



Fundy Model Forest

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***The Fundy Model Forest...
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“The Fundy Model Forest (FMF) is a partnership of 38 organizations that are promoting sustainable forest management practices in the Acadian Forest region.”

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Canadian Institute of Forestry
Canadian Forest Service
City of Moncton
Conservation Council of New Brunswick
Fisheries and Oceans Canada
Indian and Northern Affairs Canada
Eel Ground First Nation
Elgin Eco Association
Elmhurst Outdoors
Environment Canada
Fawcett Lumber Company
Fundy Environmental Action Group
Fundy National Park
Greater Fundy Ecosystem Research Group
INFOR, Inc.
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KC Irving Chair for Sustainable Development
Maritime College of Forest Technology
NB Department of the Environment and Local Government
NB Department of Natural Resources
NB Federation of Naturalists
New Brunswick Federation of Woodlot Owners
NB Premier's Round Table on the Environment & Economy
New Brunswick School District 2
New Brunswick School District 6
Nova Forest Alliance
Petitcodiac Sportsman's Club
Red Bank First Nation
Remsoft Inc.
Southern New Brunswick Wood Cooperative Limited
Sussex and District Chamber of Commerce
Sussex Fish and Game Association
Town of Sussex
Université de Moncton
University of NB, Fredericton - Faculty of Forestry
University of NB - Saint John Campus
Village of Petitcodiac
Washademoak Environmentalists



A METHODOLOGY FOR EVALUATING PUBLIC VALUES OF NEW BRUNSWICK FORESTS.

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For: The Fundy Model Forest, Sussex, New Brunswick.

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ABSTRACT:

In today's forest management context, it is vital for managers to understand and accommodate public values and perceptions of the forest. This report summarizes the current literature studying public values for forests, and outlines a methodology for assessing the public values of New Brunswick's forests. The methodology includes both a mail survey, and focus group sessions. The mail survey can be used to determine what values the public holds for New Brunswick forests and what they are willing to pay to maintain those values. Here, the Analytical Hierarchy Process (AHP) and Contingent Valuation Method (CVM) are promoted as useful techniques for ranking and placing a dollar value on such values, respectively. The focus group sessions can be used to assess the public's preferences over different forest stand-types. Here, pictures of stand-types at various ages and management can be shown to the public to determine what stands best satisfy particular values. By combining mail survey and focus group sessions, a willingness to pay for stand-type preferences can then be elicited.

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1.0 INTRODUCTION

As the public becomes increasingly attentive to environmental issues, forest resource managers are being asked to incorporate non-traditional values into their planning. These include a wide array of non-market or passive-use values such as recreation, aesthetics, nutrient cycling, and spiritual values. In a recent study, Constanza et al. (1997) estimated the non-market value of the world's ecosystems was between US\$16-54 trillion (10^{12}) per year compared to the worth of the global gross national product at \$18 trillion US/year (Constanza et al. 1997). This ground-breaking study has led to interest in assessing non-market values at all forest management scales.

The assessment of non-market values is increasingly being incorporated into sustainable forest management planning. Sustainable forest management has been defined as management that is economically, environmentally, and socially sustainable (Bliss 2000). While much attention has been paid to economic and environmental sustainability, social sustainability is seldom addressed. Forest managers have assumed that if a forest is managed so that it is not detrimental to the environment, and is economically sound and creating jobs, society will be automatically satisfied with the management. It has been found that this is not the case (Bliss 2000). The public bases its perception of forest management on what they see, what they hear in the media, and what they "feel" when they think about the forest. Thus forest managers are beginning to recognize the importance of managing the forest to provide appropriate landscapes that fulfill the public's values.

Public values for the forest can be broken into two main categories, use and non-use values (Table 1). Non-market values can be found within both categories.

Table 1. Identifying Forest Activities that Generate Value for Humans

Use-Values		Non-Use Values
i. Direct-Use	ii. Indirect-Use	iii. Existence
Wood products (timber, fuel)	Watershed protection	Biodiversity (wildlife)
Non-wood products (food, medicine, genetic material)	Nutrient cycling	Culture, heritage
Educational, recreational & cultural uses	Air pollution reduction	Intrinsic worth
Human Habitat	Micro-climactic regulation	Bequest
Landscape Views (aesthetics)	Carbon storage	Spiritual

Source: adapted from Barbier (1991).

2.0 GOAL AND SCOPE

The purpose of this study is to provide a methodology that, once applied, will further improve existing knowledge of public values in New Brunswick. This information can be used to provide a basis for future forest management actions. More specifically, the knowledge gained from the application of this methodology will aid forest managers in policy making by helping them understand and accommodate the preferences of the external public at large. This goal is in accordance with the mission statement of the Fundy Model Forest, in southern NB.

The specific objectives of this study are to provide a methodology that will: (1) Assess the values that the public of southern New Brunswick hold for NB forests generally; and (2) Determine how forest stand-types affect public values. To achieve the first objective, this study will develop a survey that specifies general questions along with Contingent Valuation Method (CVM) questions and Analytical Hierarchy Process (AHP) questions. To achieve the second objective, this study will explore focus group sessions where personal interviews would be conducted along with the showing of stand-type characteristic pictures. The specifics of these approaches are detailed later in the study.

The scope of the survey and focus group sessions will include residents of the Fundy Model Forest region, and residents of near-by urban centers. Non-market values considered in this study fall under three broad categories. Category 1 is termed Recreation Values, and includes five sub-categories: hiking/biking, hunting/fishing, ATV/snowmobiling, camping, and viewing wildlife. Category 2 is termed Environmental Values, and is comprised of four sub-categories: air quality, water quality, soil quality, and nutrient cycling. Lastly, Category 3 is termed Existence Values, and includes four sub-categories: bequest value, cultural/heritage, biodiversity, and spiritual value. A fourth Category, termed Economic Values, is used as a base for comparison. There are four sub-categories in the Economic Values Category that include urban employment, rural employment, tourism, and industry. The sub-category values were chosen in consultation with knowledgeable parties and can be modified to incorporate other values if deemed important. It is recognized that there are additional non-market and market values that are important to the public, but these will not be specifically addressed within the scope of this study for reasons of added complexity.

The remainder of this study is organized as follows. In Section 3, a review of the relevant literature is conducted. Based on this review, Section 4 details the methodology of the survey and focus group techniques. Section 5 concludes the study. References, definitions, and appendices (including mail survey and focus group questions) are provided at the end.

3.0 LITERATURE REVIEW

There have been many techniques developed to assess public values of forests. Pearse and Pearse (2001) provide an overview of the diversity of these techniques. The literature review conducted in this section focuses on four such techniques thought to be most relevant to the objectives outlined in Section 2. Specifically, this section outlines studies using general surveys, Analytical Hierarchy Process (AHP) surveys, Contingent Valuation Method (CVM) surveys, and focus group sessions to assess public forest values and stand-type preferences.

3.1 General Surveys

Mail surveys have been used to elicit public values for forests in many regions of the world (Adamowicz et al. 1994, Filion et al. 1994, Kearney 1996, Bjorner et al. 2000). Kearney (1996), for example, used a general survey to determine the characteristics and preferences of users of the Indian River in Michigan. Specifically she looked at visitation patterns, level of satisfaction of participating in various activities, type of outdoor experience preferred, attitudes about regulations and possible development actions, and understanding of attitudes towards management activities. She found that people generally use the Indian River for its restorative benefits, and the opportunity to interact with nature. Management activities that enhanced the above tended to be endorsed.

