Campbell River Project Water Use Plan

Upper and Lower Campbell and John Hart Reservoirs Survey

Implementation Year 1

Reference: JHTMON-2

Upper Campbell, Lower Campbell and John Hart Reservoirs and Elk Canyon Public Use and Perception Survey

Study Period: 2015

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EXECUTIVE SUMMARY

The Upper and Lower Campbell and John Hart Reservoirs and Elk Canyon Public Use and Perceptions Study (JHTMON 2) is a 10-year study that will monitor the use and perceptions of recreational and tourism users of the reservoirs, rivers and Elk Falls site within the Campbell River Reservoir system. This project forms part of the Campbell River Water Use Plan and aims to establish performance measures for a full range of recreational factors and evaluate the recreation and tourism opportunities through an on-going perception study.

The study includes: the determination of performance measures, the development of impact hypotheses to address the management questions outlined in the project Terms of Reference (BC Hydro 2013), sampling design and site selection, questionnaire and discrete choice experiment (DCE) design, data collection, data entry and management, data analysis, and reporting. This report summarizes and synthesizes the results of Year 1, the developmental year of the study (2014/2015). Data analyses will be completed and included in the Year 2 report.

The key management questions to be addressed by the program are outlined in Table 1. To address the management questions, specific parameters are being measured using a public use and perceptions survey along with available water level/river discharge data, to be administered seasonally over the course of 10 years.

Impact hypotheses were developed in direct relation to the management questions. The survey has been designed to address the impact hypotheses while also incorporating performance measures determined at the initial stages of the study design.

The sampling plan included the determination of sampling effort, identification of the sample locations, and timing of sampling. Total effort annually is anticipated to be 128 interview days conducted at eight sites across four seasons. The sample locations are Quinsam River Campsite/Lower Campbell River trails; Elk Falls Day-Use Area; McIvor Lake Park; Loveland Bay Provincial Park; Ralph River Campsite; Buttle Lake Campsite; Miller Creek Forest Recreation Site; and Campbell Lake Forest Recreation Site.

Survey design involved several phases, addressing both the base questionnaire and DCE components. The key phases included consultation with BC Hydro and associated management agencies; determination of the discrete choice experiment framework, design of the questionnaire and DCE survey tool; and survey testing and refinements.

The DCE component of the survey was designed to identify preferences for recreational features affected by water use operations and to gather information about public use and perceptions on recreation in the Campbell Reservoirs. The DCE design utilizes photos manipulated to represent different reservoir scenarios with a focus on five attributes: water level; quantity of debris; shoreline condition; lakebed condition; and type of boat launch. In total, 48 photo combinations were produced and blocked into four different booklets. Each respondent is given one of the four photo booklets along with the survey, and asked to choose and record their preferred scenarios.

Data analysis will occur following the data collection in Year 2 (2015/2016). Analysis will include descriptive and comparative statistical tests, as is appropriate for the different types of data. Future reports will describe the outcome of Year 2 data collection and the results of the data analysis.

Table 1. JHTMON2 - Status of management questions and hypotheses after Year 1

Management Question	Null Hypotheses	Comments
For Reservoirs: What is the relationship between reservoir operations and overall recreation benefit and does it lead to competing trade-offs between reservoir based and river based benefits?	$H_{0\text{-}A}$: Changes in overall satisfaction with the recreation experience, if they occur, are not related to reservoir operations.	No results to date. Year 1 was allocated to study development. No data analysis was conducted.
For Rivers: What is the relationship between river discharge and respective riverine recreation/tourism benefits and is it such that it would necessitate trade-offs between recreation, fish and power benefits?	$H_{0\text{-}B}$: Changes in overall satisfaction with the recreation experience, if they occur, are not related to riverine discharge.	No results to date. Year 1 was allocated to study development. No data analysis was conducted.
For Elk Canyon Falls: Is there a specific relationship between recreational value and incidence of high spill events and does this support the presently held belief that higher flows should be considered in the future?	$H_{0\text{-}C}$: Changes in overall satisfaction with the recreation experience of visitors to Elk Canyon Falls is not related to riverine discharges (i.e. spill events).	No results to date. Year 1 was allocated to study development. No data analysis was conducted.

ACKNOWLEDGEMENTS

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1 INTRODUCTION

As an outcome of the Consultative Committee process (Campbell River Water Use Plan Consultative Committee, 2004), an objective for recreation and tourism in the Campbell River system was articulated: to enhance and protect the quality of recreation and tourism amenities and increase the quality of recreation and tourism opportunities with sustainable carrying capacities. This process determined preferred reservoir elevation ranges and flow rates which were then adopted in the Campbell River Water Use Plan (WUP). During the Consultative Committee process, preferred elevations, flow rates, weighting, seasons, etc. were determined first using professional judgement and local experience, and second, through a public perceptions study and interviews with local experts (BC Hydro, 2013). Following this approach, it was recognized that a more systematic and robust approach to valuing the recreation resource could be possible (BC Hydro, 2013).

This project aims to improve upon previous evaluations of recreation and tourism within the Campbell River system area (BC Hydro, 2013). It aims to systematically establish performance measures for a full range of recreational factors and evaluate the recreation and tourism opportunities through an on-going perception study. The Upper and Lower Campbell and John Hart Reservoirs and Elk Canyon Public Use and Perceptions Study (JHTMON 2) is a 10-year study that will monitor the use and perceptions of recreational and tourism users of the reservoirs, rivers and Elk Falls site within the Campbell River Reservoir system. This study is one of a series of monitoring programs that fulfills BC Hydro's obligations under the Campbell River WUP as approved by the Comptroller of Water Rights.

