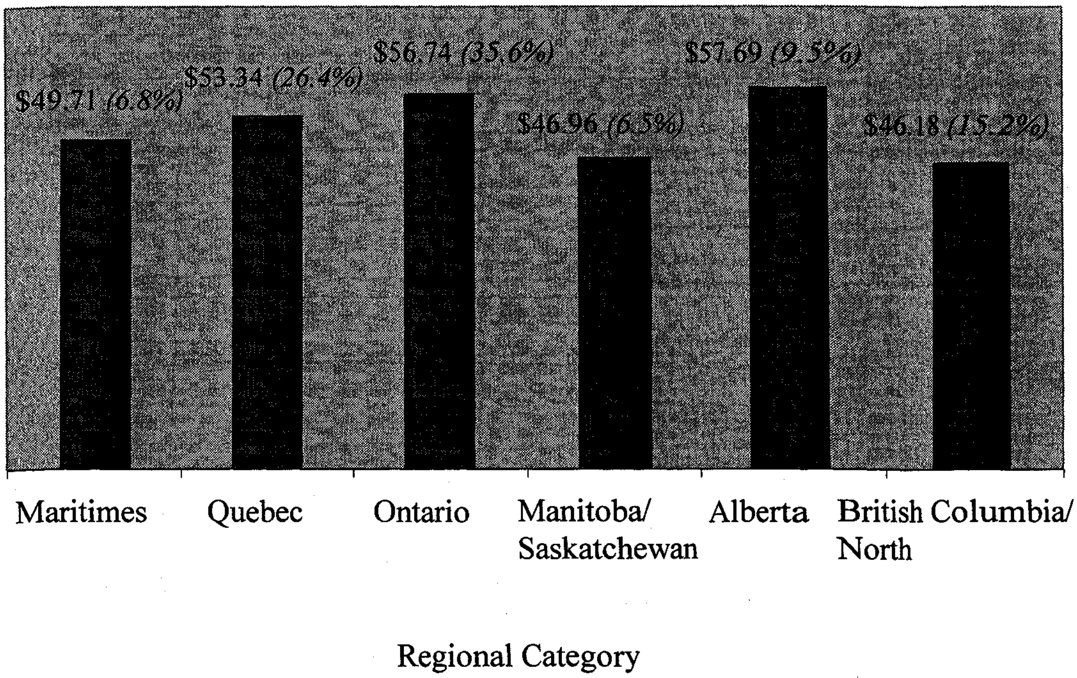


Figure 5.12 explores whether there were regional differences in the amount respondents would be willing to contribute to the national parks fund. Compared to the rest of the country, Albertans and Ontarians had the largest WTP values (about $58 and $57, respectively) and accounted for 9.5% and 35.6% of the total CVM survey responses. Manitoba/Saskatchewan and British Columbia/North respondents had the lowest WTP values ($47 and $46, respectively) and made up 6.5% and 15.2% of the total CVM survey responses.

With the exception of the British Columbia/North category, respondents from the more affluent provinces seemed willing to contribute more to the national parks fund.

The lower WTP value for the 'British Columbia/North' respondents may be due, in part, because this regional category has the highest proportion of land already in protected area status compared to the rest of Canada. Thus, respondents from this region may feel less compelled to contribute additional funds to another park-related cause.

The Parks Canada's analysis of the 2005 Survey data, indicated that even though they hold the two largest populations in Canada, both Ontario and Quebec were under-represented in terms of visitors to the national parks (Parks Canada Agency, 2006b). This under-representation presents a challenge to Parks Canada (Ibid, 2006b).

Interestingly, even though Ontario is under represented in terms of park visitors, it still ranked a close second in terms of contribution amount. The relatively high willingness to contribute to the national parks fund, despite the proportionately low visitation, is suggestive of the importance of national park non-use values to Ontarians.

Figure 5.13. Willingness to Pay a Specified Bid Amount (WTPbid) versus Household Language*

**1% statistical significance level, (% of CVM survey population)*

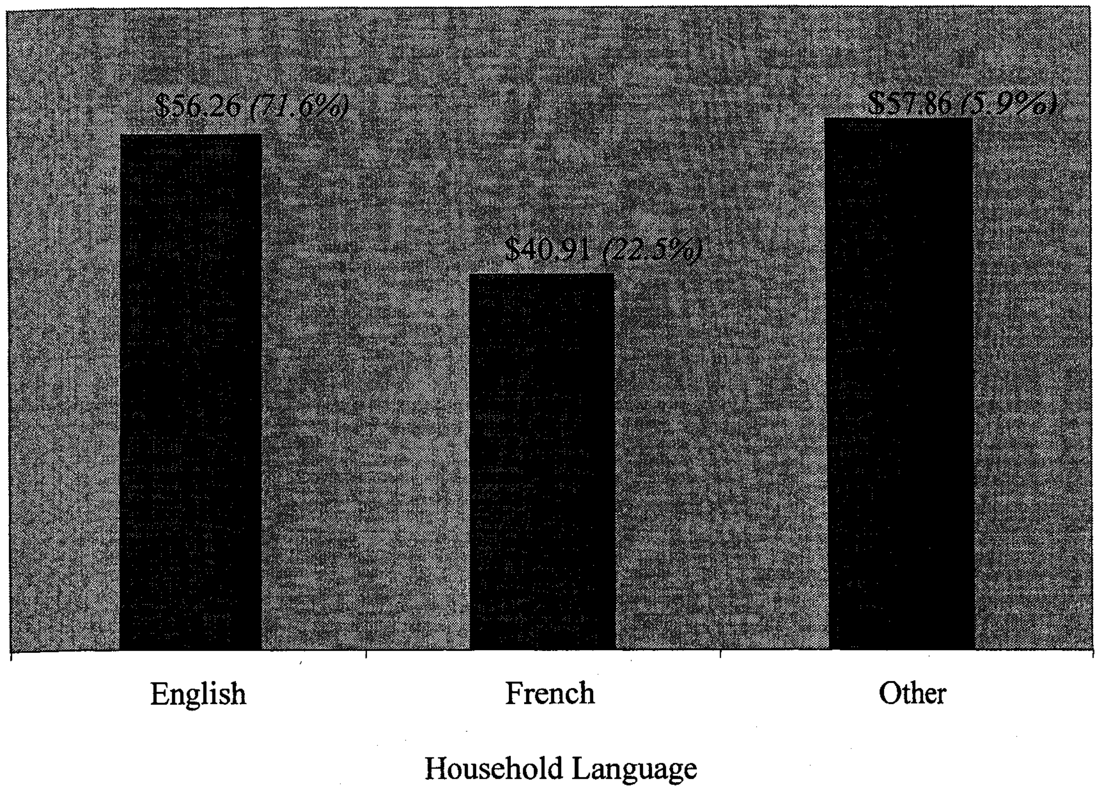


Figure 5.13 indicates that households which predominantly spoke French had the lowest WTP contribution to the hypothetical non-profit fund for Canada's national parks. As indicated by their slightly higher WTP values, respondents from the 'Other' household languages appeared to have a slightly greater appreciation for national parks than those from English or French-speaking households. A possible explanation for the higher WTP value for the 'Other' household language category is the relatively small percentage (5.9%) of observations in this category. As indicated in the descriptive statistics (Table 5.3), according to the 2001 Census, the proportion of respondents in this category should be 10.5%. Thus, it can be argued that increasing the number of 'Other' language category

respondents from the current 94 observations to the more representative 168 observations may alter the WTP contribution amount so that it is more similar with the English or French household language categories.

An alternative explanation for this discrepancy is the possibility that some cultural or political differences explain the difference in WTP contributions. For example, it may be that respondents from different nations and cultural backgrounds are more aware of the shortage of large, natural, protected areas in other parts of the world, and therefore, more appreciative of Canada's national parks. This appreciation and awareness could be reflected in a willingness to contribute a larger sum of money to the national parks fund.

In any case, given the increasing reliance on immigrants to expand the Canadian population, this finding may be worth further investigation by Parks Canada to ensure continued appreciation and public support for Agency policy and programs.

Figure 5.14. Willingness to Pay a Specified Bid Amount (WTPbid) versus Respondent Age*

**1% statistical significance level*

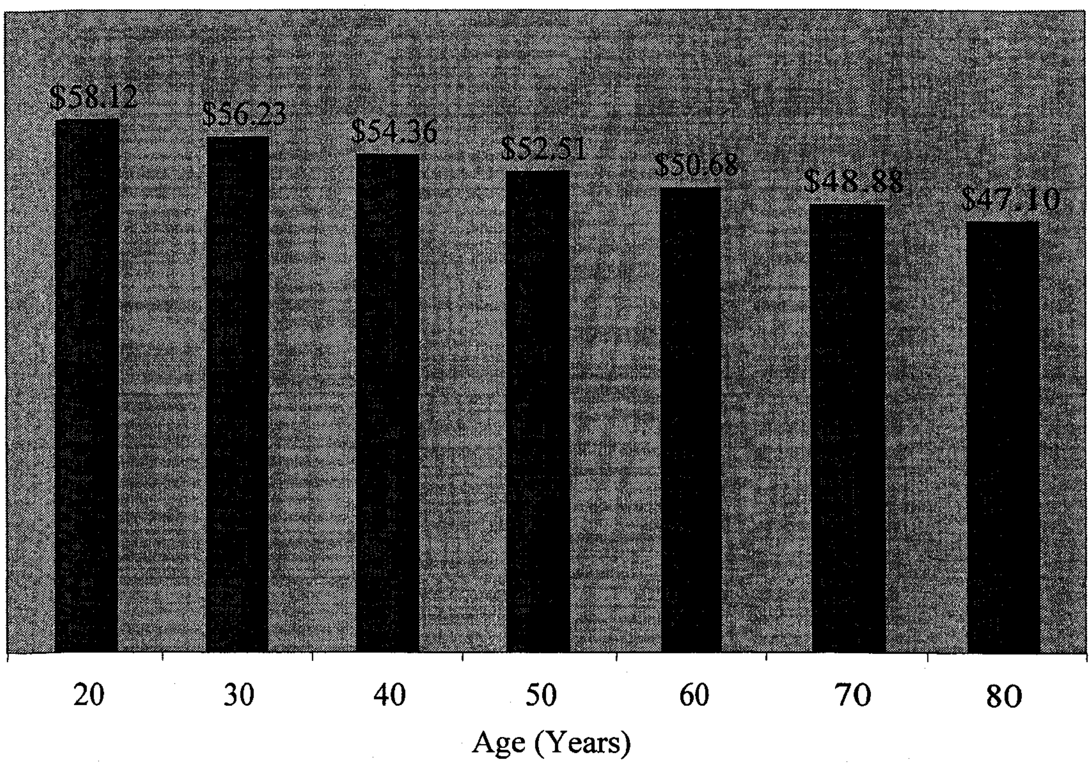


Figure 5.14 suggests that respondents' WTP to the non-profit fund for Canada's national parks decreased as they got older. As also observed in Figure 5.8 for the WTPun final model, the higher contribution amount for younger respondents reported by the WTPbid final model could be due to several reasons. For example, it could reflect the fact that younger respondents visit the parks more for recreation purposes and therefore have a higher 'use value' for the national parks than older respondents. As well, younger respondents may have a higher 'option value' for a future visit to a national park than the older survey participants. Secondly, the lower WTP for older respondents may be the result of less environmental awareness and appreciation compared to younger

respondents. Thirdly, older respondents may be on fixed incomes or less physically able or interested in visiting a national park.

Whatever the reason, this finding is worth further investigation by Parks Canada, since Canadian demographics suggest an increasingly aging population. If older Canadians are less willing to provide financial support to the national parks, this may result in a reduction in the public perception of national parks as a political and funding priority in the future.

Figure 5.15. Willingness to Pay a Specified Bid Amount (WTPbid) versus Level of Agreement for the Option to Visit a National Park in the Future (Option Value)*

**1% statistical significance level, (% of CVM survey population)*

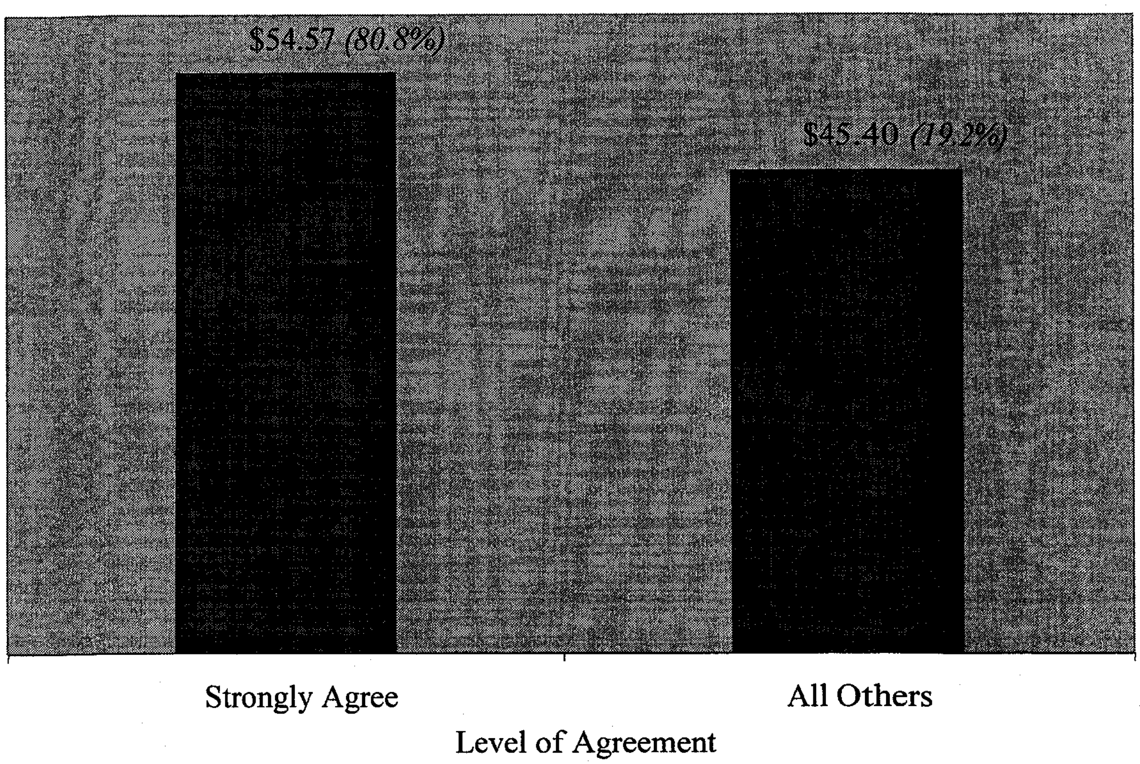


Figure 5.15 indicates that respondents who strongly agreed that they wanted the option to visit the national park of their choice in the future were willing to make a larger contribution to the national parks fund ($55) than respondents from all the other response categories ($45). As noted by the descriptive statistics, about 81% of the CVM survey respondents strongly agreed that they wanted to have the option to visit a national park in the future. The results for this variable can be considered a proxy for the 'option value' respondents have for a potential future visit to one of Canada's national parks.

Figure 5.16. Willingness to Pay a Specified Bid Amount (WTPbid) versus Gender**

***5% statistical significance level, (% of CVM survey population)*

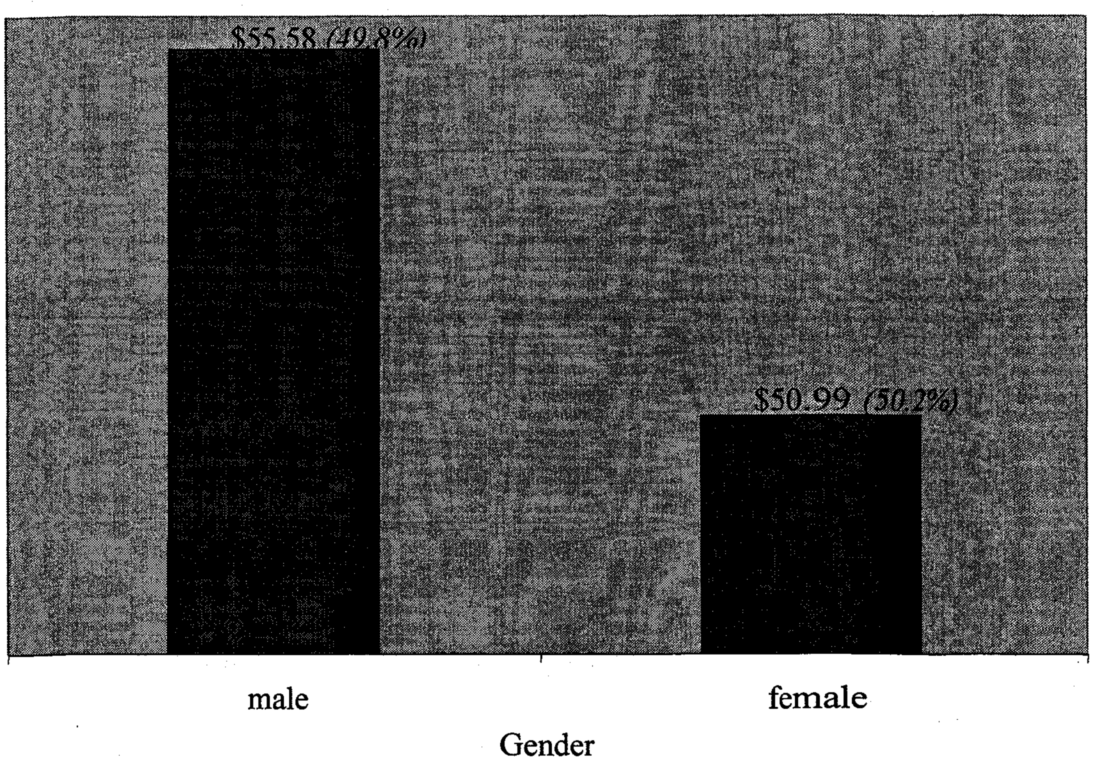


Figure 5.16 suggests male respondents were willing to contribute more ($56) to the national parks fund than female respondents ($51). Possible explanations may be

a difference in earnings between male and female survey respondents. Alternatively, in the sampled households, men may be the primary decision makers regarding financial contributions to charitable or other organizations. Another possible explanation is that perhaps more men than women participate in park-related recreation activities, and therefore are willing to contribute more to national parks.