Robson et al. (2000) conducted an innovative survey comparing the social values of forest-dependent, provincial, and national publics for socially sustainable forest management in Canadian forests. Respondents for a mail survey were randomly selected from telephone books, and sent a survey that was designed following Dillman's (1978) Method. Questions such as "Do you agree or disagree with the following statement" and "Please rank the importance of the following uses of Canada's forests in accordance with your own preferences." Their results suggest that forest and non-forest dependant communities share similar forest values, and that clearcutting does not reflect those values. They also suggested that forest managers should be extremely responsive to the local public when making forest management decisions (Robson et al. 2000).

Sanderson et al. (2002) conducted a mail survey of 643 people living in or near the Nova Forest Alliance Project Area, and 141 people from the Halifax/Dartmouth area to determine the public's perception and attitudes towards sustainable forest management. They obtained a response rate of 50% and 39% respectively. Over 71% of respondents felt that little or no opportunity was given to them to express views on the use of forests in Nova Scotia, and the largest percentage (51%) do not feel forest management in Nova Scotia is sustainable. Respondents indicated if they had "one wish" for forest management change in Nova Scotia, forest preservation (14.6%) and heritage (9.6%) issues topped this list(Sanderson et al. 2002).

Marktrend Research (2000) conducted a survey to determine the importance public places on different provincial priorities for forests in BC. Respondents rated "protecting

the environment” as the most important forest management activity from their perspective. This preference was followed closely by “encouraging a healthy forest industry”. High support was shown for 3rd party forest certification (85%), and 84% supported an increase in AAC without expanding the current managed land-base, or comprising the environment (Marktrend 2000).

Crone et al. (2002) conducted a mail survey of 14 communities in Alaska to assess how the public socially and economically valued the forest. Respondents generally rated less consumptive and non-commercial uses the highest. Also respondents felt that the condition of public lands effected their quality of life (Corne et al. 2002).

3.2 Analytic Hierarchy Process Surveys

Another survey method that has been used to assess values is the Analytic Hierarchy Process (AHP). This method determines the relative importance that individuals place on different elements of a situation by asking pair-wise rankings of alternatives (Saaty 1980). It has also been used in producing judgments, enabling consensus, and planning for implementation (Schmoldt and Peterson 2000). AHP has been used in forestry to determine the relative importance of the strengths, weaknesses, opportunities and threats involved in implementing forest certification (Kurttila et al. 2000). Schmoldt and Peterson (2000) used AHP to help forest fire research development. The AHP has also been widely used in decision-making, and city planning.

Ananda and Herath (2003) suggest that AHP may be a valuable method for assisting in complex forest management decision-making. Complexity in forest management decision-making arises from the multiple-use nature of forest goods and services, involvement of various stakeholders, and the difficulty in monetary valuation of ecological services. They structured their analysis by defining fundamental and means objectives, different management options, identifying criteria, identifying stakeholder groups and weighting schemes for each group’s input. Their results show that AHP can formalize public participation in decision-making and increase the transparency and credibility of the process. As well it was found that the weighting of different groups’ values significantly effected the outcome of the AHP.

Witt (1998) developed a mail survey that utilized a form of AHP to determine how large a priority the public felt different forest values should have when the government is considering distributing funding (Witt 1998). It was found that items that had the highest priority were considered “public trust” values such as state parks. Not surprisingly people who hunted and fished in the past 12 months showed stronger support than the general public for funding these activities (Witt 1998).

3.3 Contingent Valuation Method Surveys

The Contingent Valuation Method (CVM) has been used by economists for over 30 years to evaluate non-market goods and services. In a forestry context, such non-market values as recreation, option, existence, and environmental services have been investigated. The CVM method involves a survey where respondents are asked to state a monetary amount they would be willing to pay (WTP) for improvement or maintenance of a set of forest values. The following details a number of such studies.

Loomis et al. (1989) used a 1987 CVM mail survey of 15,300 hunting license holders (60% response rate) and 3,000 randomly selected general public (44% response rate) to determine the value of loss of deer hunting areas, compared to use of the same area as a housing development located in the United States of America. It was found that the value of deer forage was comparable to the value of forage for livestock production.

Mattsson and Li (1994) used a mail survey in Sweden to determine how forest activities (interventions) affect passive-uses of the public such as berry picking, hiking, and visual experiences. Pictures of four different interventions were distributed in the survey so that links could be made to forest attributes such as tree age and species composition of the forest. It was found that respondents were WTP between \$365-\$584 (in approximate Canadian dollars) for non-timber values provided by the forest annually.

Another CVM survey in Sweden determined the recreation value, in economic terms, of various stand types within the boreal forest in terms of different silvicultural interventions (Hologen et al. 2000). A survey was mailed to a systematic random sample of 2000 individuals of a total population of 170,000 individuals with a response rate of 69%. Pictures were shown to respondents at four different silvicultural stages of stand development (approximately 30 years) for the following stand types: 1) Natural regeneration using seed trees; 2) Single tree selection (uneven ages); 3) Planting after clear cutting, and 4) Natural regeneration using advance growth (shelter-wood system). It was found that the most efficient way to increase recreation value, in economic terms was to “mix” the rotation periods. Also shelter-wood systems were the most preferred, while clear-cut systems were the least preferred (Hologen et al. 2000).

Hagen et. al (1992) estimated WTP for recreation, option, and existence values of preserving old growth forest and spotted owl habitat in the Pacific Northwest USA. Dillman’s “Total Design Method” was used to format the surveys which were sent to a randomly selected 1000 USA households (Dillman 1978). They had a total response rate of 41%. They determined a WTP of \$77.75 including non-response and protest bids, and a WTP of \$259.91 excluding the non-response and protest bids for protecting old growth forest and spotted owl habitat (Hagen et al. 1992).

Filion et al. (1994) combined a mail and telephone CVM survey that was administered to 103,398 individuals in Canada. A 71.1% response rate was achieved. The purpose of the study was to determine the economic significance of wildlife-related recreational

activities in 1991. It was found that hunters were WTP \$12.50/day, and non-consumptive users were WTP \$4.9/day. All wildlife related activities were valued at \$55,675,000,000.

The benefits of marten habitat versus timber production was explored using a CVM study in Newfoundland, Canada (Condon 1993). The issue at hand was the potential eradication of American marten due to clear-cutting their habitat. Data was conducted in Newfoundland in 1992. A survey was conducted to determine what residents were WTP for preservation of marten habitat. The value of timber on the land proposed to be set aside was determined using the net social value method, and the residual harvest method. It was found that income, education, family size, and bid amount most effected the outcome of results. Also, average household WTP for marten habitat was estimated at \$28.38, and the total aggregate annual WTP value was \$10,430,757. The author compared this value to the harvest value of timber to Newfoundland residents of between \$1,000,000 (using the residual harvest method) to \$1,300,000 (using a 'net social values' method) (Condon 1993).

Bjorner et al. (2000) followed Dillman (1978) in designing his survey to determine non-extractive uses and passive-uses of forested land in Tokkekob Hegn forest north of Copenhagen, Denmark. A survey, and two reminders were mailed to 3,700 respondents in April 1999, and a response rate of 69.7% was obtained. Five focus groups were conducted to insure that respondents could understand survey questions. An open-ended WTP question was asked in each of the following scenarios: i) private – activities the respondent would like to do in the forest; ii) public – activities all people might enjoy such as exercise, riding, and cycling, and iii) committed – a luxuriant forest with varied vegetation and old trees (habitat) that houses a lot of foxes, deer and other wildlife. A WTP was elicited (in approximated Canadian dollars) of \$18 per person for the private scenario, of \$16 per person for the public scenario, and \$15 per person for the committed scenario (Bjorner et al. 2000).