For the CVM survey, Figure 5.16 indicates that the proportion of male to female respondents was about 50% for each gender category. As shown in the Table 5.3, the gender proportions for this question were a close approximation of those for the Canadian population. Hence, over or under sampling of a particular gender category was not a problem and cannot explain the difference in WTP between male and female respondents.

Further investigation of this apparent gender discrepancy in WTP for national parks may be useful to help Parks Canada improve communication and management strategies.

Figure 5.17. If Visited in 2003/04, Willingness to Pay a Specified Bid Amount (WTPbid) versus Ability to Recall Name of Last National Park Visited**

***5% statistical significance level, (% of CVM survey population)*

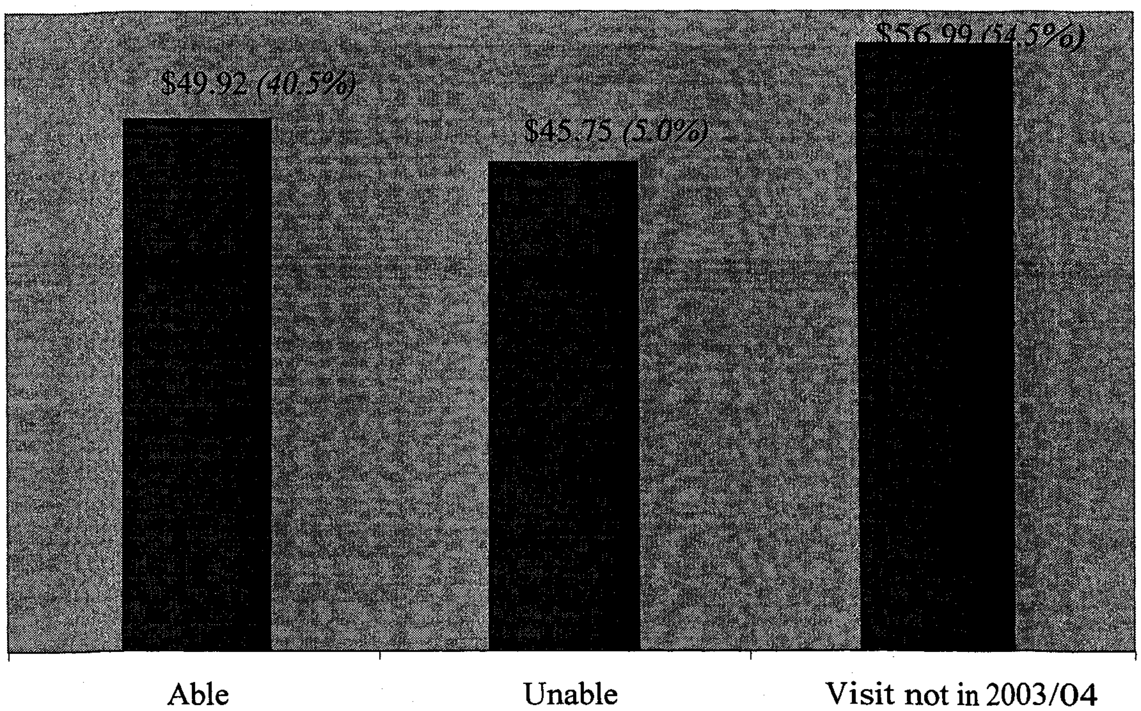


Figure 5.17 refers to those persons who reported visiting a Canadian national park in 2003/04. The graph shows the relationship between respondents who could correctly recall the last name of the last Canadian national park they visited in 2003/04 and the amount they would be willing to contribute to the national parks fund. As indicated in the chart, those respondents who visited a national park in other years had a higher WTP value ($57) than those who were able to recall the name of the park ($50) they visited in 2003/04. One possible explanation for this finding is that perhaps the value of a good memory, such as a positive national park experience, increases over time. Respondents

who were unable to recall the park name were willing to contribute the smallest amount ($46) to the parks fund. A possible explanation for the lower WTP amount for respondents who were unable to recall the name of the last national park they visited is that they comprised a small proportion (5%) of the total CVM survey observations for this question. Hence, the small number of observations in this category resulted in a downward bias of the WTP value.

An alternative explanation may be that the respondent's inability to recall the name of the last national park they visited is suggestive of an 'unmemorable' or less than satisfactory national park visit. Given that one of the objectives of Parks Canada is to 'promote public understanding and appreciation' for Canadian national parks (Parks Canada Agency, 2006), the ability of recent visitors to recall the park name can serve as a very simple indicator of the effectiveness of Parks Canada public education and awareness initiatives.

Figure 5.18. Willingness to Pay a Specified Bid Amount (WTPbid) versus Years Since Last Visit to a National Park**

***5% statistical significance level, (% of CVM survey population)*

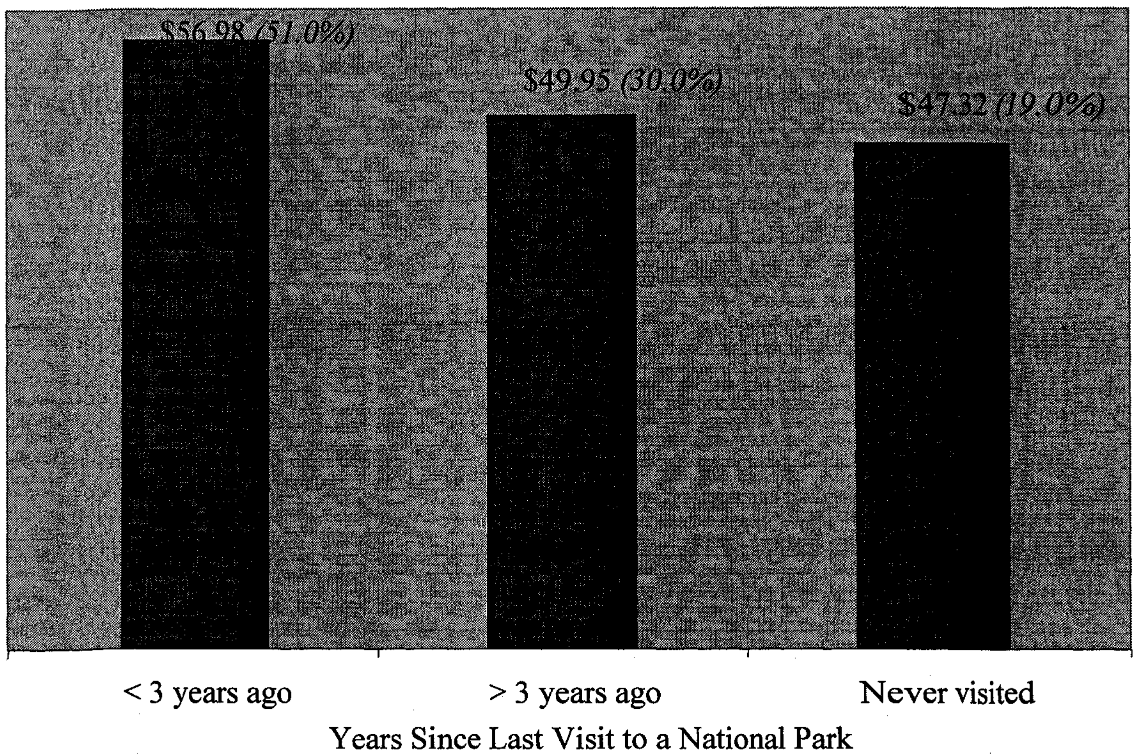


Figure 5.18 illustrates the relationship between the time since the most recent visit to a national park and the amount respondents were willing to contribute to the national park fund. The graph shows that about 81% of the CVM respondents had previously visited a Canadian national park. Furthermore, those respondents who had visited a national park in the past three years were willing to contribute the most ($57) to the national parks fund. This group accounted for 51% of all the CVM survey respondents.

Those respondents who had never visited a national park, 19% of the CVM survey population, were willing to contribute the least ($47) to the national parks fund. Interestingly, the amount non-visitors were WTP was only about 5% less than the amount of respondents who had visited a national park more than 3 years ago, and only 17% less than respondents who had visited a park in the past 3 years. This finding suggests that non-visitors do have a significant 'non-use' value for national parks. As noted previously, the omission of non-visitor values from the decision-making calculus of Parks Canada may preclude the use of national park resources that best reflects the interests and values of all Canadians.

Figure 5.19. Willingness to Pay a Specified Bid Amount (WTPbid) versus Level of Exposure to Information About Parks Canada**

***5% statistical significance level,, (% of CVM survey population)*

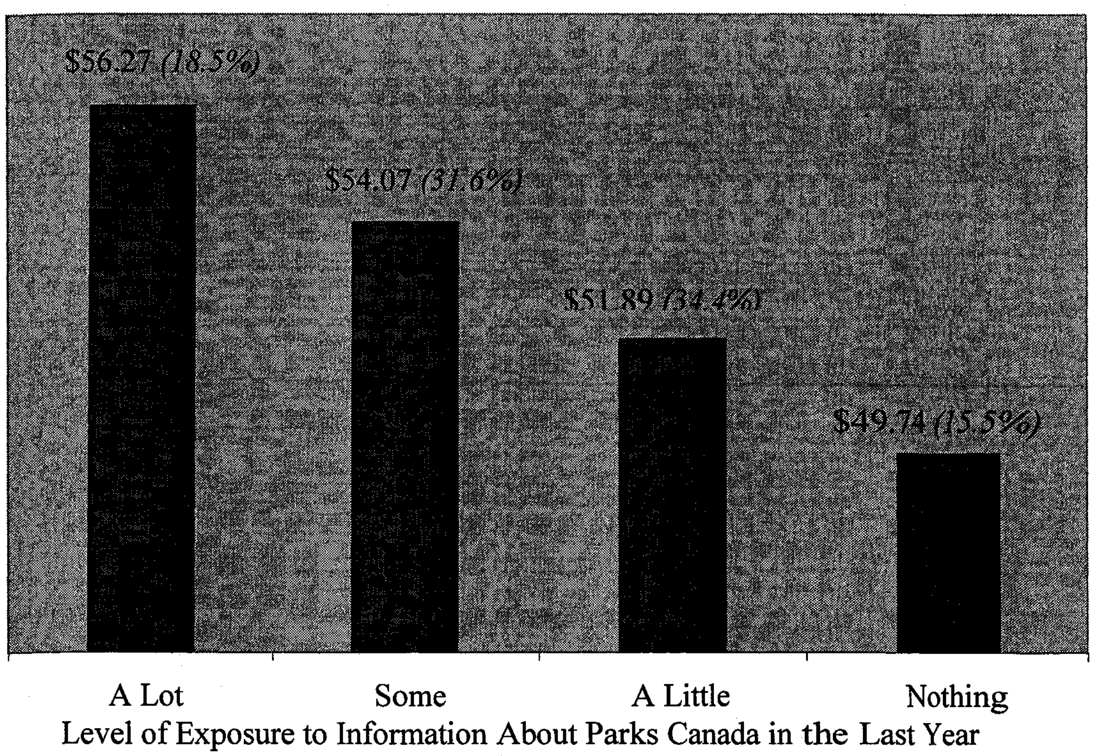


Figure 5.19 examines the influence of the respondents seeing, hearing, talking or reading about Parks Canada in the past year on the amount that they would contribute to the national parks fund. In general, it seems the more exposure respondents had to information about Parks Canada, the higher their stated WTP contributions to the national

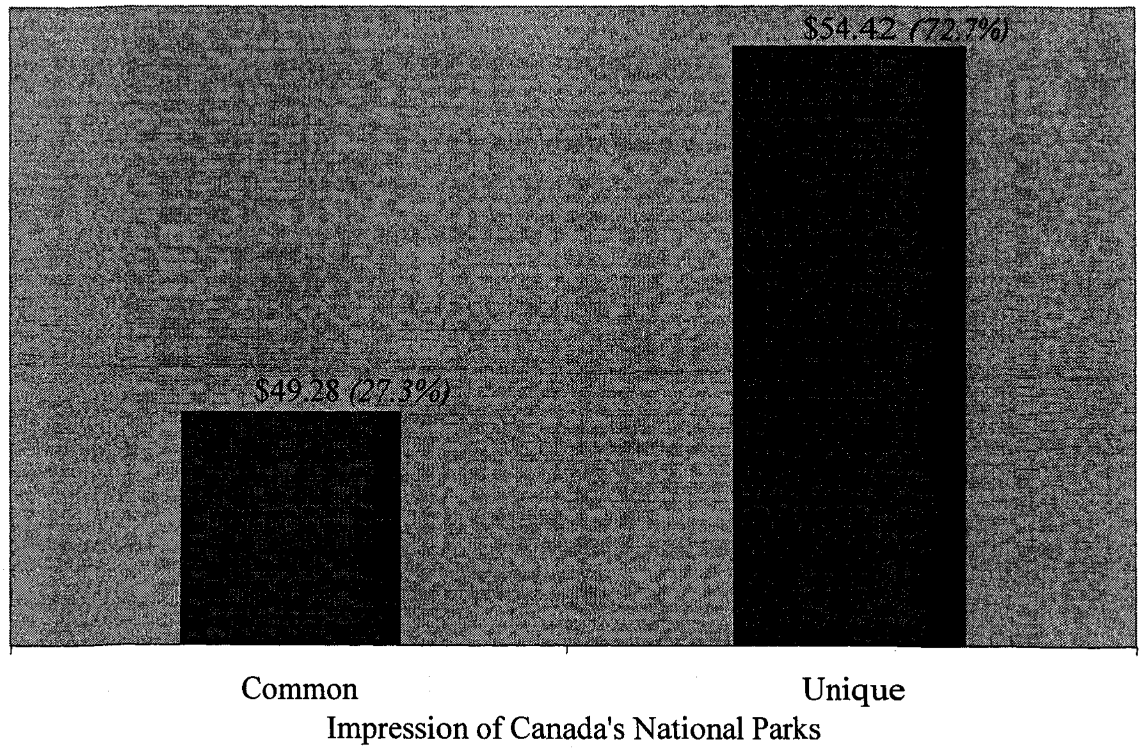
parks fund. Respondents who had 'A Lot' of exposure to Parks Canada information had the highest WTP amount ($56). This group accounted for 18.5% of the CVM survey population.

The dollar contribution to the national parks fund decreased with lower levels of exposure to information about Parks Canada. About 66% of the CVM survey respondents had received 'Some' or 'A little' exposure to Parks Canada information in the past year and were willing to contribute about $54 and $52 to the national parks fund, respectively.

It is worth noting that the 15.5% of CVM survey respondents who had no exposure to Parks Canada information were willing to pay only about 12% less to the parks fund than those respondents who had 'A Lot ' of exposure to the information. This finding indicates the considerable resiliency of the importance of national parks among the surveyed Canadians. It seems the lack of respondent exposure to any information about Parks Canada within the past year did not drastically decrease the respondent's willingness to financially support the national parks fund. However, this may not be the case if the respondent had no exposure to information about Parks Canada for a longer time period.

Figure 5.20. Willingness to Pay versus Common/Unique Impression of Canada's National Parks**

***5% statistical significance level, (% of CVM survey population)*



As shown in Figure 5.20, respondents who felt Canada's national parks were 'Unique' were willing to contribute more to the national parks fund than respondents who regarded the parks as 'Common'. About 73% of the CVM survey respondents regarded Canada's national parks as 'Unique' and were willing to contribute about $54 to the national parks fund. Conversely, about 27% of the CVM survey respondents regarded Canada's national parks as 'Common' and were willing to contribute about $49 to the national parks fund.

This finding suggests that Parks Canada may generate more citizen support for the national parks by promoting the unique characteristics of Canada's national parks and by trying to encourage and offer unique park visitor experiences.

Figure 5.21. Willingness to Pay a Specified Bid Amount (WTPbid) versus Volunteering Time with a Wilderness Protection Organization**

***5% statistical significance level, (% of CVM survey population)*

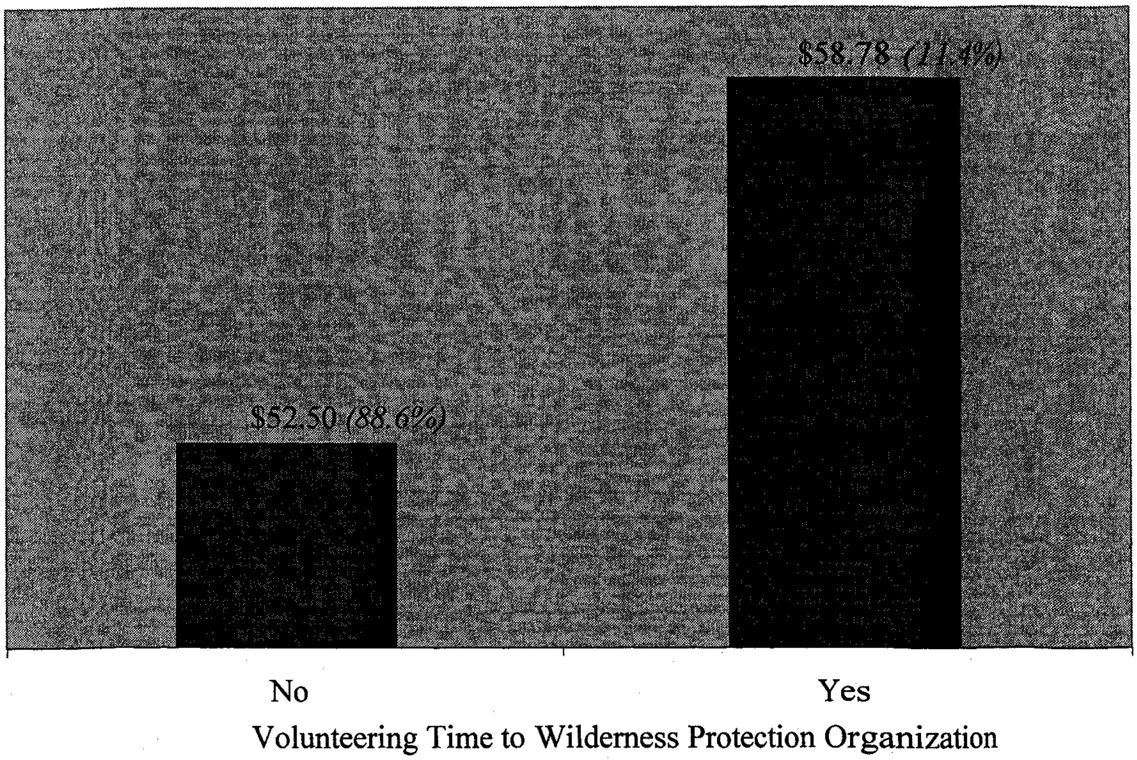


Figure 5.21 suggests that respondents who volunteer their time with nature/wilderness protection organizations were willing to contribute more to the national parks fund ($59) than respondents who were not volunteers to these types of organizations ($53). As well, the graph indicates that about 89% of the CVM survey respondents did not volunteer any time to a nature/wilderness protection organization.