McDaniels and Roessler (1998) conducted a survey that investigated the public's WTP through a provincial tax increase for a potential doubling of wilderness areas in BC. This is widely debated by stakeholders and a current issue being decided by provincial policy makers. Two groups totaling 28 people participated in a ½ day workshop. They were asked to provide insight into how much tax revenue from the forest industry each provincial resident should forgo to increase wilderness preservation. The study will be used as a tool for decision analysis (DA). The role of the multi-attribute assessment is stressed to help the social decision maker structure by eliciting values from diverse stakeholder groups. It was found that doubling protected area is important to respondents, but this varies largely between respondents. A large value was placed on ecological services. Respondents perceived benefits for current (\$169,000,000) and future generations (\$169,000,000) to be of similar values (McDaniels and Roessler 1998).

In 1993, Reid et al. (1995) distributed a mail survey to British Columbians. Using randomly selected names from the provincial phone book, they distributed the survey to 3000 individuals using the Dillman Method. The purpose of the survey was to elicit,

through open-end and dichotomous choice CVM questions, the non-use values of increasing protected areas where all logging and mining would be prohibited. The payment vehicle was a one-time increase in provincial taxes that households would pay into a special fund. A logit model was used with the probability of answering yes to the wilderness protection question being a function of income, bid value, and education. It was found that the mean WTP per household for the doubling of current protected areas was \$119.00 for the open-ended question, and \$130.20 for the dichotomous choice question. This is equivalent to \$137.8-\$166.0 million dollars across the province (Reid et al. 1995).

Walsh et al. (1994) used the CVM and found that residents of Colorado State were willing-to-pay (WTP) an average of \$47 (USD) per annum for the protection of forest quality. The data were obtained from a household survey designed to represent the resident population of Colorado. A sample size of 1% of the population was drawn from a current telephone book. Direct-use values (recreation), option values, and non-use values (existence and bequest values) were assessed. With data from this study, a demand function was estimated for WTP_{ij} per household *i* for forest quality *j*. Public (non-use) preservation values represented almost three-quarters of total benefits (Walsh et al. 1990).

A variation of the CVM, the Choice Experiment Method (CE), was used to estimate public values for a forested area in southern United States (Bliss et al. 1994). When using the CE method, respondents are given two forest management outcomes to choose from (one is usually the status quo, and the other is a new set of attributes along with a change in cost). Then the respondent is asked to pick one, or neither, of the options. Bliss et al. (1994) found that the public in the southern United States valued environmental integrity, and that there was no significant difference between the population at large and woodlot owners.

In a joint CVM and Choice Experiment (CE), preferred sites for moose hunting were elicited from moose hunters in Alberta (Adamowicz et al. 1994). Hunters were randomly selected from moose hunting license holders and mailed an invitation to attend an intensive half-day workshop to determine their use values. Groups were defined as urban and rural hunters. In the CE results, a significant difference was found between the urban and rural groups. Hunters preferred sites with good access, and the least amount of travel time to the site the better. In the CVM, respondents stated a WTP for \$69.93 for improved hunting site quality.

3.4 Focus Group Sessions

Focus group sessions are increasingly being arranged to investigate public values of the forest. Brunson and Shelby (1992), for example, arranged focus group field trips throughout the United States to help assess how the public views different stand-types, and how different silvicultural interventions fulfill their needs. It was found that old-growth forest best suited all types of values, followed by patch cuts, and shelterwood

interventions. Clearcuts did not meet the requirements to fulfill the public's values on a scale of -5 to +5 where anything less than 0 did not meet requirements.

In 1997, Paquet and Belanger (1997) worked with focus groups to assess sensitive recreational landscapes in Quebec's boreal balsam fir forest. They found the public adversely reacted to even low levels of clear-cutting, though most thought having up to 25% of the landscape (visible landscape in a photographic slide, measured in perspective) in a clear-cut was acceptable. Respondents also preferred smaller cut blocks over large ones (Paquet and Belanger 1997).

Berris and Baker (1989) explored public preferences for forested landscapes in the West Kootenays, British Columbia. They found that public preferences are most affected by the absence or presence of visible forest alterations, and that public preferences are effected slightly less by the "drama" of the landscape (Berris and Bekker 1989).

In another British Columbia focus group study, the B.C. Ministry of Forests found that the acceptability of forest scenery in middle-ground landscape views of clear-cuts varied greatly with the "existing visual condition". Respondents expressed higher levels of acceptability with more natural appearing conditions (BC Ministry of Forests 1996).

In New Zealand, Thorn et al. (1997) showed focus groups digitally altered pictures of forests to determine the public's visual preference for different types of forest management. Their innovative approach addressed the constraints posed by images by creating a library of over 3000 forest images, and subjecting the images to histogram equalization to achieve the best consistent contrast and coloration. Computer models were used to determine predict future forest conditions under different management interventions, and though computer software, the above-mentioned pictures were altered to reflect those future conditions. Visualizations of alternative forest plantation management scenarios were used in a systematic assessment of public perceptions of the visual consequences of each scenario. They found that the public preferred contour planting over vertical planting approaches (Thorn et al. 1997).

4.0 METHODOLOGY

A two-pronged methodological approach is taken to meet the objectives outlined in Section 2. A mail survey method will be developed to assess public forest values, and a focus group method will be developed to assess how different forest stand-types affect public values. The methodology behind the above objectives is discussed below.

4.1 Mail Surveys

Mail surveys have been chosen to elicit public values of the forest for a number of reasons. Mail surveys may be filled out when the respondent has time, they are not perceived to be as large an invasion of privacy as telephone surveys, and they are cost

efficient (Bateman et al. 2002). The disadvantage of mail surveys compared to personal interviews is that there may be a higher non-response rate, and fewer detailed questions can be asked. Personal interviews are much more costly, and require much more time than mail surveys. Sections 4.1.1 to 4.1.3 outline the design of the mail survey.

4.1.1 Study Area and Sampling Design

The focus of this study is not defined within a particular region in New Brunswick. Many of the questions asked will be general in nature. However, as discussed later in this section, the sample population consists of those in the southern part of New Brunswick. Therefore, it is expected that the southern forest region will be the relevant reference point that many respondents will be thinking of when answering questions. Additionally, since the southern forest region of New Brunswick contains the 420,000 ha area of the Fundy Model Forest (refer to Figure 1), it is quite likely that this particular region would be the point of reference for southern NB participants in the study developed here. As such, we provide more details on the Fundy Model Forest (FMF) forest below.

Figure 1. Location of the Fundy Model Forest in New Brunswick. (The FMF is show in the darker shade).



Source: FMF (2002)

The FMF region includes Fundy National Park, borders the city of Moncton, and takes in the town of Sussex among several other smaller villages. Within the region, 63% of the land is owned by 3,500 small woodlot owners, 5% is Fundy National Park, 15% Crown Land, and 17% industrial freehold land owned by JD Irving Ltd. (FMF, 2002). A partnership made of 34 diverse groups including the federal and provincial governments, private woodlot and other landowners, environmental and recreational groups, and educational and scientific organizations are represented in the Fundy Model Forest. The

FMF is representative of the Acadian Forest Region, and is an excellent study area due to the innovative forest management of its partners.

Members of the public residing within the FMF as well the three major centers (Moncton, Saint John, and Fredericton) and two local communities (Sussex and Petitcodiac) can be randomly selected to fill out a mail survey (from telephone lists). It is important to include people residing in both urban and rural communities to assess differences in demographics, and better represent the population New Brunswick.