Despite this low participation rate, the difference in the WTP amount between volunteers and non-volunteers was only about 11%. This finding suggests that respondents who do not volunteer their time for a nature/wilderness protection organization may still be willing to show their support for these organizations through a comparable monetary contribution.

Figure 5.22. Willingness to Pay a Specified Bid Amount (WTPbid) versus Education Level**

***5% statistical significance level, (% of CVM survey population)*

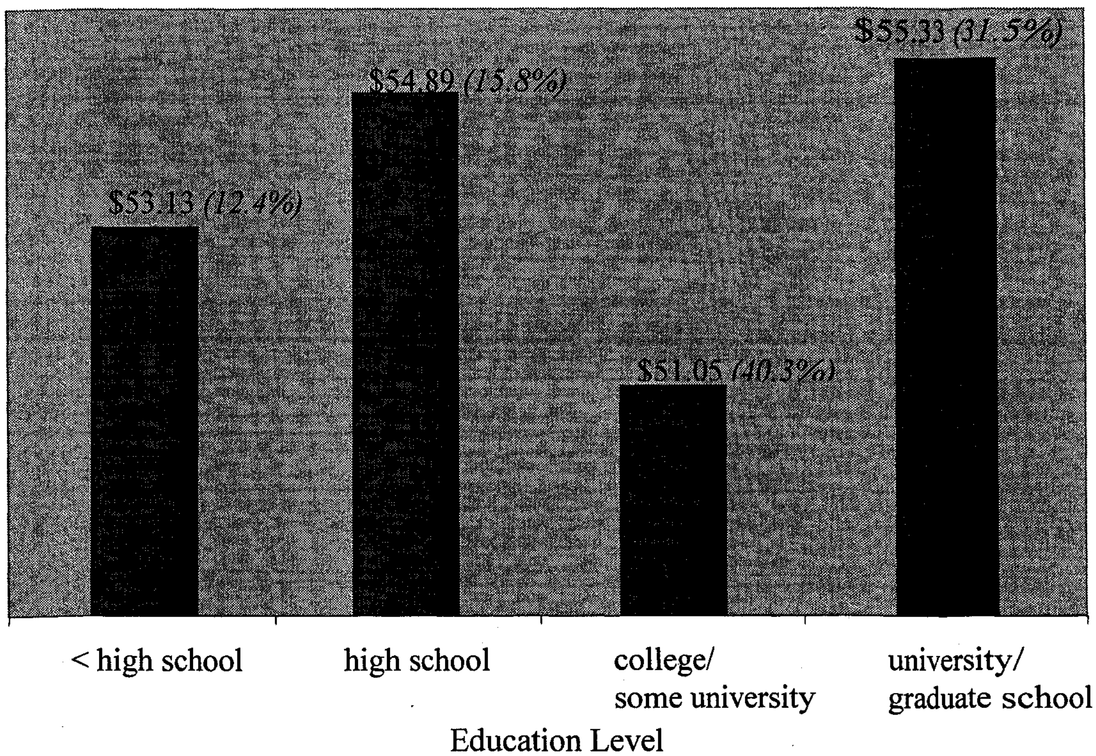


Figure 5.22 suggests that respondents who had the highest level of education were willing to contribute slightly more to the national parks fund than respondents in the other education categories.

While the 'Education Level' variable was found to be statistically significant at the .05 level, the fact that there was only an 8% difference in the contribution dollar amounts across all the education categories suggests that respondents felt quite similarly about the dollar amount they were willing to contribute to the national parks fund - regardless of their level of education. Broadly speaking, this finding suggests that Canadian appreciation and support for the national parks is comparable across all levels of education within Canadian society. However, as indicated by the 2001 Census Canada statistics in Table 5.3, the CVM survey population was over-represented by the highest education level and under-represented by the lowest education level. Specifically, the CVM survey population had 31.5% of respondents with a 'university/graduate school' level of education while the Census reported the proportion as only 15.4% of the Canadian population. Similarly, the CVM survey population had 12.4% of respondents with a 'less than high school' education level while the Census reported the proportion as 31.3% of the Canadian population. Hence, it may be that the WTP values for these education levels may have been different than those reported had the CVM survey population been a better representation of the equivalent Canadian population.

5.6 SUMMARY

This chapter provides analysis of the Parks Canada 2005 National Public Opinion Survey questions pertaining only to the valuation of Canada's national parks. The chapter was divided into three sections. The first section presented the descriptive statistics of the regression variables and compared their similarity between the Canadian population, the 2005 Survey population and the CVM sub-sample. A few descriptive statistics of CVM sub-sample were presented to clarify respondent support for the valuation scenario. to the reader how aggregate household and national benefit values were obtained (see Section 5.3).

The second section of this chapter examined and discussed the results of the preliminary and final regression models. The regression analysis provides a more in-depth analysis of how the demographic, attitudinal and experiential survey variables influence the respondents' monetary valuation of the benefits they receive from Canada's national parks. Only those variables in the preliminary regression models that were statistically significant at the .05 level or lower were included in the final regression models.

The regression results were presented for two statistical models. The first model (WTPun) examined a respondent's WTP an unspecified bid amount to a hypothetical national parks fund. The second model (WTPbid) determined what specific dollar amount a respondent would contribute to the fund. With the exception of the coefficient for the statement that 'national parks are meant to be enjoyed by future generations as much as by generations today', the coefficients on the variables in both regression models had the expected positive or negative signs.

It was concluded that the final regression model for estimating a respondent's WTP an unspecified amount to the national parks fund (WTPun) was driven primarily by: the level of respondent support for government funding for national parks, exposure to information regarding national parks, community size, age, donations to other wilderness organizations, perceived individual responsibility for protecting nature and the impression of national parks as unique or common places.

Interestingly, the variables driving the WTPun final regression model were quite different from those of the WTPun final model. The most important predictor variables for estimating the dollar amount that respondents would be willing to contribute to the national parks fund were related to the bid amount, variables for bequest and option value, region of residence, household language, age, gender, ability to recall the name of the last national park visited, number of years since last national park visit, level of exposure to information about Parks Canada, the impression of national parks as common or unique places, level of education, and whether the respondent volunteered some of their time for a nature/wilderness protection organization. Only the variables for age and the impression of national parks as common/unique were found in both final regression models.

The final section of this chapter presented a visual interpretation and written description of the variables mentioned above. Given the complicated interpretation of the regression coefficients, it was hoped that a more complete interpretation of the regression variables would generate a more meaningful understanding of the regression model as opposed to merely noting the values of the regression parameters.

The following chapter will discuss these results in a policy context and offer recommendations as to how these findings should be used in future policy and management decisions concerning Canada's national parks.

Chapter 6. CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

6.0 INTRODUCTION

Although Canada's National Parks are anecdotally highly valued by Canadians, the benefits that Canadians receive from their national park system are difficult to quantify in financial terms without formal markets. As a result, non-market benefits are typically underestimated and the costs of the national park system appear to outweigh the benefits. This 'market failure' is a serious shortcoming for many public goods, such as national parks. By focusing attention solely on the discrepancy between easily observable market costs and benefits, a false but seductive argument is sometimes made to advocate private sector takeover of valuable public goods.

The determination of value is a major part of natural resource management in national parks. Critically important is the method used to assess this value. Who assigns value and how the value is assigned are central issues (Eagles, 2002). The argument can be made that national park policies should reflect the values of the entire country. If that is the case, a decision-making system must be developed that realistically provides an opportunity for all people within the nation to participate, at least, in major decisions affecting their national parks. Since Canadian national parks are paid for primarily by federal tax dollars, no one group should dominate and obscure the public interest.

Considering the many CVM and other types of economic studies that have been done on park-related topics, there are relatively few studies of the combined use and non-use benefits that society receives from their national parks. The summary and meta-analysis of CVM studies by Loomis and White (1996) suggest that the CVM can provide meaningful estimates of the benefits of preserving endangered species which can be used in policy planning. These authors also suggest that rather than valuing individual species, habitat-based valuation, such as the valuation of national parks, is likely to be more useful.

The support for increased expenditure on national parks in Canada was examined in this study as a way to better approximate the economic value that Canadians derive from their national park system. This has not been done prior to this study,

6.1 ACHIEVEMENT OF RESEARCH OBJECTIVES

The purpose of this study was to estimate the dollar value of the 'surplus' or 'net' benefits beyond the current tax, visitor fees and other expenditures that Canadians receive from their national parks. As noted in Chapter 1, given the diversity of social, economic and environmental benefits arising from national parks, many well-publicized surveys have indicated that a large percentage of Canadians feel that Canada's national parks are important to Canadian society. However, the questions that remain to be answered are: How important are national parks to Canadians compared to other issues and why? The study attempted to answer these questions using the Contingent Valuation Method (CVM).

The CVM survey questions at the core of this research were, by necessity, a small component of the much broader 2005 Parks Canada National Public Opinion Survey. However, as noted in the NOAA Panel Report's 'Survey Guidelines' for an ideal CVM survey design: "a CVM survey does not have to meet each of these guidelines in order to qualify as a source of reliable information" (U.S. Dept. of the Interior, 1993. p. 4608). In accordance with the NOAA Panel recommendations, the CVM survey used a WTP elicitation format, a conservative design and closed-ended question format. The 2005

Public Opinion Survey was administered by telephone on behalf of Parks Canada by the national polling firm Environics©. A total of 6,086 Canadians were successfully polled of which a random sub-sample of 1,308 were asked the CVM valuation questions.

In order to examine how the CVM survey respondents who agreed to pay an unspecified dollar amount compared with those who agreed to pay a specific bid amount, two regression models were developed. The first regression model was derived from asking respondents a 'Yes' or 'No' question regarding their willingness to make a contribution of an unspecified amount to a hypothetical non-profit fund to support Canada's national parks. This model was referred to as WTPun.

Those respondents who answered 'Yes' to the above question were asked a double-bounded dichotomous choice question with an open-ended follow-up question to elicit their WTP dollar amount. The second regression model was calculated from the respondents 'Yes' or 'No' responses to agree to pay the bid amounts presented to them in the double-bounded dichotomous choice question. This model was referred to as WTPbid. The bid amounts were randomly assigned and ranged from $10 to $80.

Estimation results revealed that Canadians do value the benefits provided by Canada's national parks beyond their current visitor, tax and other expenditures for the national parks. About 61% of the CVM survey respondents agreed to make a contribution to the hypothetical parks fund. The estimated mean contribution for the WTPbid model was $53.32 per household. The estimated mean for the open-ended WTP question was $69.65 per household. These mean WTP values were interpreted as a proxy for the 'surplus' or 'unaccounted' value of the benefits Canadian households receive from their national parks, beyond their current expenditures for them.

The survey also identified which factors and types of economic use or non-use values influenced the WTP responses. Fifty six of the 2005 Survey's variables were examined through 12 preliminary regression models for their influence on WTP. Only those variables that were statistically significant at the .05 level or lower were included in the final regression models.

The final regression models indicated that respondents who agreed to pay an unspecified dollar amount (WTPun) to the national parks fund differed considerably from those who agreed to pay a specified amount (WTPbid). For example, neither use nor non-use value types were especially important predictors for the WTPun model. Rather, the most important predictor variables for the WTPun model were attitudinal variables such as: the level of respondent support for funding national parks with government funds, exposure to information about the national parks, community size, contributions to nature organizations, the perceived individual responsibility for protecting nature and the impression of national parks as common or unique places.

While use value-related variables were also poor predictors for the WTPbid model, non-use value-related variables were very important predictor variables for this model. As well, demographic variables were more prominent predictors of WTP the specified bid amount. Specifically, the most important predictor variables for the WTPbid model included the bid amount, the level of agreement statements regarding bequest and option value, region of residence, household language, age, gender, the ability to recall the name of the last national park visited, the number of years since the last national park visit, the level of exposure to information about Parks Canada, the impression of national parks as common or unique, level of education and volunteered time with a nature protection organization.

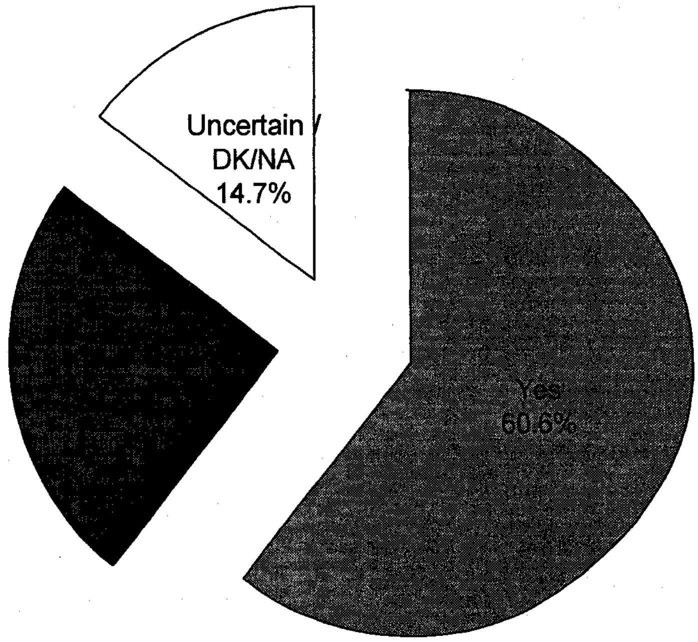
As noted above, only the variables for respondent age and the common/unique impression of national parks were found in both the WTPun and WTPbid models.

6.2 AGGREGATE WTP VALUE: THE NET BENEFITS FROM CANADA'S NATIONAL PARKS

Aggregation of individual values for expressing the total value for environmental goods, such as parks, is commonly found in the literature (see Appendix I). The values calculated in this section are the value of the benefits that respondents received from the national parks above and beyond their current public and private expenditures on national parks. In economic terms, these unaccounted for benefits are called 'net benefits' or the 'consumer surplus'.

As Richer (1995) suggests, one can generate an estimate of total WTP for the entire survey population by multiplying the estimate per household by the number of households in the survey population. Following this approach, the aggregate value of the net benefits Canadians receive from their national parks, as estimated in this study, is the mean WTP multiplied by the number of Canadian households. In 2001 there were 11,562,975 households in Canada (Statistics Canada, 2001a). As shown in Figure 6.1, based on the responses to Q21X, about 60.6% of respondents were willing to make a contribution to the national parks fund.

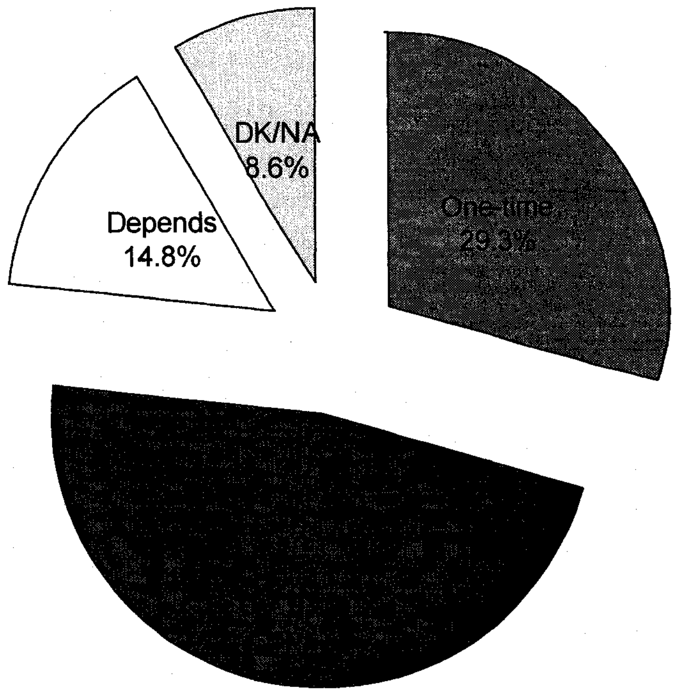
Figure 6.1. Percent of Respondents Willing to Make a Contribution to Non-profit Fund to Support National Parks ***n=1598***



If one extrapolates these results from the CVM survey sample to those of the Canadian population, 7,007,162.85 households would be willing to make a contribution to the national parks fund. Using the calculated WTP mean values of $53.32 from the WTPbid regression model and $69.65 from the open-ended valuation question (Q25X), the aggregate WTP to the national parks fund is $373.6 million and $488.0 million, respectively. These values represent a conservative range of the value of the net benefits that Canadians receive from their national park system.

Based on the responses to Q26X, (see Figure 6.2) about 47.2% of the CVM survey respondents were willing to contribute to the parks fund on an annual basis.

Figure 6.2. Yearly or One-time Contribution to the Non-profit Fund to Support National Parks *n=1598*



This translates to an additional annual WTP of between $176.3 and $230.4 million per year. This annual net benefit alone is close to the 2005 total annual budget of Parks Canada - about $250 million[10].

Table 6.1 summarizes the aggregated net benefits accruing to Canadians from the national parks.

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[10] Personal conversation with Paul Hartley, Chief of Financial Planning and Resource Utilization for the Parks Canada Finance Department. Gatineau, Quebec.

Table 6.1. Value of Net Benefits (as measured by WTP) to Canadians from Canada's National Parks

Mean WTP	Number of Households* willing to contribute	One-Time Payment	Annual WTP
$53.32	7,007,162.85	$373,621,923.2	$176,349,547.7
$69.65	7,007,162.85	$488,048,892.5	$230,359,077.3

*Statistics Canada, 2001a.

Using the more conservative values from the double-bounded regression analysis, ($53.32 per household) and assuming the most pessimistic scenario (i.e. that no Canadians would contribute to the national parks fund on an annual basis), the value of the net benefits would be equivalent to the 'one-time' payment of about $374 million. However, if one assumes a more optimistic scenario (i.e. that those Canadians who said they would contribute on an annual basis would do so for the next three years), and a discount rate of 7% (Parks Canada Agency, 2004), the present value of the net benefits Canadians receive from the national parks would be about $836 million. If instead of a 3-year time horizon, longer time periods of 5, 10 and 25 years are used in this calculation, the present value of the net benefits would increase to about $1.1 billion, $1.6 billion and $2.4 billion, respectively.