There are a number of drawbacks from using lists to draw a sample (Dillman 1978). First not all members of the general population possess the attributes to be placed on a list. In my case, not all people own or rent a dwelling. Secondly some people are able to obtain private listings of their addresses and phone numbers, and therefore are impossible to include in the sample pool. Thirdly, all lists that are available are at least to some extent out-of-date. This is due to mobility of residents. A fourth problem is the impossibility in determining if individuals are duplicated, which is frequent. Thus, it is impossible to determine the chance of every person in a sample. The final drawback is the difficulty of obtaining lists of names. Still, with all of its apparent weaknesses, mail surveys are a viable method of determining social values.

For this study, it does not matter which member of a particular household completes the survey (providing they are age 18 or older), as the purpose is to elicit general values and opinions. It is recognized that certain segments of the population will be over/under represented in this survey sample. This can be accounted for in the analysis of results. Specifically, respondents will be asked their age group, gender, and other such socio-economic characteristics. According to the above information, responses can be weighted in order to reflect the actual population characteristics (as reported by the Statistics Canada Census for that area).

The particular sample group for this study is households in Sussex, Petitcodiac, Moncton, Saint John, and Fredericton. These communities were selected because they are considered representative of the region. Households can be selected using a stratified random sampling method. The advantage to this method is that it allows for a sample that represents members of different geographic locations. This will allow for an assessment of the patterns of values in desired proportions. The disadvantage to this method is that it requires more effort than simple random sampling, and it needs a larger sample size to produce statistically meaningful results (Fink and Kosecoff 1998). The stratification can be based on the town and city limits of the communities mentioned. Each household in the phone book can be assigned a number. Then a list of random numbers can be generated. Each house can be phoned to see if a member would be willing to take the time to fill out my survey. If the household is willing, a survey will be sent out to them via mail or email, whatever is their preference. Phone calls will be made until 35% more households are reached than the number of completed surveys required for statistically significant results (Dillman 1978). This should account for households that do not return a completed survey.

The number of households in each area to be surveyed can be obtained from Statistics Canada website (Stats Can. 2003). Walsh et al. (1990) state that one percent of households was sufficient to contact in a mail survey. Therefore, 1.35% of the households should be contacted in a survey to account for non-responses. A non-response of 35% is expected (Dillman 1978). Table 2 summarizes the sampling requirements if the above strategy is followed.

Table 2. Number of surveys required for each different community.

City	Total Population	Number of dwellings (owned and rented)	Number of responses required	Number of surveys to be mailed
Moncton	61,045	25,770	258	347
Fredericton	47,560	20,310	203	274
Saint John	69,665	29,595	296	400
Sussex	4,180	1,810	18	25
Petitcodiac	1445	580	6	9
Total number of surveys to be mailed:				1054

There are various costs associated with conducting a mail survey. Table 3 is a summary of the mail-out costs of conducting this survey.

Table 3. Costs of conducting public values survey for Southern New Brunswick Forests.

Description of Materials	Cost	Required amount	Cost/item	Purpose of item
B&W printing	\$0.05/page	7378 pages	\$369.00	To use in mail survey.
Mail-Out envelopes	\$0.75/envelope	1054 envelopes	\$790.50	To send out survey.
Return envelopes	\$0.05/envelope	1054 envelopes	\$52.70	For respondents to return completed.
Stamps	\$0.48/stamp	3162 stamps	\$1,517.76	To mail surveys, return envelopes, and reminders.
Reminder card	\$1.00/card	1054 cards	\$1,054.00	To increase response rate to survey.
Total money required for materials =			\$2,729.96	

4.1.2 Survey Questions Design

The design of the mail survey will partially follow the Total Design Method (Dillman 1978). This method is “the book” on conducting mail surveys. When writing questions from the survey, it is important to note that there are four types of questions that may be asked (Dillman 1978):

1. What people say they want: their *attitudes (values)*
2. What people think is true: their *beliefs*
3. What people do: their *behavior*
4. What people are: their *attributes*

The survey will address all of the above in the following order: attributes, beliefs, attitudes, and behavior.

Specific questions in the mail survey will address two main issues: (1) What values does the public hold for New Brunswick's forests, and what is their order of importance relative to economic values? (2) What is the public WTP for management of these values? The first issue will be addressed through general "agree-disagree" or "ordered ranking" questions, in conjunction with Analytic Hierarchy Process (AHP) questions (Saaty 1980). These questions will be close-ended to allow for easier interpretation of data (Dillman 1978). The second issue will be addressed through CVM questions. The following discusses these questions in detail.

General Questions

Respondents will be asked a number of general questions (Questions 38-42, Appendix A), to determine their age group, gender, and average annual family income. This type of question will assist in the analysis of the rest of the survey, and allow for a weighting, if necessary, of responses to more accurately reflect the population of New Brunswick.

"Yes or No", "Agree or Disagree" and "Ordered Ranking" questions (Questions 1-24, Appendix A) will be phrased similarly to those asked by Robson (2000). The purpose of using similar questions is to compare this survey to other findings to see if New Brunswick residents value the forest the same as British Columbia, and Canadian publics.

Analytical Hierarchy Process Questions

The Analytic Hierarchy Process (APH) uses matrices to quantitatively assign weights to different possible problem solutions (Saaty 1980). In the case of this study, it will be used to assign weights to the public's ranking of alternative forest values. A matrix of pair-wise comparisons will be constructed to determine the weighting of each possible choice. In this matrix the element $a_{ij} = 1/a_{ji}$ and thus when $i = j$, $a_{ij} = 1$. Since this study employs a modified version Saaty's AHP, the value of w_i may vary from 1 to 7, where 1/1 indicates equal importance, 3/1 weakly more importance, 5/1 strongly more importance, and 7/1 demonstrably more important, and w_i is the weight assigned to any given value choice. It was decided to allow the value w_i to vary from 1 to 7 instead of Saaty's recommendation of 1 to 9 as the range of importance in this situation is not as varied as in his demonstration, and this will make it easier for respondents to complete the survey. Questions 25-29 in Appendix A are AHP formatted questions.

The public is asked, in Questions 25-28 of Appendix A, to rank the different sub-categories within each main value category in the study.³ For example, "which type of

³ Recall from Section 2 the main categories considered here include: (1) Recreation values; hiking/biking, hunting/fishing, ATV/snowmobiling, camping, and aesthetic; (2) Environmental values; air quality, water quality, soil quality, and nutrient cycling; (3) Existence values; bequest value, cultural/heritage, biodiversity, and spiritual value; (4) Economic values; urban employment, rural employment, tourism, and industry.

recreation is more important to you; hunting/fishing, camping, hiking/biking, or watching wildlife?” Then, the public is asked, in Question 29 of Appendix A, to rank each of the main value categories. In following this procedure, a complete ranking of all forest values will be made (both within sub-category and main category values). An example of such an outcome is shown in Table 4.

The reasoning behind asking the respondent to rank the sub-categories first is to create awareness of the main value classes, before asking. Determining differences in preferences in the AHP questions will also serve as a cross check with the CVM questions. This will be explained in more detail below.

Table 4. Example of results from AHP survey questions.

CATEGORIES AND SUB-CATEGORIES	SUB-CATEGORY RANKING (PERFORMANCE/100)	CATEGORY RANKING (PERFORMANCE/100)
<i>Recreation Values</i>		25
Hiking/Biking	40	
Hunting/Fishing	15	
Camping	20	
ATVing/Snowmobiling	5	
Aesthetics	20	
Total Sub-Category	100	
<i>Environment Values</i>		35
Air quality	30	
Water quality	35	
Soil quality	25	
Nutrient Cycling	10	
Total Sub-Category	100	
<i>Existence Values</i>		28
Biodiversity	35	
Bequest	35	
Cultural/Heritage	10	
Spiritual	20	
Total Sub-Category	100	
<i>Economic Values</i>		12
Rural jobs	40	
Urban jobs	20	
Industry	10	
Tourism	30	
Total Sub-Category	100	
Total Category		100

Contingent Valuation Method Questions

The CVM questions (Questions 30-37, Appendix A) will assess how much the public is willing-to-pay through a one-time increase in their provincial taxes for improved forest quality (increased protected areas, larger buffer zones, etc...). It is assumed that improved forest quality directly relates to greater satisfaction of the public’s values. CVM results can also be used to give dollar values to all AHP sub-category weights. An example of such an outcome is shown in Table 5.