It is worth noting that the WTP estimates from this study are considered a lower bound of the net benefits that Canadians receive from their national parks beyond their current expenditures for them. Firstly, no value was assigned to the 14.8% and 8.6% of respondents (see Figure 6.2) who agreed to pay something, but answered 'depends' or 'don't know' with regard to making a one-time or annual payment.

Secondly, the estimates presented are based on the WTP values for only the current generation of Canadians. Future generations may have completely different priorities and how these values might change over time is uncertain. Given the increasing scarcity of relatively unspoiled natural areas, and increasing societal appreciation for a healthy global ecosystem, future generations may value national parks more with the passing of time, and, as growth in the human population increases the demand for national park benefits.

Thirdly, the discount rate of 7% may be considered too high and unfair to future generations. A zero discount rate means that future generations are treated equally with present generations; a positive discount rate means that the welfare of future generations are 'discounted' compared to nearer generations. Higher discount rates lower the value of future benefits and costs, and, hence, bias the consumption of resources in favour of current generations. This is because the societal costs of establishing and operating a national park system may appear high in the short term, while long-term societal benefits are uncertain and difficult to quantify. The question of 'intergenerational equity' is an extremely important one and some authors argue that low or even a zero discount rate is more appropriate for publicly-funded environmental projects, like national parks (Chapman, 2000; Kahn, 1998; Farber and Hemmersbaugh, 1993).

Lastly, it is possible that respondents' WTP values may have been higher if the CVM survey had been a stand-alone survey rather than a small component of the 2005 Opinion Survey. A dedicated CVM survey would have had a greater opportunity to provide respondents with more complete information regarding the variety and magnitude of benefits flowing from the national parks, rather than relying solely on the respondents' current level of knowledge and appreciation of national park benefits. The additional information and reduction in 'survey frame bias' may have positively influenced WTP values.

6.3 ECONOMIC BENEFITS VERSUS ECONOMIC IMPACT STUDY BENEFITS

In order to correctly interpret the meaning of the WTP results, a distinction is made here between the estimate of economic benefits measured by this study and those 'economic benefits' measured by economic impact studies. The economic benefits estimated by this research are derived from the national parks. Without the national parks, these benefits would not be generated. These are not the same as those economic benefits reported by economic impact studies.

Economic impact studies describe the regional activity generated by investment spending. These studies often claim to measure the 'benefits' of economic development from tax dollars that are 'injected' into local economies. For example, in the case of national parks, the derived benefits from an economic impact study would not only include the value of the benefits generated by the parks, but also the direct spending by Parks Canada for payments of wages to park employees, purchases of goods and services for park development, operations and maintenance. Economic impact study benefits would also include the 'induced' spending by private individuals and firms arising from the purchase of goods and services by Parks Canada. Lastly, economic impact benefits would include the visitor spending attributable to the parks (White, 1993). The original expenditure can thus go through many rounds of re-spending, creating beneficial economic activity in the local economy that would not have been created without Parks Canada spending on the national park. The sum of this spending and re-spending is called 'economic impact'. But all expenditures, no matter what they are for or who makes them, have this impact. For example, larger or smaller economic impacts could have been created had the federal tax dollars been spent on building a hospital, university, prison or bridge instead of a national park. Hence, the benefits reported by economic impact studies should be interpreted with caution.

Since the main source of investment spending for Canada's national parks comes from federal tax revenues, the economic impacts from tax dollars spent on national parks do not represent an increase in wealth, but rather a transfer of wealth from one sector of the economy to the other. While the secondary revenues to local businesses and persons hired by Parks Canada may improve or 'benefit' the local economy, they are actually costs to the creation and maintenance of the national parks. In a similar manner, many of the dollars spent by Canadian tourists in the national parks do not represent an increase in wealth, but are also a transfer of tourism dollars from one region to another. As Stanley (1997) points out, it is only valid to count as benefits the expenditures produced by some of those tourists, that is, those tourists who would not otherwise have come to Canada, but came because of the national parks. It is also permissible to count those Canadian tourists who would have left Canada and spent their tourism dollars elsewhere - had it not been for the existence of the national parks.

The only real benefits stem from the benefits arising from the project itself - in this case, the national parks. For example, the use and non-use benefits attributable to the national parks would not be produced if the parks did not exist. Hence, in the strict economic sense, they are 'true' economic benefits. While economic impacts may be important to local residents and politicians vying for tax-dollar-sponsored investment in their communities, they are not proper economic benefits *per se* because they merely shift, not add, to the wealth of the national economy.

The WTP values reported in this study are based on the true economic benefits accruing to Canadians from the national parks . The WTP values reported in this study are the value of the residual or 'net' benefits that Canadians receive from the national parks beyond their current tax, tourism and other expenditures for them. As Stanley (1997) suggests, it would be irresponsible not to make the effort to get the true benefits, instead of fooling ourselves by not acknowledging that many of the benefits claimed are merely a redistribution of economic activity that would have taken place anyway.

6.4. THESIS IMPLICATIONS

6.4 a) Implications for Politicians and Policymakers

6.4 a) i) Canadians highly value Canada's national parks and are supportive of providing adequate public funding for its maintenance and completion

The descriptive statistics and regression results of this study indicate that Canadians are generally supportive of current federal expenditures on national parks. They are willing to contribute additional private and public funds to ensure the completion of the national park system and proper maintenance of park environments and visitor services. Furthermore, respondents are aware of the financial constraints facing Parks Canada and very few respondents are opposed to an increase in government funding for these purposes.

The WTP values estimated by this study support these findings and exemplify the importance of Canada's national parks to all Canadians. The fact that the WTP values are a positive and substantial dollar amount suggests that Canadians perceive the benefits accruing to them from the national parks as exceeding the foregone benefits of using tax dollars and park resources for other societal purposes.

However, the WTP values estimated in this study still need to be interpreted with caution. They were calculated to demonstrate that national parks have significant value above and beyond what is commonly measured by the observable prices in park tourism and related business markets. They were not calculated to recommend a not-for-profit fund for national parks be established to raise additional revenue or to advocate increased park fees. The hypothetical non-profit national parks fund was simply a vehicle to elicit an expression of demand for the unaccounted-for benefits that Canadians receive from their national parks. The substantial magnitude of these 'net benefits' demonstrates that market price and value do not necessarily correspond for environmental goods such as national parks. Indeed, as was shown in Chapter 3 and noted by Dearden and Rollins (2002), many environmental goods are prone to this well known 'market failure'.

6.4 a) ii) Valuation studies can provide greater democratization of the public consultation process

A key advantage of economic valuation studies, such as this study of Canada's national parks, is that rather than relying on stakeholder groups to act as surrogates for the opinions of Canadians, economic valuation research gathers the opinions directly from the Canadian population. It also enables a more unbiased approach than conventional stakeholder or interest groups, since it selects a statistically-based random sample of participants from the general Canadian population. This allows a more complete accounting of all the benefits and costs to all the people from a much larger and more representative sample of stakeholders than most current park consultation processes. As well, it relies on scientific methods that are consistent, flexible, explicit, and replicable.

As Loomis (1997) suggests, valuation studies also offer a 'dollar democracy' in which every citizen's voice is heard through the benefits and costs that they receive from the parks, regardless of how small these are per person. Even small values per individual, multiplied by the millions of citizens, can result in substantial aggregate estimates for total benefits or costs that can lead to substantially different conclusions about who the winners and losers are from a given park management decision. This 'public good' nature of non-use values explains why existence values often dwarf recreation use values and the opportunity costs of natural resource protection (Ibid, p.6).

Without the information that economic valuation can provide, park-related management decisions are especially vulnerable to 'special interests' which means: (1) those few who would bear concentrated costs can block park resource allocations that benefit society as a whole and (2) those few who stand to gain concentrated benefits from parks can spread even larger costs out over millions of taxpayers (Ibid, p.9). For this reason alone, park valuation studies are valuable to park and local community planners.

6.4 a) iii) Valuation studies can better inform policy decisions

By providing a starting point with regard to the types of values Canadians receive from their national parks, and their relative magnitude expressed in monetary terms, the results of valuation studies, such as this thesis, better express the 'full-cost accounting' value to Canadians of protected national park landscapes – whether or not they ever visit these parks. As well, incorporating these values into current Treasury Board policy thinking and park planning, would provide a useful 'benchmark' to begin to assess the level of resources that can be justifiably invested (or sacrificed) in order to achieve the balance between mandated preservation and human use objectives. Furthermore, the valuation methodology introduces an empirical basis for estimating appropriate levels of allowable use that is consistent with Parks Canada's mandate to protect and restore ecological integrity.

6.4 b) Implications for Parks Canada

6.4 b) i) Parks Canada is the most trusted steward of Canada's natural heritage

Respondents of both the 2005 Survey and CVM sub-sample populations ranked Parks Canada as the most trusted protector of Canada's natural and cultural heritage. Roughly 52% of respondents from both 2005 Survey and CVM populations stated that they trusted Parks Canada 'a great deal' with this responsibility. By comparison, trust in non-profit conservation groups, the federal and provincial governments and the private sector was about 45%, 13% and 11%, respectively.

The survey results suggested respondents had the least trust in the private sector to manage Canada's natural heritage. Only 5% of respondents trusted the private sector with this responsibility, and less than .003% of respondents did not contribute to the national parks fund because they believed national parks should be run by private firms.

In order to maintain this high level of trust from the Canadian public, Parks Canada must endeavor to make sound and transparent decisions that adhere to national park legislation and policy and best reflect the interests and values of all Canadians. This will require an ongoing willingness to monitor and incorporate new information and approaches to enhance management decisions.

6.4 b) ii) Valuation studies can facilitate management decisions

Economic valuation studies, such as this thesis, can be useful for Parks Canada at two levels: general advocacy and management support. General advocacy is needed to raise the awareness among political decision-makers and policy makers of the fact that national parks provide both monetary and non-monetary benefits to a variety of stakeholders, the sum of which exceeds the opportunity cost of the federal subsidy.

In terms of management support, economic valuation can provide national park managers with: information about the park area's goods and services; the values which people (both users and non-users) place on those goods and services; the values which are being captured by national park policy and decision-making and the values that are not; and the interest groups which could derive more benefits through alternative use of the park landscapes and are therefore inclined to be a 'threat' to the park. In this way, valuation provides useful information to guide management and financing decisions. For example, it can identify the value to park beneficiaries; it can justify funding from traditional sources; it can identify additional revenue sources; and it can expose marginalized stakeholders who may impose threats to the parks.

Recent advances in the field of economic valuation make it possible to include many outputs and conditions that were once considered unquantifiable. Quantifying the non-market benefits of national parks may help Parks Canada to justify the needed increase in government funding in times of declining federal budgets.

As well, the information provided by valuation studies may facilitate the resolution of outstanding land claim issues and accelerate the completion of the national park system.

Lastly, valuation exercises such as this study can facilitate Parks Canada's outreach and communication strategies (such as the Engaging Canadians Strategy) by helping guide financial investments and by clarifying the knowledge, importance and underlying values held by Canadians for their national parks (Parks Canada, 2001).

6.4 b) iii) Monetary values can be used as a socioeconomic indicator

The results of this research show that the CVM approach and resulting monetary values can serve as useful socioeconomic indicators to policy officials of the relative importance of national parks to Canadian society. While these values are by no means the only indicator that should be used to assess the importance of national parks to Canadians, Parks Canada officials should be aware that WTP values can be successfully used as a 'measuring stick' for determining the relative importance of the values and opinions that Canadians have for their national park system. As well, the use of dollar values provides a familiar, flexible and common metric for directly comparing the benefits and costs of the benefits of national park decision outcomes with those of other public and private institutions.

6.4 b) iv) Non-use values for national parks are most important to Canadians

Economic analysis by Parks Canada must internalize the benefits and costs associated with the non-use values of parks. As indicated by this study, use values were poor predictors of WTP. However, the non-use values of bequest, option and existence values were very important predictor variables for determining whether a respondent would contribute a specified dollar amount to the fund.

The importance of non-use values regarding Canada's national parks was also evidenced by a recent national television and radio poll by the Canadian Broadcasting

Corporation which asked the Canadian public to nominate a place, idea or thing that they perceived was worthy of being considered as one of the 'Seven Wonders of Canada' (Canadian Broadcasting Corporation, 2007). Interestingly, even though the Nahanni National Park Reserve receives only about 1,000 visitors per year, it received 65,000 votes from Canadians and ranked in 4th place as one of the 'Seven Wonders of Canada'. The fact that Nahanni National Park, which is a remote wilderness waterway park that is accessible only by aircraft and canoe, was so popular among Canadians despite the low number of persons who actually visit the Park is an indication of the non-use values that people living across Canada have for this isolated protected area.

The non-use values held by Canadians for the national parks are tantamount to the value of maintaining ecological integrity in the national parks. They are implied in the protection aspect of the Parks Canada mandate. Given that decisions on human use levels in parks will inevitably influence the non-use benefits derived from parks, such decisions need to be informed by precise, quantitative information about exactly how much value would be lost if ecological integrity is reduced, even if the change is small.

The importance of non-use values to Canadians has implications for Parks Canada management decisions and policy direction. The fact that the non-use benefits from national parks are usually public in nature means that even small individual benefits must effectively be multiplied by the entire population of Canada. Consequently, it is quite possible that in some cases, the value of the non-use benefits of park preservation outweighs the value of the recreation benefits generated by visitor use of the park. Hence, if park policy does not include the value of non-use benefits in their decision-making calculus, it may be overstating the value of the benefits of human use of parks. This omission may thereby indirectly contribute to excessive damage to park ecosystems and lost non-use benefits to society.

To be fair, the value placed by Canadians on non-use benefits is not entirely ignored by Parks Canada. It is reflected in the National Parks Act, as administered by Parks Canada. Indeed, the 1988 and 2000 amendments to the National Parks Act, prioritizing the mandate to maintain ecological integrity in the parks, can be seen as an unequivocal statement that legislators believe that Canadians place great value on the non-use benefits generated by the parks. For example, it is these same non-use values that have justified the establishment of many of Canada's northernmost national parks. The latter are unlikely to ever receive significant numbers of visitors, and might actually be seriously compromised if they did! Nevertheless, the non-use values that they generate more than justify the costs in establishing and maintaining them (Gunning-Traunt, 1996). Similarly, non-use values are also the primary justification for financing much of Canada's national park system through general tax revenues rather than through user fees.

6.4 b) v) Willingness to pay questions may alter survey responses

The fact that the most statistically-significant predictor variables were considerably different for the PWTPun and WTPbid final regression models has implications for future Parks Canada public opinion poll efforts. The results indicated that the factors that motivate a respondent to agree with the intention of making a financial contribution are different than those that prompt the respondent to agree to pay a specified amount. It suggests that if Parks Canada is conducting a survey to justify a management decision for which respondents will be charged implementation costs, then it may be beneficial to ask respondents what would be their WTP for this management option, as opposed to only asking them to rate the level of importance/agreement with the decision on a Likert or equivalent scale. It can be argued that asking what respondents are WTP for a preferred management alternative may help improve the credibility of the proposed management scenario by reminding respondents that no decision is costless. This may improve the quality of survey responses as well as provide Parks Canada managers with a more precise and comparable metric for evaluating management options.

6.4 b) vi) Economic valuation results can facilitate external communications efforts

The economic valuation of national parks can facilitate several of the expected results/outcomes of Parks Canada's external communication efforts listed in the Engaging Canadians National Performance and Evaluation Framework (Parks Canada Agency, 2005b, p.6). One of the five desired outcomes of the Parks Canada National Performance and Evaluation Framework for Engaging Canadians is to understand "to what extent do key audiences and Canadians in general display an increased awareness and support for Parks Canada's mandate, systems and issues?" (Ibid. p.20). As well, Parks Canada acknowledges that: "development of a typology of supportive behaviors by audience ...should be a priority for program managers" and "a major issue is how to capture in a reasonable summary form the diversity of supportive behavior both within and across audiences" (Ibid, p.14). However, park non-users are not identified as a "key audience" and economic willingness-to-pay values are not identified as a potential summary indicator of supportive behavior.

Economic valuation and WTP measures can be used as an indicator to meet the goal of assessing audience "satisfaction with programs, services and experiences" (Parks

Canada Agency, 2005b. p.6.). WTP values can provide an especially useful measure of satisfaction for Parks Canada because "the standard most often not met is the ratings of value for money, particularly in the national parks participating in the survey"(Ibid. p.23). As well, the use of a common metric (dollars) allows satisfaction to be compared within and across audiences for the same or different products and services provided by Parks Canada. Secondly, the economic use and non-use values can be used to achieve the Framework desired outcome of assessing and "building support for conservation values and ethics, or ecological/cultural integrity values" (Ibid.p.6). As noted in the Framework, "Parks Canada has not defined what is meant by conservation values and does not systematically measure support for these concepts" (Ibid. p.iii).

As noted in the Framework: "the ultimate result of external communications is the development of supportive behavior for the Agency's goals of protection and presentation in a variety of audiences" (Ibid, p.6). In this regard, WTP estimates can be used as a common indicator of supportive behavior. As well, they would contribute to the fulfillment of Parks Canada's promise to seek and listen to Canadian opinions on developing all possible Parks Canada funding options (Treasury Board of Canada Secretariat, 2004).

Despite the fact that economic valuation and CVM studies have been done for over 50 years for a wide range of environmental goods including national parks, very few studies have been done for Canada's national parks. As noted in the Engaging Canadians Framework: "Anecdotally, values and the building of a conservation ethic with visitors and others who are influenced by Parks Canada continues to animate some discussion and debate in the Agency" (Parks Canada Agency, 2005b. p.6). It is hoped that the valuation results and examples presented in this thesis will inspire Parks Canada to move from debate to action and undertake further economic valuation studies to facilitate the decision-making process.

6.4 c) Implications for Academic Researchers

This study provides some new methodological insights. While valuation exercises for select park values or individual parks can be found, very few studies pertain to Canadian parks and no similar study has ever been done for the Canadian national park system. To date, this research effort was only the second CVM study done on a Canadian national park. As well, this study was also the first time a telephone survey was conducted for the distribution of a Parks Canada contingent valuation experiment.

6.4 c) i) A concise CVM survey design can yield reasonable results

As was noted previously, since it was part of a much larger study, the CVM valuation component of the 2005 Parks Canada Public Opinion Survey had to be as concise as possible and a number of design compromises had to be made.

This minimalist approach provided some new insights on the design of a contingent valuation questionnaire. Although the national park system is a complex economic good, and there was little opportunity within the survey to describe it, as evidenced by the responses to Q27X only about 11% of respondents felt that they did not have enough information to commit to making a contribution to the national parks fund. Furthermore, less than 1% of respondents objected to the way the valuation question was asked. Thus, despite the space constraints of the survey instrument, respondents appeared to understand the good they were being asked to value and had sufficient information to make their WTP decisions. The valuation scenario and question believability was reflected in the modest WTP responses for both the open-ended and double-bounded dichotomous choice questions.

Although the NOAA Panel recommendations for a referendum question format and 'increase in taxes' as a payment vehicle were not permitted by Parks Canada, the use of a contribution to a non-profit national parks fund as method of payment proved to also be acceptable to survey respondents. For example, incomplete responses were only about 14%, well within the 20-30% for WTP questions considered acceptable by Mitchell and Carson (1989). As well, there was no evidence of 'Yea-saying' to the WTP questions and of those respondents who were not willing to make a contribution to the national parks fund, only 6% did not trust that the fund money would be used correctly. However, the same argument could be used regardless of the payment vehicle.

6.5 RECOMMENDATIONS

6.5 a) Specific Recommendations for Politicians and Policy Advisors

6.5 a) i) Ensure Sufficient Funding for National Parks

As noted in Chapter 1, about one-tenth of one penny of a federal tax dollar goes to funding Canada's national parks. Survey respondents cited the lack of financial resources for the national parks as one of the most significant threats to the parks. As indicated by the descriptive statistics, over 82% of both the CVM and 2005 Survey respondents believed that the majority of the responsibility for the protection of natural areas and the environment should rest with the federal and provincial governments.

Over 90% of persons surveyed perceived the national parks as a 'good value'. About 97% of survey respondents supported (70% 'strongly' supported) spending federal tax dollars to maintain the existing national parks; 90% of respondents supported (54% 'strongly' supported) increasing government funding for conserving wilderness areas in the national parks and 86% supported (45% 'strongly' supported) increasing government funding for completing the national park system.

In combination with the finding that about 61% of Canadian households were willing to contribute an average of $53.32 per year as a one-time or annual contribution to a hypothetical fund in support of Canada's national parks, the evidence presented above suggests that Canadians do derive significant benefits above and beyond their current level of expenditures on national parks. It also suggests that Canadians are willing to devote additional public and personal funds to complete and maintain Canada's national park system. Hence, it is recommended that government officials ensure that Parks Canada have the sufficient financial resources to accomplish this task.

6.5 a) ii) Establish what level of decisions by Parks Canada require a national survey of Canadians

It would be useful to establish at what level of decision-making Parks Canada managers should be obliged to conduct a survey of Canadian opinion rather than conduct only local community and stakeholder groups. While public input is sought for park establishment and management planning purposes, the effort is usually limited to local or invited stakeholder group meetings and 'open house' presentations for the local community. The extent of effort to reach the Canadian population is left to the discretion of the field unit superintendent or park planner and usually limited to media releases in newspapers inviting public comment [11].

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[11] Personal conversation with Wayne Bourque, Senior Parks Canada Agency Planner. Vancouver/Victoria British Columbia.

As well, ongoing, standardized surveys of public opinion would allow Parks Canada to better anticipate future trends and shifting park values, and to gauge management decision outcomes. This would provide greater democratization of the current park decision-making process by ensuring the values and interests of all Canadians - both park visitors and non-visitors – are better understood, quantified and available for consideration in future park management decisions.

6.5 b) Broad Recommendations for Politicians and Policy Advisors

6.5 b) i) Need for better economic analysis

The 2004, the Organization for Economic Co-operation and Development (OECD) environmental performance report for Canada strongly criticized Canadian environmental policy for not using economic analysis in policy decision making (OECD, 2004). As Adamowicz notes:

> "without economic analysis of environmental policies the process is missing a key component or it is assuming information about preferences, values, and costs that could be collected and assessed in a rigorous fashion."(2007, p.7).

Adding to this difficulty is the lack of economic or environmental data around many environmental policy issues (Ibid, 2007). For example, the federal governments' nationwide 'Survey on the Importance of Nature to Canadians' (Environment Canada, 1996) which assessed the social and economic value of nature-related activities to Canadians and was conducted every five years since 1981, was discontinued after 1996. The Survey was conducted by Statistics Canada and sampled over 86,000 Canadians 15 years of age and older. The reports resulting from the Surveys' large and detailed database provided a good starting point to understand and appreciate the contribution of nature-related activities to the Canadian economy over time.

Like all levels of government, the federal government has limited resources to spend on services for their citizens and must make decisions about how and where to spend these resources. Sectors within the federal government compete for a share of the fiscal budget. Thus, national parks compete with education, infrastructure and development programs, health and welfare services, the military, and so forth. Valuing national parks can provide the economic reasons to complement the ecological ones as to why the federal government - and other groups - should invest in them. As well, economic values can help clarify the present confusion of how support for Parks Canada is tempered by commitments to competing values and priorities (Parks Canada Agency, 2004a).

No land use decision within or around a national park is exclusively local or national. There are always implications for both. Given that national parks are created for the benefit of all Canadians, it is inevitable that the interests of federal agencies and conservation groups may not always correspond to the interests of rural regions and local communities. If the costs of park creation are born locally, but the benefits are distributed nationally, some transfer payment may be warranted.

A broader development approach is needed that extends public policy beyond the current narrowly-defined realm of tourism promotion and marketing. This stems from a recognition that existing methods of government planning often marginalize important values (such as park non-use values) or do not adequately account for the consequences of decisions for its citizenry (Eagles and McCool, 2004).

It is, therefore, important for politicians, rural community planners and Parks Canada senior managers to know the value of the use and non-use benefits flowing from Canada's national parks for three reasons. Firstly, the value of the 'national parks asset' needs to be known to encourage funding and management decisions that do not diminish the value of this asset to Canadians.

Secondly, since current park policy does not explicitly include the value of non-use benefits, it may be overstating the value of the benefits of human use of parks. This omission may indirectly contribute to excessive damage to park ecosystems and lost non-use benefits to society. If one thinks of the loss of a benefit as a 'cost', then one can easily see that the 'use' benefits enjoyed by park visitors will be offset to some degree by the loss of 'non-use' benefits borne by park non-visitors (Myles, 2000). It is therefore conceivable that, in some cases, the lost non-use values to all Canadians may be greater than the use value gains to park visitors and adjacent tourism communities.

Thirdly, since the majority of the foregone benefits of using national park landscapes for other purposes is borne primarily by local communities, while the benefits of park creation mainly accrue to the nation, some type of compensation payment or transfer may be deemed necessary to ensure local support for a park. The extent of compensation will require an appraisal of the value of the landscape for both park and non-park purposes.

National park professionals and local community residents are interdependent components of park ecosystems, cultural landscapes, habitats and recreation settings. Only by working together and 'learning by doing' can the goals of enhanced decision-making capacity, park preservation and sustainable and compatible community development be achieved.

6.5 b) ii) International National Park Service to Ensure Adequate Protection and Funding

As was described in Chapter 2, 'public goods', such as national parks, are especially prone to this 'market failure' - the failure of the market to provide the socially desired quantity of the good.

Chapman (2003) points out that, theoretically, public ownership can operate more effectively than private owners (commercial firms or local groups) in providing the large areas needed to adequately protect species and biodiversity in natural ecosystems. This is because many of the non-market benefits from a large protected area are difficult for a private owner to convert to revenue. Consequently, a private manager, will typically maximize profits at a much smaller park area than the size of park area that would provide the maximum economic value to society. As well, given the profit incentive to only internalize the visitor-experienced benefits of maintaining ecological integrity and ignore the public portion of non-use benefits, an unregulated private park manager would also chose to manage the national parks at a higher level of use intensity and a lower level of ecological integrity than an altruistic public owner (Myles (2000). While this divergence of incentives could theoretically be overcome through contractual arrangements or regulation, the complexity of the desired outcome and the costs of contract monitoring and enforcement would likely outweigh the efficiency gains through privatization (Ibid, 2000).

However, if public managers do not have the resources to procure and manage protected natural areas, market failure can still occur. This is especially a concern in developing countries where the opportunity costs of establishing national parks may be too difficult to justify because the benefits accrue largely to citizens of other nations while the costs are born domestically. Hence, an International Park Service (IPS) is proposed to help acquire and manage important protected areas especially in developing countries where those sites have significant non-market environmental values on a global basis (Ibid, 2003). In so doing, the IPS could help secure greater global environmental security and better share in the costs of establishing an international protected area system.

Balmford et al. (2002) estimates that globally, the subset of subsidies which are both economically and ecologically questionable totals between US$ 950 billion and US$ 1,950 billion. James (2001) estimates that the world spends US$ 6.5 billion each year on the existing network of parks and protected areas and that half of this amount is spent in the United States alone. Globally-available resources for existing parks and protected areas falls far short of those needed to meet basic management objectives (James et al., 1999). Moreover, terrestrial and marine reserves currently cover only about 8% and 0.5% of Earth's land and sea area respectively (IUCN, 1997; Kelleher et al., 1995). This is well below the minimum safe standard considered necessary for the task of maintaining wild nature into the future (Roughgarden et al., 2001; Soulè and Sanjayan, 1998; IUCN, 1993). Balmford et al. (2002) estimated that to increase the area of protected natural areas of both land and sea to 15% for each would cost about $45 billion per year. While this amount is substantially greater than the current investment of US$6.5 billion/year, it is less than 5% of the current subsidies of US$ 950 billion to US$ 1,950 billion (Ibid, 2002). The crucial question is whether this price is worth paying? The authors conservatively estimated that the hypothetical global system of parks and protected areas would provide an annual benefit of between US$4,400 billion to US$ 5,200 billion depending on the level of resource use permitted within the protected areas. The benefit:cost ratio of this system is, therefore, around 100:1.

6.5 b) iii) Payment to National Parks for Carbon Fixation Rather than Unspecified Payments to Other Nations for Carbon Credits

Currently, there is considerable debate and concern among federal political parties as to how to best demonstrate environmental leadership and action to Canadians with respect to the challenges of global warming. The following recommendation may have significant political appeal because it is a creative, practical, tangible and domestic solution that simultaneously achieves popular environmental objectives and fulfills outstanding policy commitments that previous governments have been unable to achieve.

As noted previously in this thesis (Section 2.2.i.a), one of the benefits of national park ecosystems is the storage of carbon, a service necessary to address scientific concerns over atmospheric carbon dioxide levels (Morton, 2000). Although older forests have lower growth rates, higher mortality rates favour accumulation of woody debris and increased carbon storage in the litter layers (Turner et al., 1995). The economic benefits of storing carbon in a national park network could play a significant role in reducing greenhouse gases and help Canada meet its obligation to Kyoto targets. Protected by the forest canopy, soil carbon can be stored indefinitely (subject to fluctuations caused by natural disturbances) if these forests are reserved in a protected area network. If the forests are logged, however, the soils can quickly decompose and lose their carbon through exposure to increased sunlight, temperature and wind (Morton, 2000).

Rather than spending federal tax dollars to purchase foreign carbon credits from other countries, perhaps that money, or at least a portion of it, could be spent to purchase the forested landscapes necessary to complete the national park system. Increased spending on national parks could be justified based on the savings in foreign carbon credit purchases because of the carbon fixed by national park landscapes (per. com. Mulrooney, 2007). This could be a more effective and economically-efficient way to achieve reductions in atmospheric carbon dioxide levels. As well, this approach provides all the additional benefits that accrue to Canadians for completing the national park system. Finally, this approach may also provide an effective mechanism for other nations to complete their national park systems.

6.5 b) iv) Research Funding for Wilderness Benefits

Taxpayer-supported research should focus on wilderness research and on increasing our knowledge of non-market goods and services. Market forces can be more readily relied on to fund research on the production of timber, tourism and other marketable commodities (Morton, 2000). Increased investment in wilderness research also has the potential to produce substantial global economic benefits if, for example, transferring information on the economic importance of conserving wild watersheds results in policy changes that reduce road building and logging in tropical and boreal forests.

6.5 c) Specific Recommendations for Parks Canada

6.5 c) i) Develop and routinely implement a standardized valuation survey

Parks Canada acknowledges that it "does not have a comprehensive set of definitions or a classification scheme for supportive behavior by audience" (Parks Canada Agency, 2005b. p.15). As well, the 1999 and 2001 State of the Parks Reports did not make use of the baselines of the 1997 Report, making it difficult to determine how the state of the parks had changed. While Parks Canada has implemented a system-wide ecological monitoring and reporting program based on 6 to 8 key indicators that will be monitored in each park (Ibid, 2005), it has not developed the same for economic indicators.

For these reasons, Parks Canada should provide more continuity between reports by using baselines and benchmarks more consistently as a means of reporting changes and trends in the state of parks over time (OAG, 2005). As shown by this study, WTP values can be estimated and used as an economic indicator for determining the relative importance of the values and opinions that Canadians have for their national parks. Although the values presented in this research study were for the national park system, a similar CVM approach could be used to explore visitor and non-visitor values and opinions at the park level. It is therefore recommended that Parks Canada undertake routine and more sophisticated explorations using WTP estimates as a metric for comparison. WTP values should be part of the suite of social science measuring indexes such as satisfaction scores, level of agreement and Likert scales. These values can be assessed on how they change over time and in relation to outcomes of park management decisions. Efforts should also be made to utilize question design and wording so survey results and WTP values can be easily compared with those of other park jurisdictions.

6.5 c) ii) Manage parks to first ensure ecological integrity (non-use) values, then encourage recreation (use) values

Given that non-use values dominated the predictor variable list for WTP a specified amount, Parks Canada should interpret this as another indication that Canadians largely support the notion of managing national parks to protect ecological integrity - not for creating 'wilderness recreation theme parks'. Use values, especially for commercial activities, were not the main variables that influenced the WTP values. Although respondents who had visited a national park within the past 3 years had a higher WTP than those respondents who had visited later or had never visited a national park, the amount that non-visitors were WTP was only about 5% less than the amount for respondents who had visited a national park more than 3 years ago, and only 17% less than respondents who had visited a park in the past 3 years. This finding suggests that non-visitors do have a significant 'non-use' value for national parks. Hence, it is recommended that Parks Canada encourage visitor activities and use levels within the park constraint of maintaining ecological integrity. As well, Parks Canada should monitor and incorporate use and non-use values into the decision-making process to reflect the interests of all Canadians.

6.5 c) iii) Exploit opportunities to expose Canadians to information about national parks, Parks Canada and marine conservation areas

The final regression models suggested that some of the most important variables for predicting WTP are under considerable Parks Canada influence to change. These include the level of exposure to information about national parks and the level of exposure to information about Parks Canada. Parks Canada should expand their communication efforts to help build and maintain its public support. As well, it should highlight to the public the non-use and use values it serves to advocate and protect for the Canadian public.

While less than 16% of respondents reported having no exposure to information regarding national parks or Parks Canada in the past year, about 37% reported having no exposure to Canada's national marine conservations in the past year. Given that only 2 of 29 marine natural regions are represented by a National Marine Conservation Area (NMCA), it is recommended that Parks Canada make more of an effort to promote NMCAs to try and build comparable public and political support for them as exists for the national parks. Increasing the level of awareness may facilitate the progress of the NMCA program.

6.5 c) iv) Examine reasons why WTP values differed by region and community size

The discovery that Ontarians and Albertans and respondents who lived in rural communities had the highest WTP probabilities is also worthy of further investigation. A better understanding of the basis for their higher level of support for national parks may help reveal what strategies can be developed to build equivalent support in other regions and community types. As noted by Gunning-Traunt (1996), an improved strategy to build support for national parks would be especially useful in Quebec where, despite its ranking third in terms of WTP values, six of the eleven ecological regions that lack representation with a national park are located.

6.5 c) v) Examine influence of household language on support for national parks

The discovery that households which spoke 'Other' languages, besides French or English, were willing to contribute the most to the national parks fund, and that French-speaking households were willing to contribute the least amount to the fund, is also worthy of further investigation by Parks Canada. Given the increasing reliance on immigrants to augment Canada's low birth rate and aging population, it is imperative that Parks Canada be aware of how cultural differences are impacting the appreciation and support for national park values, policies and programs.

6. 5c) vi) Examine influence of age on support for national parks

Both final regression models indicated that the respondents' willingness to contribute to the non-profit fund for Canada's national parks decreased by about 2% to 4% for each decade between 20 and 80 years of age. Parks Canada should consider what this finding may suggest in terms of public and private support for national parks given the aging population of Canada. Research investigating the interest and preferences for national parks among older population cohorts could help Parks Canada prepare for future demographic trends in the Canadian population. If older Canadians are less able or willing to support national parks through private and public financial contributions, there will undoubtedly be negative repercussions for park management decisions.

6.5 c) vii) Examine the influence of gender on support for national parks

The observation that male respondents had a higher probability of willingness to pay a specified amount than females suggests there may be opportunities to improve national park support by identifying the basis for this difference. For example, the gender bias observed by the WTP values from this study may reflect a gender bias in the way national park recreation opportunities are presented and perceived by women.

6.5 c) viii) Emphasize unique characteristics of national parks

The finding that respondents who felt national parks were 'unique' had a higher probability of being WTP an unspecified amount or bid amount than respondents who felt national parks were common has practical implications for Parks Canada management. It suggests that Parks Canada should strive to present to Canadians the 'uniqueness' of national park landscapes and visitor experiences rather than present parks as homogeneous product or 'theme park' environment that can be found elsewhere.

6.5) c) ix) Work with nature/wilderness protection organizations to encourage greater advocacy for national parks, but focus most effort on the general public

Respondents who volunteered their time and/or donated money to a nature/wilderness organization had a higher willingness to contribute to the national parks fund. However, even though almost 90% of respondents did not volunteer time for a wilderness/nature protection organization, they were still willing to show their support for these organizations through a moderately lower (11%) financial contribution. This finding suggests that while it is advantageous to work in concert with organizations that are supportive of national parks, the bulk of the support still comes from the large majority of persons who value national parks but have no affiliation with an organization to formalize their supportive behavior.