Table 5. Example of results from CVM questions implied by AHP ranking results.

CATEGORIES AND SUB-CATEGORIES	WILLINGNESS-TO-PAY BY SUB-CATEGORY	WILLINGNESS-TO-PAY BY CATEGORY
<i>Recreation Values</i>		\$35
Hiking/Biking	\$10	
Hunting/Fishing	\$12	
Camping	\$3	
ATVing/Snowmobiling	\$4	
Aesthetics	\$6	
Total Sub-Category	\$35	
<i>Environment Values</i>		\$40
Air quality	\$10	
Water quality	\$10	
Soil quality	\$10	
Nutrient Cycling	\$10	
Total Sub-Category	\$40	
<i>Existence Values</i>		\$10
Biodiversity	\$5	
Bequest	\$2	
Cultural/Heritage	\$2	
Spiritual	\$1	
Total Sub-Category	\$10	
<i>Economic Values</i>		\$12
Rural jobs	\$3	
Urban jobs	\$3	
Industry	\$3	
Tourism	\$3	
Total Sub-Category	\$12	
Total Category		\$97

In addition to using the CVM questions as a cross check with the AHP questions, the CVM data should be tested for validity and reliability. Specifically, a regression analysis can be performed to determine the relationship between the respondent's socio-economic characteristics and their willingness-to-pay (WTP). The results should conform with a-priori expectations (discussed further in other studies that have used the CVM method).

The regression procedure is as follows. A functional relationship between WTP_i (where WTP_i is the willingness-to-pay by individual i) can be expressed as follows:

$$[1] \quad WTP_i = f(I_i, S_i)$$

Where I_i is the income of the individual, and S_i is the socio-economic characteristics of that individual.

Assuming a linear functional form, the equation to be regressed can be stated as follows:

$$[2] \quad WTP_i = a + I_i + G_i + A_i + R_i + L_i + W_i + \epsilon$$

Where I_i is the income of an individual, G_i is the gender of an individual, A_i is the age of an individual, R_i is the amount of times per year an individual recreates in the forest, L_i is

the location of an individual (lives in a rural or urban area), W_i is if an individual or a member of their family works in the forestry sector, and ϵ is an error term.

4.2 Focus Groups

Focus groups have typically been the method used to determine what stand-types are preferred by the public (refer to Section 3). Standard survey methods have rarely been used due to the difficulty in getting the information across in an understandable and time-effective way, and due to the high costs involved with printing high-quality color pictures needed for stand-type comparisons. There have been advances in computer applications, however, that may make these constraints less binding in the near future. However, for the moment, these applications are not available to the majority of researchers.

Within a focus group setting, there are two options for eliciting preferred stand-types by the public: (1) Through the use of pictures of different stand-types at a number of small town-hall meetings; and (2) Through taking field trips to the forest, showing groups what the forest is like on the ground, and asking about their preferences. Both of these options have a number of advantages and disadvantages. These are discussed below along with how they would be implemented.

4.2.1 Focus Group “Town-hall Meetings”

Focus groups can be held with interest groups in Moncton, Saint John, Fredericton, Petitcodiac and Sussex. Participants of these meetings can first be asked to complete the same questionnaire as was used in the mail survey discussed previously. This would allow the researchers to assess any potential bias in the sample relative to the survey sample. Next, the participants can be shown pictures of different stand-types (Appendix B) using a computer slideshow and projector, and asked which one they prefer for the satisfaction of each forest value (economic, existence, recreation, environmental). The AHP method could also be applied here to determine how much more important one stand-type is over another.

If there is no significant difference between the written survey completed by members of the focus groups and respondents to the mail survey, it would be possible to extend the findings of the survey results to determine stand-type preferences (and the willingness to pay for the maintenance of those stand-types) across the entire study sample.

Pictures of four (4) different dominant stand types can be taken at three (3) different development stages approximately 25 years apart. Stands can be located using maps provided by the FMF. While it is recognized that one picture is not truly representative of all stands in each classification, that picture will serve as an adequate assessment for the purposes of this study. To avoid bias between hardwood and softwood stands, pictures should be taken 3-4 weeks after bud-break in the spring of 2003. If pictures

were taken in the winter when hardwoods have no leaves, there would be a bias towards softwood stands. On the other hand, if pictures were taken in the fall, the colors of hardwood leaves would show them bias. Each picture should be a view within the stand along with a landscape level view of the stand as an insert.

Advantages to this method are that it is relatively easy to coordinate with local interest groups (attend their regular monthly meetings), no complex bussing arrangements need to be made for respondents, a great number of respondents may be reached compared to the field-trip option, and respondents are less likely to need incentives to attend the session. Disadvantages to this option include less interaction between surveyor and respondent, the possibility that respondents are not associating the picture with the “real” forest, and lack of interest on the behalf of respondents.

4.2.2 Focus Group “Field Trips”

Field trips would be designed much the same as the town hall meetings, except respondents would be bussed to different sights. Here, they would be asked to walk around the site, to get a “feel” for the area.

Advantages of this method are that the researcher gets to interact with respondents more closely, the respondents get to view the actual forest they are valuing, and the respondents get more than a “snapshot” of stand characteristics. Disadvantages to this method include relatively high costs, liability issues, and difficulties in location all stand-types in the same small area. However, even with these disadvantages, it is felt that field-trips would be very useful in providing an insight into how the public values the forest.

4.2.3 Focus Group Biases to Minimize

Notwithstanding the method chosen to elicit public values, precautions must be taken to reduce the bias as much as possible. Care must be taken to ensure that all stands are viewed with similar lighting, no large rocks or streams, no large mountains in the background, and similar slopes. All of the above may be distracting to respondents, and the public’s decision about preferred stand-types may end up reflecting the stand location rather than the stand-type (Miller 1988, Brunson and Shelby 1992). Appendix B provides an example of the picture-showing methodology that could employed in the focus group sessions.

5.0 CONCLUSIONS

Presently the majority of forest planning initiatives address public values through indirect methods, if at all. With improved information regarding public values, it should be more practical for forest resource managers to include public values as specific objectives within their management planning. The inclusion of public values in such planning may

lead to increased public awareness, increased enjoyment of forested land, and increased public goodwill towards forest management initiatives.

6.0 DEFINITIONS

Air, water and soil values: Includes the values humans have for the maintenance of these resources.

Analytical Hierarchy Process (AHP): Used to determine a hierarchy of choices in decision making, and to provide a weighted ranking of alternatives (Saaty 1980).

Choice Experiment (CE): A stated preference method used to give an experimental and involved analysis of choice behavior. It has its origin in conjoint analysis, which is used to represent individual judgments of multi-attribute stimuli (Batsell and Louviere 1991).

Contingent Valuation Method (CVM): A method used to solicit an individual's willingness to pay for a non-market value, or willingness to accept a loss of such a value. CVM falls under the category of "Stated Preference" models (Boxall et al. 1996).

Direct-use value: Comprising the current benefits that humans derive from using forest resources (Barbier 1991).

Economic values: Include all the economic benefit generated from forest harvesting activities.

Existence values: Comprises the intrinsic value of wildlife, biodiversity, and the legacy of leaving an intact forest ecosystem for future generations.