6.5 d) Broad Recommendations for Parks Canada

6.5 d) i) Develop a series of benchmark CVM surveys to calibrate less rigorous CVM survey efforts

Nunes (2002) underlines the suitability of CVM for decision-making, namely when evaluating different policy options under consideration. As recommended by the NOAA Panel (U.S. Dept. of the Interior, p.4609-4610), Parks Canada should produce a set of reliable 'reference surveys' to alleviate the current burden of proof on individual CVM surveys, and to calibrate surveys that do not fully meet the ideal conditions of CVM survey design. Once these benchmarks are available, they could be used as reference points for later CVM studies. For example, when a national park valuation is required, surveys could be used to elicit answers to questions like "Would you pay more, less, about the same to prevent this reduction in park quality than you would to prevent the reduction in park quality of Scenario A?" "Would you pay an amount to avoid this reduction in park quality that is between Scenario B and C?" "If so, is the amount much closer to B than C, closer to B than C, halfway between B and C, much closer to C than B,..."? These questions presumably would not be asked so schematically. Responses to such a study could then serve as a reliable source of information in the assessment of changes to park quality. These reference studies could further improve the reliability of CVM studies in park management. They could contribute to increased accuracy and reduced cost of subsequent valuation studies. In that sense, they can be regarded as an investment (Ibid, p.4611).

6.5 e) Recommendations for Academic Research

6.5 e) i) Conduct follow-up surveys to confirm research results, establish trend data and build upon thesis findings

As noted previously, this thesis is the first attempt to estimate the net benefits accruing to Canadians from their national parks. It is also one of the few applications of the CVM approach to valuing a national park system. Hence, there is great scope for improvement and understanding from further valuation research of Canada's system of national parks.

While this CVM research effort was by necessity a smaller component of a larger public opinion exercise, future research explorations may benefit from being solely dedicated valuation studies of Canada's national parks. A comparison of the results from this survey with data from more comprehensive valuation studies on the same subject matter would provide additional insight into the debates surrounding optimal survey format, ideal bid range values and consistency of predictor variables and WTP estimates. In so doing, a more complete examination of the importance and value of national parks to Canadians will have taken place that concomitantly addresses a multitude of concerns in the parks and economic valuation literature.

6.5 e) ii) Conduct research to understand the relationship between national parks and adjacent rural communities

If the definition of 'rural' can be considered to be all things 'non-urban', then national parks are truly an integral part of rural Canada. We now understand enough about ecology and ecological processes to know that national parks cannot exist as islands surrounded by a sea of development. The conservation biology goals inherent in national park designation force us to look to the lands outside the park, and to work with local residents to create a land-use vision for these buffer zones that can accommodate rural communities and biodiversity. Increasingly, the relationship between national parks and neighboring rural communities is a critical factor in achieving the sustainability goal for both park and rural community groups.

Development – good, bad and indifferent – has followed the establishment of national parks in rural areas. Since the establishment of Banff National Park in 1885, national parks have served as an important catalyst for local and regional economic development. Rural development and national parks have always been tied together. The future of Canadian national parks and rural communities proximal or adjacent to them is, and will, continue to be intertwined. This is because the growth or change of these 'park gateway' communities has a powerful influence on park resources, management and visitors' experiences (Machlis and Field, 2000). Parks provide an important component of attraction and vitality within rural communities and, since parks are largely managed to preserve their natural state, they may provide protected area benefit flows for the indefinite future. Thus, parks truly provide an opportunity for viable and sustainable development in many rural communities.

However, despite their contribution to rural communities that are proximal to national parks, the role of Canadian national parks in rural planning and development has yet to be defined and examined, and the impact of rural development on national parks still needs to be comprehensively explored. To date, the role of national parks as a rural development tool in Canada has been largely overlooked. Typically, rural communities are associated with agricultural or resource extraction as the economic base and the contribution of national parks as a centerpiece for rural development - as engines of change in local economies or as elements of rural planning and development strategies - is relatively unstudied by the social science community. Ironically, as shown in Chapter 3, the majority of research and policy that does link rural development and national parks comes from outside North America. In particular, research and policy in Latin America, Africa, Asia and Europe describe more thoroughly the interplay of national parks in local and regional economic strategies.

In regard to Canada's national parks, a host of rural development and resource management questions remain unanswered. For example, how important is the park resource in attracting tourism? What aspects of the parks are most valued by visitors? How does park management affect tourism values? Environmental resources such as forests, mountains, and water bodies provide non-market open space inputs into the tourism production process (Marcouiller, 1997). These latent inputs appear critical to rural nature-based tourism, yet resource managers have only anecdotal information on which to tailor their development activities. The assessment of linkages is needed to better inform decision making in resource management and community development.

Thus, the opportunity exists for developing a broad-based research effort on national parks and rural development. This would be useful for ensuring both healthy parks and vibrant local economies.

6.5 e) iii) Explore the potential 'embedded effect' of national park valuation studies

According to the descriptive statistics, about 9% of 2005 Survey and 7% of CVM respondents mistakenly cited Ontario's Algonquin Provincial Park as the last national park they visited. This finding raises the following questions: 'To what extent do WTP values depend on which agency manages a protected area?' and 'How are WTP values influenced by respondent knowledge about details of a park or the park system?' If respondents are unable to differentiate between provincial and national parks or between specific park locations, then what is the correct 'margin' or 'level of resolution' for asking WTP and other park system-related questions? Are the WTP values for other park and protected area jurisdictions part of the value that respondents expressed for the national parks? Further exploration of these questions is warranted to clearly attribute the benefits of parks to their appropriate jurisdiction.

6.6 LIMITATIONS OF THIS STUDY

Although the economic valuation of national parks provides useful information to park and policy officials, they should also be aware of its limitations. It is important to consider other approaches to valuation because differences in the monetary wealth of individual households means that the exclusive use of 'dollar values' can be extremely misleading. This is because 'willingness to pay' is dependent on 'ability to pay'. Thus, poorer households are disadvantaged in expressing their importance for goods and services using a monetary metric. For example, national parks may be the only source of employment in a remote area, or may provide a crucial source of animal protein in local diets. Converted to dollar values, such measurements may appear trivial in economic terms, but their loss could be devastating to large numbers of people (United Nations Environmental Program Convention on Biodiversity, 2003). For these reasons, many Canadians may prefer that national park resources be allocated using political, ethical and cultural criteria rather than reference to a single, one-dimensional monetary measure and a poorly understood economic efficiency concept.

While the valuation process can facilitate national park decisions, as noted previously, it should not be the sole criterion for management action for the following reasons. Firstly, governments and other agents involved in the development process may have other goals that supercede or compromise the economic imperative. Secondly, the use of economic efficiency assumes that the prevailing distribution of income is socially acceptable - since it is that distribution that determines the WTP measures. Thirdly, as was commented previously, the discount rate used to convert future benefit and cost streams to current dollar values may bias the outcomes in favour of present and against future generations.

There are also some limitations to this thesis that pertain to the CVM survey instrument and research design. In spite of satisfactorily answering the research questions, it is possible that responses may have been improved had the CVM survey been a stand-alone valuation study and not part of a broader opinion poll. For example, an academic-sponsored and dedicated survey would have enabled a more extensive probing of the underlying motivations driving the WTP values and allowed the use of a survey design that was more consistent with the NOAA Panel recommendations. As well, it would have enabled greater control of survey design, pretesting, implementation protocol and data processing.

Another limitation that arose from this thesis research being part of a bigger study is related to the target population. The Parks Canada 2005 Survey sample was designed to be representative of the demographic characteristics of the Canadian population - not the demographic characteristics of Canadian households. Since the most appropriate unit for aggregating the WTP values to the non-profit fund was the household - not the individual person - a sampling strategy based on the Canadian household demographics may have been more appropriate for this study.

While for most demographic variables the CVM survey population mirrored that of the Canadian population, this was not the case for some income and education categories. As noted previously, in comparison to the Canadian population, both the 2005 Survey and CVM sub-sample populations had a significantly larger proportion of persons with some university/college education (about 15% versus 32%, respectively). As well, the 2005 Survey and CVM survey populations had a higher proportion of persons in the $40,000 to $74,000 income category (about 45% versus 31%, respectively). These differences may have had implications on the survey results.

In terms of the survey instrument, as noted previously, the responses to a few of the questions suggest there were some problems with the question wording. While this finding is not unusual for most surveys, it could have been further minimized by better feedback during the pretest and early survey implementation period.

Another possible limitation of this study was the functional form specified for the logit model. A linear utility-theoretic model was specified which assumes income effects to be negligible. Although the WTP results for both the parametric and non-parametric results were similar, an alternative functional form which considers income effects, such as the logarithmic form specified by Hanemann (1984), may have even better aligned the parmetric and non-parmetric WTP estimates.

The option of a one-time or annual donation as an expression of WTP was also somewhat problematic. While pretesting suggested respondents preferred this option, it made aggregating the values more difficult and speculative.

Lastly, the higher mean and median WTP values for the open-ended valuation question format and the 'end effect' and 'pooling' of responses to the double-bounded valuation question format suggest that the bid range for the CVM questions was biased to the low range of possible bid values. Thus, the WTP values may be overly conservative estimates of the net benefits that Canadians receive from their national parks.

6.7 CONCLUSIONS

In 1915, when James B Harkin, the first commissioner of Canada's National Park Branch, stated that mountain scenery was worth $13.88 per acre compared to $4.91 per acre of prairie farmland, he was making his point about the value and importance of national parks in a way that parliamentarians could understand and could take to the electorate (Foster, 1978). Largely because of Harkin's statistics, parliamentarians rose in the House of Commons time and again to defend their government expenditures on national parks. Ninety two years later, that lesson and strategy of demonstrating in clear terms the importance of parks to Canadian society is needed again.

In a similar manner to that of Harkin, this study was a small but significant 'first-step' to examine the value and importance to Canadians of the benefits associated with Canada's national parks. While valuation exercises for select park values or individual parks can be found, this was the first large-scale valuation exercise of the Canadian national park system. It was also the first attempt to use a telephone survey for the distribution of a Parks Canada contingent valuation experiment. Since it was part of a much larger study, the valuation component had to be as concise as possible. This minimalist approach also provides some new insights regarding the design of a contingent valuation questionnaire.

This study provided both qualitative and quantitative evidence that supports the anecdotal evidence of the importance of Canada's national parks to Canadian society. It shed some light on the various characteristics and underlying values that influence public support for national parks. As well, the approach and monetary values derived from this research provide a useful indicator and estimate of the relative importance of national parks to Canadian society.

The natural landscapes protected by Canada's national parks permits Canadians, and visitors from around the world, to be at ease with the natural world in a harmony we do not completely understand. Our national parks are evidence that Canadians believe that some landscapes are so important, some values so eternal, that they must be part of the legacy we pass on to future generations. To compromise this legacy to meet the needs of the current generations would be to abuse our trust responsibilities to future generations and to the species that share the planet with us. If, through the lack of a coordinated approach to resolving the issues of park management and rural communities, we allow our parks to become environmentally impoverished, we will be guilty of not exercising appropriate stewardship of the national park legacy that we have received from previous generations. These sentiments are echoed in the Parks Canada Corporate Plan (Parks Canada Agency, 2004a) which states that: "*Parks Canada will only be successful in safeguarding Canada's national treasures for future generations if it is successful in engaging more and more Canadians in valuing, experiencing, protecting and presenting those treasures*".

Valuing Canada's national parks, based on the full range of use and non-use benefits that they provide, will help Parks Canada managers, regional planners and policymakers set priorities to ensure that healthy ecosystems, sustainable rural communities, and appropriate visitor services are provided and maintained. As well, it will facilitate the development of planning frameworks that can better anticipate and adapt to an ever-changing policy environment while ensuring that Canadians receive the highest possible visitor and non-visitor benefit flows from their tax dollars spent on national parks. In so doing, the national park interests of all Canadians can be more rationally and democratically fulfilled - so as to leave these icons of our natural heritage truly unimpaired for future generations.

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Appendix 1.

2004 FUNDING FOR PARKS CANADA AGENCY AND NATIONAL PARKS

APPENDIX 1. 2004 FUNDING FOR PARKS CANADA AGENCY AND NATIONAL PARKS

Q-1: How much of a federal tax dollar goes to: a) Parks Canada Agency and b) only to national parks?

Solution to Q-1: Given the following in 2004....

Net cost of Parks Canada Program (2003-04) was $511,953,000 (see Planned versus Actual Spending by Business Line in Parks Canada Agency Annual Report 2003-04 at http://www.pc.gc.ca/docs/pc/rpts/rp-pa-2003-2004/sec5-/page4b_e.asp)

Revenues were $85,589 (see Respendable Revenues in Parks Canada Agency Annual Report 2003-04 http://www.pc.gc.ca/docs/pc/rpts/rp-pa-2003-2004/sec5-/page7b_e.asp

However, the revenues are not 'respendable' and not deducted from the cost of the program. (see Planned versus Actual Spending by Business Line in Parks Canada Agency Annual Report 2003-04 at http://www.pc.gc.ca/docs/pc/rpts/rp-pa-2003-2004/sec5-/page5b_e.asp).

Therefore, instead of Parks Canada costing the taxpayer $426,364,000 (which is $511,953 - $85,589), the **cost of all Parks Canada programs is left at $511,953,000.**

The amount spent on national parks was about $250,000,000.[12]

In 2004, the federal government spent $189,463,882,000 (see Table 1. Statement of Revenue and Expenses in Public Accounts of Canada, 2003-04. Summary Tables 1.3).

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[12] Personal conversation with Paul Hartley (Chief of Financial Planning and Resource Utilization) and Michel D'Amour (Finance Officer) for the Parks Canada Agency Finance Department.

Answer for Q1-a): **($511,953,000/$189,463,882,000) X 100 = 0.2702114 % of total expenditures = about 0.270 cents per 100 cents (or per dollar)**

Thus, about one-quarter of a penny for each income tax dollar goes to Parks Canada Agency.

Answer for Q1-b): **($250,000,000/$189,463,882,000) X 100 = 0. 131951271 of total expenditures = about 0.132 cents per 100 cents (or per dollar)**

Thus, less than one-seventh of a penny for each income tax dollar goes to the national parks.

Appendix 2.

SUMMARY TABLE OF CVM STUDIES OF NATIONAL PARKS

APPENDIX 2. SUMMARY TABLE OF CVM STUDIES OF NATIONAL PARKS

Title/Author	Good Valued	Methodology	Payment Vehicle	Dependent Variable (WTP) Results	Independent Variables	Main Conclusions
Gunning-Traunt, C. (1996). *"Measuring the Existence Values of National Parks in the Northwest Territories"*.	Existence values for 4 and 10 national parks in Canada's far north	Double-bounded dichotomous choice (DC) mail survey of Canadians	One-time surtax	51% of respondents (260 persons for 10 park study and 259 persons for the 4 park study) were WTP some amount. Mean WTP of \$244/household and \$279/household for 4 and 10 parks, respectively	Income, age, education, household size, single family home, gender, Province, French speaking, awareness of national park system, charitable donations	N= 508 (54% response rate) Bid amt, language spoken, per capita income and opinion about whether Canada's 39 natural regions should be in the park system were the best predictors of WTP. Aggregate existence value for creation of the 4 parks was \$2.8 billion and 3.2 billion for the 10 park proposal.
Adamson-Badilla M. and F. Castillo. (1998). *"Using Contingent Valuation to Estimate Prices for Non-Market Amenities Provided by Protected Areas"*	Recreation use value for park visit (i.e. consumer surplus)	Dichotomous choice (DC) CVM of national and local park visitors	Entrance fee	Mean WTP was \$12 and \$6 for foreigners and locals, respectively	Education, income, nationality, membership to environmental organization, previous park visit	N = 1,283 (57% response rate) Given the current entry fee of \$6 for foreigners and \$2 for locals, the study concluded the park loses about 50% of the amenity economic value derived from the park.

APPENDIX 2 (*continued*). SUMMARY TABLE OF CVM STUDIES OF NATIONAL PARKS

Author/Title	Good Valued	Methodology	Payment Vehicle	Dependent Variable (WTP) Results	Independent Variables	Main Conclusions
Thur, S.M. (2003). "*Recreational Benefits in Coral Reef Marine Protected Areas: An Application to the Bonaire National Marine Park*".	Recreation use value for park visit (i.e. consumer surplus)	Dichotomous choice (DC) and payment card (PC) CVM study of scuba divers	Dive tag fee	Mean WTP was US$111 for the DC format and US$61 for the PC format.	Age, gender, income, number of previous Park visits, number of dives on last trip, lifetime number of dives	N = 211 (75% survey response rate) Annual recreation benefits for scuba diving of between US$3.1 million (for DC model) and US$1.7 million (for PC model).

APPENDIX 2 (*continued*). SUMMARY TABLE OF CVM STUDIES OF NATIONAL PARKS

Author/Title	Good Valued	Methodology	Payment Vehicle	Dependent Variable (WTP) Results	Independent Variables	Main Conclusions
Rashev, B. (2003). *"Alternative Economic Valuation of Pirin National Park, Bulgaria".*	Combined recreational use, option, existence and bequest values	CVM of Bulgarian visitors (interview format) and non-visitors (internet format). Payment card used for both surveys.	Combined entrance fee and tax increase	About 60% of respondents were WTP some amount for nature conservation. About 93% agreed to pay some amount as an entrance fee and 87% as a tax increase. No statistical difference between mean WTP for interview and internet survey formats. Average consumer surplus of $42 per visitor and $16 per non-visitor.	Attitude towards nature, attitude towards Park preservation, reason for/against WTP (i.e. option value), gender, age, education level, household size, number of children, net monthly household income	N = 159 interview survey (88% response rate), 845 internet survey (63% response rate). Park total consumer surplus = $50.6 million of which $47.4 million/yr is from non-use) values.$3.2 million/yr from Park visitors (i.e. recreation use values). Benefit cost ratio 65:1. Respondents ranked existence and bequest values higher than use values. Education, age and attitudes toward the Park were poor predictor variables because of lack of variability. WTP increased with income. feeling Park had no substitute and positive attitude towards nature conservation. Income and education of respondents was higher and age lower than the national average.

APPENDIX 2 (*continued*). SUMMARY TABLE OF CVM STUDIES OF NATIONAL PARKS

Author/Title	Good Valued	Methodology	Payment Vehicle	Dependent Variable (WTP) Results	Independent Variables	Main Conclusions
Bateman, I.J. and I.H. Langford. (1997). *"Non-users' Willingness to Pay for a National Park: An Application and Critique of the Contingent Valuation Method"*.	Non-user values	CVM mail survey of British households (open-ended format)	Tax increase	About 54% (166) of the respondents were WTP some amount. Whole sample mean WTP of \$53. Lump sum WTP mean of \$117.	Age, income, recreational interests, previous Park visits, expenditure, residence distance from Park, nature organization membership	N =310 (31% response rate) Higher income than general population, sample biased toward those with interests in the type of recreation offered at the Park. Non-visitors had about 50% lower WTP values than visitors. Best WTP predictor variables were distance and annual spending on countryside recreation/preservation. No aggregation of values reported because of biased sample. A flood alleviation plan with these CVM estimates produced a benefit-cost ratio of about 2:1.