Indirect-use value: Comprised of the current indirect benefits that humans derive from ecosystem support and protection provided by the forest for economic activity and environmental services (Barbier 1991).

Model Forest: "A group of Partners who together have defined an area and have committed to work together on projects that strive to advance sustainable forest management. Model forests often conduct research, facilitate information exchange, develop new forest management techniques and provide a venue for all forest interests to come to the table and work together." (FMF, 2002)

Non-use Value: All benefits humans derive from the forest outside of their physical interactions with it (Bariber 1991).

Passive-use Value: The non-consumptive use of forest resources which is not paid for.

Recreation values: Include all the "fun things" people do in the forest such a walking, bird-watching, and looking at the view. Here we assume no money is exchanged for the right to use forest land.

Stated Preference: A method used to elicit “responses to predefined alternatives in the form of ratings, rankings, or choice.” Examining consumer choices as a discrete choice or referendum. (Boxall et al. 1996)

Tourism Values: Money is exchanged for recreational activities.

7.0 LITERATURE CITED

- Adamowicz, W., P. Boxall, J. Louviere, J. Swait, and M. Williams. 1994. Stated preference methods for environmental valuation. Department of Rural Economy, Faculty of Agriculture, University of Alberta, Alberta, BC.
- BC Ministry of Forests. 1996. Clearcutting and visual quality: a public perception study. B.C. Ministry of Forests, Victoria, BC.
- Berris, C., and P. Bekker. 1989. Logging in Kootenay landscapes: The public response. Land Management Report No. 57., B.C. Ministry of Forests, Victoria, BC.
- Bjorner, T., C. Russel, A. Dubgaard, C. Damgaard, and L. Anderson. 2000. Public and Private Preference for Environmental Quality in Denmark. Forlaget, Denmark.
- Bliss, J. 2000. Public perceptions of clearcutting. *Journal of Forestry*.
- Boxall, P., W. Adamowicz, J. Swait, M. Williams, and J. Louviere. 1996. A comparison of stated preference methods for environmental valuation. *Ecological Economics* **18**:243-253.
- Brunson, M., and B. Shelby. 1992. Assessing recreational and scenic quality: how does new forestry rate? *Journal of Forestry* **90**.
- Condon, B. 1993. The economic valuation of non-timber resources in Newfoundland: a CVM approach. MA Report. University of Alberta, Alberta.
- Corne, L., P. Reed, and J. Schaefers. 2002. Social and economic assessment of the Chugach National Forest area. PNW-GTR-561, U.S. Department of Agriculture, Forest Service., Portland, OR.
- Costanza, R., R. d'Arge, R. de Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R. O'Neill, J. Paruelo, R. Raskin, P. Sutton, and M. van den Belt. 1997. The value of the world's ecosystem services and natural capital. *Nature* **387**.
- Dillman, D. 1978. *The Total Design Method*. John Wiley & Sons, Inc. UK.
- Filion, F., A. Jacquemot, E. DuWors, R. Reid, P. Boxall, P. Bouchars, P. Gray, and A. Bath. 1994. *The Importance of Wildlife to Canadians: The Economic Significance of Wildlife-Related Recreational Activities in 1991*. Canadian Wildlife Service, Environment Canada, Canada.
- FMF. 2002. Fundy Model Forest. Can be found on the web at the following address: http://www.fundymodelforest.net/e/welc_e/welc_fse.html.
- Hagen, D., J. Vincent, and P. Wells. 1992. Benefits of preserving old-growth forests and the spotted owl. *Contemporary Policy Issues* **10**:13-26.
- Hologen, P., L. Mattsson, and C. Li. 2000. Recreation values of boreal forest stand types and landscapes resulting from different silvicultural systems: An economic analysis. *Journal of Environmental Management* **60**:173-180.

- Kearney, A. 1996. Public attitudes and preferences regarding the Indian River. School of Natural Resources and Environment, University of Michigan.
- Kurttila, M., M. Pesonen, J. Kangas, and M. Kajanus. 2000. Utilizing the analytic hierarchy process (AHP) in SWOT analysis - a hybrid method and its application to a forest-certification case. *Forest Policy and Economics* **1**:41-52.
- Marktrend. 2000. Forest Issues Survey. Marktrend Inc. Vancouver.
- McDaniels, T., and C. Roessler. 1998. Multi-attribute elicitation of wilderness preservation benefits: a constructive approach. *Ecological Economics* **27**:299-312.
- Miller, P. 1988. A Landscape Ecology Approach to Visual Resource Management. Pages 191-202 *in* R. Moss, editor., *Landscape Ecology and Management*.
- Paquet, J., and L. Belanger. 1997. Public acceptability thresholds of clearcutting to maintain visual quality of boreal balsam fir landscapes. *Forest Science*:46-55.
- Pearse, D., and C. Pearse. 2001. The value of forest ecosystems. Secretariat Convention on Biological Diversity. UK.
- Reid, R., M. Stone, and T. Whitely. 1995. Economic value of wilderness protection and recreation in British Columbia. British Columbia Ministries of Forests, and Environment, Lands and Parks., British Columbia.
- Robson, M., A. Hawley, and D. Robinson. 2000. Comparing the social values of forest-dependent, provincial and national publics for socially sustainable forest management. *The Forestry Chronicle* **76**:615-622.
- Saaty, T. 1980. *The analytic hierarchy process*. McGraw-Hill, Inc.
- Sanderson, L., R. Colborne, and K. Beesley. 2002. Woodland owners' perceptions and attitudes toward sustainable forest management. Nova Scotia Agricultural College, Truro, NS.
- Schmoldt, D., and D. Peterson. 2000. Analytical group decision making in natural resources: Methodology and Application. *Forest Science* **46**:62-75.
- Thorn, A., T. Daniel, and B. Orland. 1997. Data visualisation of New Zealand forestry. *in* *GeoComputation*, University of Otago, New Zealand.
- Walsh, R., R. Bjonback, R. Aiken, and D. Rosenthal. 1990. Estimating the public benefits of protecting forest quality. *Journal of Environmental Management*. **30**:175-189.
- Witt, P. 1998. Willingness to pay for future outdoor recreation related amenities in the Texas outdoors: a vision for the future. Department of Recreation, Park and Tourism Sciences, Texas A&M University, Texas.

7.0 APPENDIX A: NB PUBIC FOREST VALUES SURVEY

Section 1: Attribute Information

This section will assist us in statistical analysis of the surveys.

1) How long have you lived at your present address? _____

2) Do you own forested land over 2 hectares? Please check appropriate box.

<input type="checkbox"/> YES	<input type="checkbox"/> NO
↓	↓
Go to question 2b.	Go to question 3.

2b) Do you presently have a management plan for your woodlot? Please check appropriate box.

<input type="checkbox"/> YES	<input type="checkbox"/> NO
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3) Does someone in your household work in the forestry sector? Please check appropriate box.

<input type="checkbox"/> YES	<input type="checkbox"/> NO
------------------------------	-----------------------------

4) Please check all of the groups below that you or a family members belong to:

<input type="checkbox"/> HUNTING OR FISHING ORGANIZATION	<input type="checkbox"/> CONSERVATION OR ENVIRONMENTAL ORGANIZATION	<input type="checkbox"/> ATV OR SNOWMOBILE ORGANIZATION	<input type="checkbox"/> WILDLIFE OR FORESTRY ORGANIZATION	<input type="checkbox"/> BIKING, SKIING, OR HIKING ORGANIZATION
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5) Which of these activities have you or a family member participated in over the past 12 months? Please check appropriate box.

Activity	Times Per 12 Month Period					
HUNTING	<input type="checkbox"/> 0-5	<input type="checkbox"/> 6-10	<input type="checkbox"/> 11-15	<input type="checkbox"/> 16-20	<input type="checkbox"/> 21+	<input type="checkbox"/> NEVER
FISHING	<input type="checkbox"/> 0-5	<input type="checkbox"/> 6-10	<input type="checkbox"/> 11-15	<input type="checkbox"/> 16-20	<input type="checkbox"/> 21+	<input type="checkbox"/> NEVER
BIKING	<input type="checkbox"/> 0-5	<input type="checkbox"/> 6-10	<input type="checkbox"/> 11-15	<input type="checkbox"/> 16-20	<input type="checkbox"/> 21+	<input type="checkbox"/> NEVER
WALKING	<input type="checkbox"/> 0-5	<input type="checkbox"/> 6-10	<input type="checkbox"/> 11-15	<input type="checkbox"/> 16-20	<input type="checkbox"/> 21+	<input type="checkbox"/> NEVER
SKIING/SNOW SHOEING	<input type="checkbox"/> 0-5	<input type="checkbox"/> 6-10	<input type="checkbox"/> 11-15	<input type="checkbox"/> 16-20	<input type="checkbox"/> 21+	<input type="checkbox"/> NEVER
SNOWMOBILING	<input type="checkbox"/> 0-5	<input type="checkbox"/> 6-10	<input type="checkbox"/> 11-15	<input type="checkbox"/> 16-20	<input type="checkbox"/> 21+	<input type="checkbox"/> NEVER
BIRD-WATCHING	<input type="checkbox"/> 0-5	<input type="checkbox"/> 6-10	<input type="checkbox"/> 11-15	<input type="checkbox"/> 16-20	<input type="checkbox"/> 21+	<input type="checkbox"/> NEVER

6) Are you aware of the Fundy Model Forest?

<input type="checkbox"/> YES	<input type="checkbox"/> NO
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Section 2. Views Section

This section helps us understand how people (you) look at current forestry practices. Please circle the number that best reflects how you feel about each of the following statements.

7) Who should forest managers be most responsive to when setting forest management goals? Please order from 1 - 9 the importance of the following interest groups according to your own preferences (1= highest importance).

INTEREST GROUP	ORDER (1 TO 9)
1. LOCAL EFFECTED COMMUNITIES	
2. LOCAL EFFECTED FIRST NATIONS GROUPS	
3. LOCAL EFFECTED INDUSTRY	
4. LOCAL EFFECT ENVIRONMENTAL INTEREST GROUPS	
5. PROVINCIAL/NATIONAL ENVIRONMENTAL INTEREST GROUPS	
6. PROVINCIAL PUBLIC OPINION	
7. NATIONAL PUBLIC OPINION	
8. GOVERNMENTAL NATURAL RESOURCE AGENICIES	
9. INTERNATIONAL PUBLIC OPINION	

8) Please order from 1 - 6 the importance of the following uses of Canada’s forests in accordance with your own preferences (1-highest importance).

MAJOR USE	ORDER (1 TO 6)
1. Use for wilderness protection.	
2. Use as a source of economic wealth and jobs.	
3. Use for maintaining the global ecosystem.	
4. Use as a place for rest and relaxation.	
5. Use for protection of Canada’s air, water, and soil.	
6. Use as a place for a variety of animal and plant life.	

The harvesting of trees is a major activity in many of New Brunswick’s forests. Other uses include commercial uses such as trapping, maple-sugar production, and guiding as well as non-commercial uses such as sport fishing, berry picking, nature interpretation, snowmobiling, hiking, and photography. All these forest uses compete with or complement each other to varying degrees (e.g., the harvesting of trees may influence recreation opportunities and wildlife populations).

Please indicate how you feel about each of the following forest management priorities by checking the box option that best reflects your feelings.

9) Forests should be managed only to produce and harvest timber.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON’T KNOW
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10) Trees like any other crop should be cut & replenished to provide consumer products.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

11) Forests should be managed for a wide range of benefits and users rather than for timber production alone.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

12) Maintaining the economy of logging communities is more important than preserving the forest for other uses and values.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

13) The present rate of harvesting trees in New Brunswick is too great to sustain the forest for uses and values other than timber production.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

14) More environmental legislation is needed to keep harvesting New Brunswick's forests from being harvested at an unsustainable rate.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

15) Forest managers should try to minimize impacts on traditional rural ways of life (e.g., hunting and fishing for food).

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

Tree harvesting methods depend upon the physical environment and the biological makeup of the area. Harvesting methods range from clear-cutting to partial cutting. Clear-cutting is the removal of all the trees within a cutting area, and is the dominant logging practice in New Brunswick. Partial cutting is the removal of certain trees selected on the basis of age, species, or health.

Please indicate how you feel about each of the following statements by checking the box option that best reflects your feelings:

16) Tree harvesting methods should maximize economic returns regardless of their impact on other forest values and uses.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

17) Clear-cutting has negative visual effects.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

18) Clear-cutting a patch of forestland is worse for the environment than making a hay field on the same patch of land.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

19) Clear-cutting leads to over cutting.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

20) Clear-cutting mimics natural disturbances (forest fire and spruce budworm attacks).

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

21) Clear-cutting had negative environmental effects.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

22) Partial-cutting is better than clear-cutting for maintaining forest uses and values other than timber production.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

23) All types of forest harvesting lowers biodiversity.

<input type="checkbox"/> STRONGLY AGREE	<input type="checkbox"/> AGREE	<input type="checkbox"/> NEUTRAL	<input type="checkbox"/> DISAGREE	<input type="checkbox"/> STRONGLY DISAGREE	<input type="checkbox"/> I DON'T KNOW
--	---------------------------------------	---	--	---	--

Section 3. Values Section

This section helps us understand how you value the forest in different ways.

The forests of New Brunswick provide many values to the public. Existence values include wildlife, biodiversity, and the legacy of leaving an intact forest ecosystem for future generations. Recreation values include the fun things people do in the forest such as walking, bird watching, and looking at the view. Environmental values include the support provided to clean air, water and soil quality. Economic values are the jobs and incomes provided from timber and non-timber harvesting activities.

24) How do you value the forest?

- ◆ Please order the following from 1 - 4 (1= most important).

EXISTENCE _____	RECREATION _____	ENVIRONMENTAL _____	ECONOMIC _____
--------------------	---------------------	------------------------	-------------------

25) For each pair of value comparisons below:

- ◆ Check one box on each line of the grey-highlighted section to indicate the value that is *more important* to you.
- ◆ Check one box in the white section to the right to indicate *how much more important* that value is compared to the other.

(Note: If both values are of the same importance to you, please just check the “EQUALY” box.)