APPENDIX 2 (*continued*). SUMMARY TABLE OF CVM STUDIES OF NATIONAL PARKS

Author/Title	Good Valued	Methodology	Payment Vehicle	Dependent Variable (WTP) Results	Independent Variables	Main Conclusions
Lee, C-K. and S-Y. Han. (2002). *"Estimating the use and preservation values of national parks' tourism resources using a contingent valuation method".*	Recreational use and combined non-use values (i.e. option, existence and bequest values) for the Korean national park system	Dichotomous choice CVM of Korean visitors to five national parks (interview format)	Combined entrance fee and tax increase	Estimated WTP for park admission fee (i.e. use values): US$5 to US$14 . Estimated annual WTP per person for tax increase (i.e. non-use values): US$11 to US$14	Bid amount, income, education, gender, age, environmental attitude, "pull factor" of 12 characteristics of national parks such as attractiveness and accessibility.	N = 2,300 Best WTP predictor for use value was bid amt, pull factor, education, age and gender. Best predictor variables for WTP for non-use values was bid amt. Other variables not significant. Could justify raising fees and taxes for additional funding
Jerrell, R. (1995). *"Willingness to Pay for Desert Protection".*	Total Economic Value for 3 new national parks and 76 new wilderness areas in the Mohave Desert (California)	Single and double-bounded dichotomous choice CVM of California households. Mail survey format	Combined tax increase and mineral price increase	26% of respondents WTP some amount. The single and double-bounded CVM yielded annual household WTP values of US$84 to US$101, respectively.	Bid amount, income, education, participation in outdoor recreational activities, environmental organization membership, desert residency	N = 356 (38% response rate). TEV of enhanced desert protection worth US$177 million to US$448 million/yr to Californians. Best WTP predictors were bid amt, membership in environmental group, participation in outdoor recreational activities. Income, desert residency, and education not significant variables.

APPENDIX 2 (*continued*). SUMMARY TABLE OF CVM STUDIES OF NATIONAL PARKS

Author/Title	**Good Valued**	**Methodology**	**Payment Vehicle**	**Dependent Variable (WTP) Results**	**Independent Variables**	**Main Conclusions**
Nunes, P. (2002a). *"Using Factor Analysis to Identify Consumer Preferences for the Protection of a Natural Area in Portugal".*	Total Economic Value for Parque Natural Alentejano e Costa Vicentina	Double-bounded dichotomous choice CVM with open-ended follow up. Interview survey of Portugese citizens.	Donations to a dedicated park protection fund.	Mean WTP estimates for the wilderness area and recreation area protection programs were about $75 and $58 per household/year.	Age, income, urban or rural residency, social concerns, environmental concerns, knowledge of protected areas, concerns about parks, prior visits to park, gender, education, career, charitable donations, environmental organization membership.	N = 1,678 (47% response rate) Aggregate recreational use value of $104 million and non-use value of $136 million for the park. Best WTP predictor variables were bid amt, age (between 18 and 39 years), income, urban residency, 'warm glow' factor of giving to a cause.

APPENDIX 2 (*continued*). SUMMARY TABLE OF CVM STUDIES OF NATIONAL PARKS

Author/Title	Good Valued	Methodology	Payment Vehicle	Dependent Variable (WTP) Results	Independent Variables	Main Conclusions
Mathieu, L.F., *et al.* (2003). *"Valuing Marine Parks in a Developing Country: A Case Study of the Seychelles".*	Recreational use value (consumer surplus)	Payment card CVM. Interview format	Entrance fee	96% (289) of tourists WTP some amount. Mean WTP of US$12.20 for the entrance fee. Consumer surplus of US$2.20 per tourist per park visit.	Age, income, education, environmental group membership, expectations, motivations for WTP, attitudes about park protection, country of origin, recreation activity in Seychelles.	N = 300 (response rate) Best WTP predictors were visitor expectations (i.e. good diving), attitudes about park protection, country of origin (i.e. U.K., Russia, Italy), reason for visit, motivations for WTP (i.e. for future generations, for conservation/protection) and recreation activity (i.e. glass bottom boat trips, trips to Ile Coco National Park). Demographic variables (i.e. age, sex, income and education) were not significant. Consumer surplus of US$88,000 per year for these types of recreational uses. Concluded that park entrance fees could be increased without sharp reductions in visitation.

APPENDIX 2 (*continued*). SUMMARY TABLE OF CVM STUDIES OF NATIONAL PARKS

Author/Title	Good Valued	Methodology	Payment Vehicle	Dependent Variable (WTP) Results	Independent Variables	Main Conclusions
Hadker N.S., *et al.*(1997). *"Willingness to pay for Borivli National Park: Evidence from a Contingent Valuation"*.	Recreational use and combined non-use values (i.e. option, existence and bequest values).	Double-bounded dichotomous choice CVM with open-ended follow up. Interview survey of Bombay residents.	Monthly increase in household costs for the next 5 years.	73% of respondents WTP some amount. Mean WTP of $0.55 per person per month.	Age, gender, education level, occupation, income, residence location, years of residency, household size, environmental value scale, attitudes about development vs. environment, previous Park visits, knowledge of Park environmental issues. willingness to volunteer for Park (if zero WTP), preferred payment vehicle. household source for WTP contribution.	N = 494 (89% response rate). Present spending on Park is $0.5 million per year. Aggregated WTP = $6.5 million per year (net present value of $27.3 million over 5 years). Best predictor variables of WTP were education level, environmental value scale (i.e. characteristics of Borivli that are important to respondent), occupation, attitudes about development vs. the environment and visitation frequency. Income elasticity of demand was almost zero. (i.e. demand for the Park was invariant with income).

APPENDIX 2 (*continued*). SUMMARY TABLE OF CVM STUDIES OF NATIONAL PARKS

Author/Title	Good Valued	Methodology	Payment Vehicle	Dependent Variable (WTP) Results	Independent Variables	Main Conclusions
Kosz, M. (1996). *"Valuing Riverside Wetlands: The Case of the Donau-Auen National Park".*	Recreational use and combined non-use values (i.e. option, existence and bequest values).	Open-ended CVM interview survey of Austrian residents	Annual tax increase	30% of respondents (287) WTP some amount. Mean WTP of $37/person/year for the 11,500 ha. park alone. WTP of $14 and $8 for the 9,700 ha. and 2,700 ha. parks and hydro projects.	Preferences for overall protection of nature, park area visitation, WTP entrance fee, motives for payment (i.e. bequest, option, existence values), education, residency, acceptance of hydro power station, plan to visit park, outdoor sport participation, income, children, employment s enthusiast	N = 962 Net present value (NPV) for park alone = $1.3 million. Distribution of WTP for park between existence, option and bequest value was 51%, 37% and 12% , respectively. NPV for 9,700 ha. park and power station = $1.8 million. NPV for 2,700 ha. park and power station = $4.2 million. If WTP $44/person/yr. instead of $37/person/yr, NPV for 11,500 ha. park would equal NPV for 2,700 ha. park and hydro project. Best predictor variables for WTP unspecified amount were employment, education, residency, children, Best predictors of WTP were employment, age, income, children, residency, plan for future visit.

Appendix 3.

PARKS CANADA 2005
NATIONAL PUBLIC OPINION SURVEY

APPENDIX 3. PARKS CANADA 2005 NATIONAL PUBLIC OPINION SURVEY

Environics Research Group.
March 10, 2005

Parks Canada
2005 National Public Opinion Survey

DRAFT 7.1 Questionnaire

[questions coded by A,B,C, M, X sample - guide at. end of form]

Introduction

Good morning/afternoon/evening. My name is ______________ and I am calling from Environics Research Group, a public opinion research company. We are conducting a study to find out what people think about some important issues facing Canada's natural environment and historical places. Please be assured that we are not selling or soliciting anything. This survey is registered with the national survey registration system.

IF ASKED: The survey will take about 20 minutes to complete
IF ASKED: I can tell you at the end who sponsored this survey

IF ASKED: The registration system has been created by the Canadian survey research industry to allow the public to verify that a survey is legitimate, get information about the survey industry or register a complaint. The registration systems toll-free telephone number is 1-800-554-9996.

We choose telephone numbers at random and then select one person from each household to be interviewed. To do this, we would like to speak to the person in your household, 18 years of age or older, who has had the most recent birthday. Would that be you?

IF PERSON SELECTED IS NOT AVAILABLE, ARRANGE FOR CALL-BACK
IF PERSON SELECTED IS NOT AVAILABLE OVER INTERVIEW PERIOD, ASK FOR PERSON WITH NEXT MOST RECENT BIRTHDAY

ASK: Would you prefer to be interviewed in English or French?

A. Importance of Canada's Natural and Cultural Resources

I'd like to start out with a few questions about Canada's natural areas and wilderness . . .

1A. For each of the following statements, please tell me if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree?
READ AND ROTATE

a. It is important that Canada protect its natural areas and environment

b. It is important that Canada protect its lakes and oceans

c. I am currently concerned about threats to Canada's natural areas and environment

d. I consider the time I spent in natural or wilderness areas a very important part of my childhood

e. I want natural areas and wilderness to be available to my children and grandchildren

f. It is important that the stories of Canada's natural areas, wildlife and environment be passed on to future generations.

01 – Strongly agree
02 – Somewhat agree
03 – Somewhat disagree
04 – Strongly disagree
VOLUNTEERED
05 – Neither agree/disagree
99 – DK/NA

2B. Please tell me how much responsibility each of the following should have for the protection of natural areas and wilderness: a lot, some, a little, or none?
READ AND ROTATE

a. The federal government

b. Your [provincial/territorial] government

c. Private industry

d. Local communities

e. Not for profit environment and wildlife conservation groups

f. Individual Canadians

01 – A lot
02 – Some
03 – A little
04 – None
VOLUNTEERED
05 – Depends
99 – DK/NA

Turning now to Canada's past and history . . .

3A. Please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each of the following statements:
READ AND ROTATE.

a. Canada's history is very important to me

b. It is important that Canada protect its significant historic places

c. It is important that Canadians be told important stories about the country's past

d. It is important that the stories of Canada's history be passed on to future generations

e. The Canadian history that I learned as a youth is very meaningful to me today.

01 – Strongly agree
02 – Somewhat agree
03 – Somewhat disagree

04 – Strongly disagree
VOLUNTEERED
05 – Neither agree/disagree
99 – DK/NA

4C. Please tell me how much responsibility each of the following should have for the conservation of the country's historic places: A lot, some, a little, or none?
READ AND ROTATE

a. The federal government

b. Your [provincial/territorial] government

c. Private industry

d. Local communities

e. Not for profit heritage conservation groups.

f. Individual Canadians

01 – A lot
02 – Some
03 – A little
04 – None
VOLUNTEERED
05 – Depends
99 – DK/NA

5A How much do you trust each of the following as a protector or steward of Canada's natural and cultural heritage? Starting with ____, would you trust it a great deal, somewhat, only a little, or not at all?
READ IN SAME SEQUENCE AS Q.2B OR 4C, WITH E. ALWAYS AT THE END

a. The federal government

b. Your [provincial/ territorial] government

c. Private sector companies

d. Not for profit environmental, wildlife or heritage conservation groups

e. Parks Canada

01 – Trust a great deal
02 – Trust somewhat
03 – Trust only a little
04 – Trust not at all
VOLUNTEERED
05 – Depends
99 – DK/NA

B. Parks Canada

I will now turn to a few questions about the organization Parks Canada.

11A. To the best of your knowledge, what does Parks Canada do?
DO NOT READ – CODE UP TO THREE RESPONSES; PROBE: Anything else?

01 – Operates/maintains parks
02 – Protects parks
03 – Establishes/designates new parks
04 – Protects natural environment
05 – Provides opportunities to learn about natural environment
06 – Operates historic sites
07 – Establishes/designates new historic sites
08 – Protects cultural heritage/Canadian history
09 - Provides opportunities to learn about cultural heritage / Canadian history
10 - Offers recreation opportunities (camping etc)
11 - Establishes/designates national marine conservation areas
12 - Restores natural environments
13 - Restores historic places
14 - Never heard of Parks Canada
98 - Other (SPECIFY____________________)
99 – Don't know
96 – No answer

12A. What is the <u>symbol</u> or corporate logo of Parks Canada?
DO NOT READ – CODE ONE ONLY

01 – Beaver
02 – Maple leaf
03 – Other animal or fauna
04 – Other flora or plant
98 – Other (SPECIFY ____________________)
99 – Don't know
96 – No answer

6A. Please tell me whether you strongly support, somewhat support, somewhat oppose or strongly oppose the use of your tax dollars by the federal government for each of the following:
READ AND ROTATE BETWEEN AND WITHIN BLOCKS A-D and E-H

a. Complete the system of national parks

b. Maintain existing national parks

c. Educate the public on issues related to the natural environment

d. Increase the use and enjoyment of the country's national parks

e. Increase the number of national historic sites

f. Maintain existing historic sites

g. Educate the public on issues related to Canada's historic places

h. Increase the use and enjoyment of the country's national historic sites

01 – Strongly support
02 – Somewhat support
03 – Somewhat oppose
04 – Strongly oppose
VOLUNTEERED
05 – Depends
99 – DK/NA

7B. Please tell me whether you strongly support, somewhat support, somewhat oppose or strongly oppose increasing government funding for the conservation of <u>natural areas and wilderness</u> in Canada's national parks

01 – Strongly support
02 – Somewhat support
03 – Somewhat oppose
04 – Strongly oppose
VOLUNTEERED
05 – Depends
99 – DK/NA

8C Please tell me whether you strongly support, somewhat support, somewhat oppose or strongly oppose increasing government funding for the conservation of <u>Canada's national historic sites</u>

01 – Strongly support
02 – Somewhat support
03 – Somewhat oppose
04 – Strongly oppose
VOLUNTEERED
05 – Depends
99 – DK/NA

9A. Before today, how much have you heard, read, seen or talked about the following in the last year: a lot, some, a little, nothing.
KEEP a. FIRST; READ AND ROTATE b. to f. - REPEAT SCALE AS REQUIRED

a. Parks Canada

b. National Parks of Canada

c. National Historic Sites

d. National Marine Conservation Areas

e. Historic Canals and Waterways

f. World Heritage Sites

01 – A lot
02 – Some
03 – A little

04 – Nothing.
VOLUNTEERED
99 – DK/NA

10A. (ASK IF CODE A LOT OR SOME FOR 9a, - OTHERS GO TO Q.11A) In the previous question, you mentioned hearing, reading, seeing or talking (a lot OR some FROM Q.9) about the organization Parks Canada in the past year. Could you tell me what subjects or topics concerning Parks Canada were discussed.
DO NOT READ – CODE UP TO THREE RESPONSES

01 – Research done by Parks Canada
02 – Efforts to protect the environment
03 – Efforts to protect Canadian historic places
04 – Educational efforts about natural environments/parks
05 – Educational efforts about history/historic sites
06 – Regular reports issued by Parks Canada
07 – A strike by Parks Canada workers
08 – Creation of new parks (e.g. in Nunavut or Labrador)
09 – Creation of new historic sites
10 – Creation of new marine conservation areas
11 – State/Condition of national parks/national historic sites
12 – Public safety/accidents
13 – Canal-related issues
14 – Specific mention of Parks Canada issues in newspaper articles
15 – Fires in national parks
16 – Environmental restoration efforts in national parks
17 – Fee increases
18 – Avalanches
19 – Travel, tourism or visitation related
98 – Other (SPECIFY ______________________)
99 – Cannot recall
96 – No answer

C. National Parks

13A. Now, thinking about visits to National Parks. Have you ever visited a national park?

01 – Yes	
02 – No	SKIP TO Q.18B
99 – DK/NA	SKIP TO Q.18B

14A. When did you last visit a national park? Was it in:
READ IN SEQUENCE – CODE ONE ONLY – PAUSE AFTER READING EACH RESPONSE

01 – 2004
02 – 2003
03 – 2002, or
04 – As an adult but before 2002
VOLUNTEERED
05 – As a child or youth
06 - 2005
99 - Cannot recall/NA

15A. Did you ever visit a national park as a child or youth?

IF VOLUNTEERED IN Q.14A, RECORD AS "YES"

01 – Yes
02 – No
99 – Cannot recall/NA

16A. (IF VISITED IN 2003 or 2004 IN Q.14A) What was the <u>name</u> of the last national park you visited?
SPECIFY – CODING TO BE DONE WITH LIST POST-FIELD

____

99 – Cannot recall
96 – No answer

17A. (ASK IF VISITED AS ADULT IN Q.14A) During your adult life, have you visited national parks:

01 – Frequently
02 – Occasionally, or
03 – Rarely
VOLUNTEERED
99 – DK/NA

18B. I will read you a list, and for each pair of words in the list, I would like to know which one word most fits with your impression of <u>Canada's national parks</u>. Starting with:
READ AND ROTATE ORDER OF PAIRS; ROTATE ORDER OF WORDS IN EACH PAIR

a. <u>Fun</u> or <u>Dull</u>

   01 – Fun
   02 – Dull
   VOLUNTEERED
   03 – Neither
   99 – DK/NA

b. <u>Hard to get</u> or <u>to Easy to get to</u>

   01 – Easy to get to
   02 – Hard to get to
   VOLUNTEERED
   03 – Neither
   99 – DK/NA

c. <u>Poor value</u> or <u>Good value</u>

   01 – Good value
   02 – Poor value
   VOLUNTEERED
   03 – Neither
   99 – DK/NA

d. <u>Relevant to you</u> or <u>Not relevant to you</u>

   01 – Relevant to you
   02 – Not relevant to you

VOLUNTEERED
03 – Neither
99 – DK/NA

e. Memorable or Forgettable

01 – Memorable
02 - Forgettable
VOLUNTEERED
03 – Neither
99 – DK/NA

f. Artificial or Authentic

01 – Authentic
02 – Artificial
VOLUNTEERED
03 – Neither
99 – DK/NA

g. Unique or Common

01 – Unique
02 – Common
VOLUNTEERED
03 – Neither
99 – DK/NA

19B. Thinking about why national parks might be important to you, please tell me your level of agreement with the following statements. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree that:
READ AND ROTATE

a. National parks improve the well-being of local communities

b. National parks are meant to be enjoyed by future generations as much as by people today

c. I would miss national parks a lot if they were gone

d. Every Canadian should visit a national park at least once in their lifetime

e. National parks provide opportunities for outdoor recreation like hiking and camping.

f. National parks provide a place to learn about and understand nature.

g. National parks protect wildlife, habitat and help improve water and air quality.

h. Knowing that national parks exist is important to me, even if no one ever visits them

i. National parks create opportunities for tourism and local business

j. I want to be able to visit the national park of my choice in the future.