VALUE COMPARISONS (ENVIRONMENTAL)			HOW MUCH MORE IMPORTANT?			
<input type="checkbox"/> Air quality	vs	<input type="checkbox"/> Water quality	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Water quality	vs	<input type="checkbox"/> Soil quality	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Soil quality	vs	<input type="checkbox"/> Nutrient Cycling	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Nutrient Cycling	vs	<input type="checkbox"/> Water quality	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Soil quality	vs	<input type="checkbox"/> Air quality	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Air quality	vs	<input type="checkbox"/> Nutrient Cycling	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY

26) Similarly to Question 25:

VALUE COMPARISONS (ECONOMIC)			HOW MUCH MORE IMPORTANT?			
<input type="checkbox"/> Rural jobs	vs	<input type="checkbox"/> Urban jobs	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Urban jobs	vs	<input type="checkbox"/> Industry profits	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Industry profits	vs	<input type="checkbox"/> Rural jobs	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Tourism	vs	<input type="checkbox"/> Urban jobs	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Rural jobs	vs	<input type="checkbox"/> Tourism	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Tourism	vs	<input type="checkbox"/> Industry profits	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY

27) Similarly to Question 25:

VALUE COMPARISONS (RECREATION)			HOW MUCH MORE IMPORTANT?			
<input type="checkbox"/> Hiking/Biking	vs	<input type="checkbox"/> Hunting/Fishing	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Hunting/Fishing	1/S	<input type="checkbox"/> Landscape view	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> ATV/Snowmobiling	1/S	<input type="checkbox"/> Hiking/Biking	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Camping	1/S	<input type="checkbox"/> Hunting/Fishing	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Landscape view	1/S	<input type="checkbox"/> ATV/Snowmobiling	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> ATV/Snowmobiling	1/S	<input type="checkbox"/> Hunting/Fishing	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Landscape view	1/S	<input type="checkbox"/> Hiking/Biking	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Hiking/Biking	1/S	<input type="checkbox"/> Camping	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Camping	1/S	<input type="checkbox"/> Landscape view	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> ATV/Snowmobiling	1/S	<input type="checkbox"/> Camping	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY

28) Similarly to Question 25:

VALUE COMPARISONS (EXISTENCE)			HOW MUCH MORE IMPORTANT?			
<input type="checkbox"/> Biodiversity	vs	<input type="checkbox"/> Bequest	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Bequest	1/S	<input type="checkbox"/> Cultural/Heritage	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Cultural/Heritage	1/S	<input type="checkbox"/> Spiritual	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Spiritual	1/S	<input type="checkbox"/> Bequest	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Biodiversity	1/S	<input type="checkbox"/> Cultural/Heritage	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> Biodiversity	1/S	<input type="checkbox"/> Spiritual	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY

29) Similarly to Question 25:

VALUE COMPARISONS (MAJOR CATEGORIES)			HOW MUCH MORE IMPORTANT?			
<input type="checkbox"/> ECONOMIC	vs	<input type="checkbox"/> ENVIRONMENTAL	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> ENVIRONMENTAL	1/S	<input type="checkbox"/> EXISTENCE	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> RECREATION	1/S	<input type="checkbox"/> ECONOMIC	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> RECREATION	1/S	<input type="checkbox"/> ENVIRONMENTAL	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> EXISTENCE	1/S	<input type="checkbox"/> ECONOMIC	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY
<input type="checkbox"/> RECREATION	1/S	<input type="checkbox"/> EXISTENCE	<input type="checkbox"/> EQUALY	<input type="checkbox"/> WEAKLY	<input type="checkbox"/> MODERATELY	<input type="checkbox"/> ABSOLUTELY

Section 4. Forest Management Section

This section helps us understand how you view important forest management issues. Please read the information below, and then answer the questions.

It is possible to subsidize private landowners to encourage management for diverse forest values. This subsidy would in part cover the harvest revenues owners would be losing by not harvesting all the forest products available for harvest on their land. If owners have (and follow) a management plan with the requirements below, they would qualify for a subsidy:

i) Existence Management – Maintain biodiversity, leave intact functional ecosystems for future generations, preserve areas of cultural importance.	iii) Recreation/Aesthetics - Allow hikers, skiers, bikers, and birdwatchers access to their land, either to recreate in, or to pass through to another site, maintain viewscapes.
ii) Environment – Maintain large buffers on waterways and roads, manage for air, water, and soil quality.	iv) Economic – Maintain employee employment levels and wage income.

30) Would you be willing to pay \$50 through a one-time increase in your provincial taxes to support the above fund for private landowner forest management?

<input type="checkbox"/> YES	<input type="checkbox"/> NO
↓	↓
Would you pay \$100? <input type="checkbox"/> YES <input type="checkbox"/> NO	Would you pay \$25? <input type="checkbox"/> YES <input type="checkbox"/> NO

31) What percentage of the money you are willing to pay in question 30 should go to support each of the following values?

EXISTENCE _____%	RECREATION _____%	ENVIRONMENT _____%	ECONOMIC _____%	= 100%
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32) What percentage of the Existence moneys should go to each of the following?

BIODIVERSITY _____%	FUTURE GENERATIONS _____%	CULTURAL/HERITAGE _____%	SPIRITUAL _____%	= 100%
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33) What percentage of the Recreation moneys should go to each of the following?

HIKERS/BIKERS _____%	CAMPERS _____%	LANDSCAPE VIEW _____%	HUNTING/FISHING _____%	ATV/SNOWMOBILING _____%	=100%
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34) What percentage of the Environment moneys should go to each of the following?

WATER QUALITY _____%	NUTRIENT CYCLING _____%	AIR QUALITY _____%	SOIL QUALITY _____%	= 100%
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35) What percentage of the Economic moneys should go to each of the following?

RURAL JOBS _____%	URBAN JOBS _____%	INDUSTRY PROFITS _____%	TOURISM _____%	= 100%
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36) What percentage of the costs of diverse forest values management should be borne by each party (out of 100%)?

PROVINCIAL GOVERNMENT _____ %	WOODLOT MANAGER _____ %	WOOD BUYER _____ %	<input type="checkbox"/> I DO NOT THINK MORE INNOVATIVE MANAGEMENT IS NECESSARY.
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Section 5: Attribute Information

This section will assist us in statistical analysis of the surveys.

37) Are you male or female?

<input type="checkbox"/> Male	<input type="checkbox"/> Female
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38) What is your age range? Please check appropriate box:

<input type="checkbox"/> 15-19 YEARS	<input type="checkbox"/> 20-24 YEARS	<input type="checkbox"/> 25-44 YEARS	<input type="checkbox"/> 45-54 YEARS
<input type="checkbox"/> 55-64 YEARS	<input type="checkbox"/> 65-74 YEARS	<input type="checkbox"/> 75-85 YEARS	<input type="checkbox"/> AGE 85 AND OVER

39) What is the highest education level you have completed? Please check appropriate box:

<input type="checkbox"/> ELEMENTARY	<input type="checkbox"/> SOME HIGH SCHOOL	<input type="checkbox"/> HIGH SCHOOL
<input type="checkbox"/> SOME POST SECONDARY	<input type="checkbox"/> POST SECONDARY	<input type="checkbox"/> GRADUATE STUDIES







40) What is your approximate annual household income? Please check appropriate box:

<input type="checkbox"/> 0-\$20,000	<input type="checkbox"/> \$20,001-\$30,000	<input type="checkbox"/> \$30,001-\$40,000
<input type="checkbox"/> \$40,001-\$50,000	<input type="checkbox"/> \$50,001-\$70,000	<input type="checkbox"/> \$70,001 and up

Thank you very much for taking the time to help me by completing this survey!!!
 If you have any questions, concerns, or comments please write them on the back of this sheet, or contact me at any time. If you want a copy of my results, please fill in your name and contact information on the back of this sheet. Remember this is a **confidential** survey, and if you don't include your contact information, you may still request survey results in the future.

8.0 APPENDIX B: FOCUS GROUP ANALYSIS OF STAND-TYPES

Below is an example of photos that could be used in focus group sessions. These pictures are shown in pairs of two, and are set up in an AHP format. Specifically, for each pair of photos, focus group participants would be asked to choose their preferred option for a particular forest value (economic, environmental, existence, and recreation). They would then be asked to rank by how much they prefer one above the other (for each particular value). Participants would be encouraged to discuss the reason for their rankings.

	
A vs. B	Equally Slightly Moderately Definitely Absolutely
	
C vs. A	Equally Slightly Moderately Definitely Absolutely
	
B vs. C	Equally Slightly Moderately Definitely Absolutely