01 – Strongly agree
02 – Somewhat agree
03 – Somewhat disagree
04 – Strongly disagree
VOLUNTEERED
05 – Neither agree/disagree
99 – DK/NA

20B. What do you think is the greatest threat to national parks in Canada today?
DO NOT READ – CODE ONE ONLY

01 - Environmental pollution
02 – Encroachment/pressure from human populations (outside park)
03 - Commercial activity in the park
04 - Resource extraction
05 - Overuse
06 - Lack of public concern/interest
07 - Loss of natural habitat
08 - Lack of financial resources
09 - Lack of understanding
10 - Lack of political support
11 - Mismanagement / government interference
12 - Not enough employees
13 - None
98 - Other (SPECIFY ____________)
99 - Don't know
96 - NA / NR.

21X: Research suggests that current funding is not sufficient to maintain the national parks. As a result, the natural areas and visitor services in the parks may deteriorate. If a non-profit fund was created to raise additional money to help the national parks, would you be willing to make a contribution?

01 – Yes
02 – No SKIP TO Q.27X
99 – Uncertain/DK/NA SKIP TO Q.27X

22X. Would you be willing to make a contribution of $___ to this fund?
RANDOMLY ASSIGN ONE OF THE FOLLOWING AMOUNTS: $10, $20, $30, $40, $50, $60, $70 or $80. IF RESPONDENT ASKS WHETHER THIS IS A YEARLY OR ONE-TIME CONTRIBUTION, INDICATE: It's your choice", THEN RECORD RESPONSE IN Q.26X and CONTINUE WITH Q.23X or Q.24X

01 – Yes
02 – No SKIP TO Q.24X
99 – Uncertain/DK/NA SKIP TO Q.24X

23X. (IF YES TO Q.22X BUT NOT AT $80 LEVEL - $80 LEVEL SKIP TO Q.25X) Would you be willing to contribute $ ___ to this fund?
INSERT AMOUNT THAT IS $10 HIGHER THAN ONE INCLUDED IN Q.22X)

01 – Yes

02 – No
99 – Uncertain/DK/NA

SKIP TO Q.25X

24X. (IF NO/DK TO Q.22X BUT NOT AT $10 LEVEL - $10 LEVEL SKIP TO Q.25X) Would you be willing to contribute $ ___ to this fund?
INSERT AMOUNT THAT IS $10 LOWER THAN ONE INCLUDED IN Q.22X)

01 – Yes
02 – No
99 – Uncertain/DK/NA

25X. What would be the most you would be willing to contribute to this fund?
RECORD AMOUNT

$______
99999 – DK/NA

26X. Would this be a one-time or yearly contribution?

01 – One time
02 – Yearly
VOLUNTEERED
03 – Depends
99 – DK/NA

SKIP TO Q.28M

27X (IF NO/UNCERTAIN IN Q.21X) Can you tell me why you would not, or are unsure, about making a contribution to this fund?
DO NOT READ – CODE ALL THAT APPLY

01 - I want to have national parks, but I don't want to pay for them.
02 - I will not use these areas myself, so I don't want to pay for them.
03 - I object to the way the question was asked.
04 - The dollar amount was too high.
05 - I think Parks Canada gets enough money.
06 - I did not have enough information to answer "yes".
07 - I already pay too much in taxes.
98 - Other (SPECIFY________________________).
99 – DK/NA

28M. The governments of Canada and Manitoba are planning to create a new national park for this province.
Were you aware of the plan to establish a new national park?
01 – Yes
02 – No SKIP TO Q.30M
VOLUNTEERED

99 – DK/NA SKIP TO Q.30M

29M. Are you aware of any <u>issues</u> associated with the establishment of a new national park?

01 – Yes
02 – No
VOLUNTEERED
99 – DK/NA

30M.The new national park would be located near the north end of Lake Winnipeg, near Grand Rapids. What sorts of positive or negative impacts do you feel it a national park in this location would have?
SPECIFY VERBATIMS: PROBE IF NECESSARY: On the environment? On the economy? On the quality of life?

____________________.
99 – DK/NA

31M. Overall, would you strongly agree, somewhat agree, somewhat disagree or strongly disagree that a new national park should be established near the north end of Lake Winnipeg?

01 – Strongly agree
02 – Somewhat agree
03 – Somewhat disagree
04 – Strongly disagree
VOLUNTEERED
05 – Neither agree/disagree
99 – DK/NA

D. National Historic Sites

32A. Now, thinking about visits to <u>National Historic Sites</u>. Have you <u>ever</u> visited a national historic site?

01 – Yes
02 – No SKIP TO Q.37C
99 – DK/NA SKIP TO Q.37C

33A. When did you <u>last</u> visit a national historic site? Was it in:
READ IN SEQUENCE – CODE ONE ONLY – PAUSE AFTER READING EACH RESPONSE

01 – 2004
02 – 2003
03 – 2002, or
04 – As an adult but before 2002
VOLUNTEERED
05 – As a child or youth
06 - 2005
99 - Cannot recall/NA

34A. Did you ever visit a national historic site as a child or youth?

IF VOLUNTEERED IN Q.33A, RECORD AS "YES"

01 – Yes
02 – No
99 – Cannot recall/NA

35A. (IF VISITED IN 2003 or 2004 IN Q.33A) What was the name of the last national historic site you visited?
SPECIFY – CODING TO BE DONE WITH LIST POST-FIELD

____
99 – Cannot recall
96 – No answer

36A. (ASK IF VISITED AS ADULT IN Q.33A) During your adult life, have you visited national historic sites:

01 – Frequently
02 – Occasionally, or
03 – Rarely
VOLUNTEERED
99 – DK/NA

37C. Historic sites in Canada consist of buildings, forts or other locations in which events of historical significance have taken place. I will read you a list, and for each pair of words in the list, I would like to know which one word most fits with your impression of Canada's national historic sites. Starting with:
READ AND ROTATE ORDER OF PAIRS; ROTATE ORDER OF WORDS IN EACH PAIR

a. Fun or Dull

01 – Fun
02 – Dull
VOLUNTEERED
03 – Neither
99 – DK/NA

b. Hard to get or to Easy to get to

01 – Easy to get to
02 – Hard to get to
VOLUNTEERED
03 – Neither
99 – DK/NA

c. Poor value or Good value

01 – Good value
02 – Poor value
VOLUNTEERED
03 – Neither
99 – DK/NA

d. Relevant to you or Not relevant to you

01 – Relevant to you
02 – Not relevant to you
VOLUNTEERED
03 – Neither
99 – DK/NA

e. Memorable or Forgettable

01 – Memorable
02 - Forgettable
VOLUNTEERED
03 – Neither
99 – DK/NA

f. Artificial or Authentic

01 – Authentic
02 – Artificial
VOLUNTEERED
03 – Neither
99 – DK/NA

g. Unique or Common

01 – Unique
02 – Common
VOLUNTEERED
03 – Neither
99 – DK/NA

38C. Please tell me whether you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each of the following statements?
READ AND ROTATE

a. Having national historic sites is one way that Canada helps to preserve its history

b. Having national historic sites improves the well-being of local communities

c. Canada's national historic sites are a good way to learn about Canada's history

d. I would miss national historic sites a lot if they were gone

e. Every Canadian should visit a national historic site at least once in their lifetime

01 – Strongly agree
02 – Somewhat agree
03 – Somewhat disagree
04 – Strongly disagree
VOLUNTEERED
05 – Neither agree/disagree
99 – DK/NA

39C. What do you think is the <u>greatest threat</u> to the preservation of Canada's national historic sites today?
DO NOT READ – CODE ONE ONLY

01 - Lack of financial resources
02 - Pollution
03 - Lack of awareness/understanding of significance to society
04 - Lack of public concern/interest
05 - Vandalism
06 - Urban development
07 - No alternative use for buildings/sites
08 - Lack of legal protection
09 - Poor management practices
10 - Not a government priority
11 - Not enough employees
12 - None
98 - Other (SPECIFY ____________)
99 - Don't know
96 – NA / NR.

E. Information Sources

ASK ALL

40A. Which one of the following would you most trust to provide you with accurate information about the status of Canada's national parks and historic sites?
READ AND ROTATE – CODE ONE ONLY

01 – Environmental, wildlife and heritage conservation groups
02 – The media
03 – [Parks Canada/Government of Canada] **[RANDOMLY SPLIT SAMPLE 50-50]**
04 – Historians, ecologists and other academics
VOLUNTEERED
05 – All equally trustworthy
06 – None of the above
07 – Depends
98 – Other (SPECIFY ____________________)
99 – DK/NA

41A. I will now ask a question about <u>World Heritage Sites</u> designated by the United Nations. Canada currently has 13 <u>World Heritage Sites</u>. Please name any one of these Canadian sites.
DO NOT READ – CODE FIRST MENTION IF MORE THAN ONE VOLUNTEERED - IF RESPONSE IS CLOSE TO ONE OF FOLLOWING, CODE IT INTO CATEGORY

01 – Canadian Rocky Mountain Parks / the Rocky Mountains
02 – Dinosaur Provincial Park
03 – Gros Morne National Park
04 – Head-Smashed-In Buffalo Jump
05 – Historic District of Quebec / old Quebec
06 – Kluane National Park and Reserve/Tatashenshini-Alsek Park
07 – L'Anse aux Meadows / Viking Settlement in Newfoundland
08 – Miguasha Park

09 – Nahanni National Park Reserve
10 – Old Town Lunenburg
11 – Sgaang Gwaii / Gwaii Haanas
12 – Waterton Lakes National Park
13 – Wood Buffalo National Park
98 – Other (DO NOT CODE)
99 – DK/NA

F. Recreational and Leisure Activities

42A. Have you personally participated in any of the following recreational activities in the past two years? (2003-2004)? IF YES, ASK: Have you participated in this activity once, a couple of times, or more than a couple of times in the past two years?
READ AND ROTATE

a. Mountain-biking

b. Rock climbing

c. Motor boating

d. Snowmobiling

e. Dirt bike riding

f. Downhill skiing or snowboarding

g. Birdwatching

01 – No
02 – Yes, once
03 – Yes, a couple of times
03 – Yes, more than a couple of times
99 – DK/NA

43A. (IF YES TO Q.42f) Thinking about the last time you went downhill skiing or snowboarding, how important was each of the following considerations in deciding on where to go skiing or snowboarding? Was ___ very important, somewhat important, not very important, or not at all important?
READ AND ROTATE

a. Snow conditions

b. Being close to where you live

c. Value for money

d. Having accommodations close to the ski area

e. Type of other services at the ski area, such as restaurants, shopping and other activities

f. Type of ski terrain

g. Environmental practices at the ski area

01 – Very important
02 – Somewhat important
03 – Not very important

04 – Not at all important
VOLUNTEERED
05 – Depends
99 – DK/NA

44A. Have you visited any of the following in your local area in the past two years?
READ IN SEQUENCE

a. Arts or cultural festivals and events

b. Museums

c. Other historical attractions or places besides national historic sites.

01 – Yes
02 – No
99 – DK/NA

45B. Are you involved in any organization or cause related to the protection of natural areas and wilderness in terms of:
READ AND ROTATE

a. Volunteering your time

b. Donating money

c. Participating as a member

d. Subscribing to a magazine or newsletter

01 – Yes
02 – No
99 – DK/NA

46C. Are you involved in any organization or cause related to history or the conservation of historic places in terms of:
READ AND ROTATE

a. Volunteering your time

b. Donating money

c. Participating as a member

d. Subscribing to a magazine or newsletter

01 – Yes
02 – No
99 – DK/NA

G. Respondent Profile

SAMPLE A FOR ALL REMAING QUESTIONS (Q.47 - 55)

To finish up, I would like to ask you a few questions about you and your household for statistical purposes only. Please be assured that your answers will remain completely confidential.

47. What is the highest level of education that you have reached?
DO NOT READ – CODE ONE ONLY

01 - Some elementary
02 - Completed elementary
03 - Some high school
04 - Completed high school
05 - Community college/ vocational/ trade school/ commercial/ CEGEP
06 - Some university
07 - Completed university
08 - Post-graduate university/professional school
99 – NA/REFUSE

48. In what year were you born?

____
99 – NA/REFUSE

49. From the following list, where were you born?
DO NOT READ – CODE INTO CORRECT CONTINENT

01 – Canada
02 – US
03 – Europe
04 – Asia
05 – Other (SPECIFY ____________________)
99 – NA/REFUSE

50. And from the following list, where were your parents born?
DO NOT READ – CODE ONE OR TWO

01 – Canada
02 – US
03 – Europe
04 – Asia
05 – Other (SPECIFY ____________________)
99 – NA/REFUSE

51. Do you have any children under16 years of age living at home?

01 – Yes
02 – No
99 – NA/REFUSE

52. What language do you most frequently speak in your household?
DO NOT READ – CODE ONE ONLY

01 - English
02 - French
03 – Spanish
04 – Italian
05 – Mandarin/Cantonese
06 – German
07 – Portuguese
08 – Arabic
09 – Japanese
10 – English and a second language
11 – French and a second language
12 – More than one (PROMPT FOR ENGLISH OR FRENCH AND A SECOND LANGUAGE)
98 – Other
99 – NA/REFUSE

53 For statistical purposes only, we need information about your gross household income. Please tell me which of the following categories applies to your total household income for the year 2004?
READ - CODE ONE ONLY

01 - Less than $40,000
02 - $40,000 to $75,000
03 - more than $75,000 to $100,000
04 - More than $100,000
VOLUNTEERED
99 - DK/NA

54. And to better understand how results vary by region, may I have your <u>6-digit postal code</u>?

____

99 - DK/NA

55 And one final question. Have you or anyone else in your family ever thought of Parks Canada as a source of employment or a place to work?]

01 – Yes
02 – No
99 – DK/NA

This completes the survey. In case my supervisor would like to verify that I conducted this interview, may I have your first name?

First Name: ________________________

Thank you very much for your time and assistance. This survey was conducted on behalf of Parks Canada, and is registered under the Federal Access to Information Act.

RECORD

56. Province/Territory

    01 - British Columbia
    02 - Alberta
    03 - Saskatchewan
    04 - Manitoba
    05 - Ontario
    06 - Quebec
    07 - Newfoundland and Labrador
    08 - Nova Scotia
    09 - New Brunswick
    10 - Prince Edward Island
    11 - Nunavut
    12 - Northwest Territories
    13 - Yukon

57. Additional Over-sample
    CODE IF APPLICABLE

    01 – Montreal CMA
    02 – Toronto CMA
    03 – St. Lawrence Islands National Park
    04 – Point Pelee National Park
    05 – Pukaskwa National Park
    06 – Southern Alberta
    07 – Yoho/Kootenay National Park

58. Community size

    01 - 1 million plus
    02 - 100,000 to 1 million
    03 - 25,000 to 100,000
    04 - 10,000 to 25,000
    05 - 5,000 to 10,000
    06 - Less than 5,000

59. Gender

    01 - Male
    02 – Female

60. Language of interview

    01 – English
    02 – French

APPENDIX 4.

DESIGN OF THE BID VECTOR

APPENDIX 4. DESIGN OF THE BID VECTOR

Given the lack of time and resources for significant CVM question pretesting, and given that no previous TEV or similar studies have been done for the Canadian national park system, there was little direct empirical guidance for establishing bid values. However, indirectly, Canadians pay for their national parks through their income tax expenditures. This research rationalized that the average contribution an average Canadian household makes to national parks could be used as an approximate mean of the bid vector. This mean value was calculated by solving the following questions.

Q-1: How much did the average Canadian household directly contribute through their 2003 federal income tax payments to: a) Parks Canada Agency and b) only to national parks?

<u>Solution to Q-1:</u> Given the following ....

In 2003, the average household income in Canada was $58,360 (see Statistics Canada 2003 Average Household Income).

Federal tax rates in 2003 were: 16% on the first $32,183 of taxable income and 22% on the next $32,185 (see What are the income tax rates in Canada for 2003? Federal Tax on Taxable Income Manual Calculation Chart in Federal and Provincial/ Territorial Tax Rates. Canada Revenue Agency).

Thus, federal tax paid on $58,360 (assuming no deductions)

($32,183 X.16) + ($26,177 X .22) = $10,908

In 2003, the average household income in Canada was $58,360 and they paid about $10,908 in federal income taxes.

Answer for Q1-a): Recall from Appendix 1, Q-1 that about .270 cents of a federal tax dollar went to the Parks Canada Agency.

Thus, 10,908 X .27 cents = $29.45 cents.

In 2003-04, the average household in Canada contributed $29.45 to Parks Canada Agency from their $10,908 paid in income taxes.

Answer for Q-1b): Recall from Q-1 that about .132 cents of a federal tax dollar went to the Parks Canada Agency.

Thus, 10,908 X .132 cents = $14.40 cents.

In 2003-04, the average household in Canada contributed $14.40 to national parks from their $10,908 paid in income taxes.

Based on the 2003 tax bracket categories, the range of yearly income tax dollars paid to Parks Canada Agency is between $13.89 to $108.22. Similarly, the range of yearly income tax dollars paid only to national parks is between $6.79 to $52.90. The approximate midpoint of this range is $29.85.

Given the average yearly household contribution to national parks ($14.40) and the range of yearly tax contributions to national parks across all income tax categories ($6.79 to $52.90 with a mid-point of $29.85), the bid amounts selected for this survey were chosen to cover and expand upon this latter range. The bid amounts chosen were: $10, $20, $30, $40, $50, $60, $70 and $80). In comparison to the current, annual, household tax contribution, these values asked respondents for a 69% to 555% potential increase in their spending on national parks.

The starting bid value (Q21X) was randomly selected from these eight bid amounts. To minimize starting point bias, each bid amount was selected as the starting bid for approximately the same number of survey respondents.