The study includes: the determination of performance measures in consultation with applicable government agencies, the development of impact hypotheses to address the management questions outlined in the project Terms of Reference (BC Hydro 2013), sampling design and site selection, questionnaire and discrete choice experiment design, data collection, data entry and management, data analysis, and reporting. This report summarizes and synthesizes the results of Year 1 of the study (2014/2015), which includes all activities up to the implementation of the field sampling.

1.1 MANAGEMENT QUESTIONS AND OBJECTIVES

The Campbell River Recreation Technical Committee identified three management questions to be addressed through the monitoring study. The key management questions to be addressed by the program are:

1. For Reservoirs: What is the relationship between reservoir operations and overall recreation benefit and does it lead to competing trade-offs between reservoir based and river based benefits?

2. For Rivers: What is the relationship between river discharge and respective riverine recreation/tourism benefits and is it such that it would necessitate trade-offs between recreation, fish and power benefits?

3. For Elk Canyon Falls: Is there a specific relationship between recreational value and incidence of high spill events and does this support the presently held belief that higher flows should be considered in the future?

These research questions stem from the main objectives for this study which are to 1) develop a more rigorous approach to determining recreation and tourism performance measures for future WUP reviews and 2) carry out an explicit evaluation of the recreation quality achieved and the trade-offs made during this WUP.

1.2 MANAGEMENT HYPOTHESES

In response to the management questions, we have devised the following research hypotheses that will be tested by the monitoring program.

For Reservoirs:

The first research hypothesis addresses the relationship between reservoir operations and overall recreation benefits. For the purposes of this study, benefits have been defined as satisfaction with the recreational experience. Testing of this hypothesis is informed by responses to the public use and perceptions survey in association with reservoir operations data available from BC Hydro.

- $H_{0\text{-}A}$: Changes in overall satisfaction with the recreation experience at reservoirs, if they occur, are not related to reservoir operations.

The second part of the management question asks if reservoir operations lead to competing trade-offs between reservoir based and river based operations. This component of the management question will be explored by comparing the results of any relationship found between reservoir levels and satisfaction of reservoir recreationists with those of any relationship between riverine flows and satisfaction of riverine-based recreationists.

For Rivers:

This research hypothesis is associated with addressing the relationship between river discharge operations and riverine recreation benefits, as measured by satisfaction with the riverine recreation experience. Testing of these hypotheses is informed by responses to the public use and perceptions survey in association with riverine discharge data available from BC Hydro.

- $H_{0\text{-}B}$: Changes in overall satisfaction with the recreation experience at rivers, if they occur, are not related to riverine discharge.

For Elk Canyon Falls:

The final research hypothesis is associated with addressing the relationship between river discharge operations and riverine recreation benefits, as measured by satisfaction with the recreation experience.

Testing of these hypotheses is informed by responses to the public use and perceptions survey in association with riverine discharge data available from BC Hydro.

- $H_{0\text{-}C}$: Changes in overall satisfaction with the recreation experience of visitors to Elk Canyon Falls is not related to riverine discharges (i.e. spill events).

2 METHODOLOGY

To address the management questions and supporting hypotheses, specific parameters are being measured using a public use and perceptions survey along with available water level/river discharge data. This monitor has scheduled annual sampling for 10 years, with sampling occurring across all four seasons. Year 1 was identified as being the developmental year of project, during which Performance Measures and impact hypotheses were identified, study design and framework established, and a finalized questionnaire/survey tool completed. At the end of each sampling year, the data is to be summarized in an interim report format. A summary report is to be produced at the end of Year 5, and a comprehensive final report is to be produced at the conclusion of the project.

2.1 STUDY DESIGN

2.1.1 DETERMINATION OF PERFORMANCE MEASURES AND INFLUENTIAL FACTORS

As identified by BC Hydro, this study aims to utilize performance measures as a means of gauging success in the provision of quality recreational opportunities as they relate to water management in the Campbell River Reservoir system. As a prerequisite, performance measures need to be meaningful to the relevant agencies and directly relate to water management in the study area. Performance measures were determined by consulting with applicable government agencies and BC Hydro. Input was sought from land managers who have a mandate to provide and manage recreation opportunities that may be affected by water management (i.e. water levels in reservoirs, flows in rivers). The primary government agencies that offer recreational opportunities within the study area are BC Parks of the Ministry of Environment and the Recreation Sites and Trails Branch of Ministry of Forests, Lands and Natural Resource Operations (MFLNRO). Other agencies that provide recreational facilities and services include the City of Campbell River and BC Hydro. Key informants from BC Parks and Recreation Sites and Trails Branch were engaged by a combination of phone calls, emails and a written exercise designed to address study questions.

The key informants that were engaged included Brent Blackmun (Nootka Area Supervisor, BC Parks), Andy Smith (Strathcona Area Supervisor, BC Parks), and Duncan McTavish (Recreation Officer, Recreation Sites and Trails Branch). The informants were engaged in a conference call to introduce the project, the objectives, and the topic of performance measures. Following the introduction, the contacts were engaged by email and phone call, and asked to provide a written response to a series of questions to help identify the primary issues for recreation managers and any performance measures that are used internally within their agencies. Following the completion of the written responses, the answers were compiled, and reviewed with the key informants. Neither of the primary agencies (i.e., BC Parks, Recreation Sites and Trails Branch) reported using any specific performance measures in the study area. A list of the written key informant questions can be found with Appendix A.

The compiled responses were then used to develop draft performance measures. These draft performance measures were developed specific to recreational issues associated with water management, as identified by the management agencies. These were subsequently discussed with the same key informants as well as with representatives from BC Hydro, until a final list of performance measures was established. The final performance measures are outlined in Table 2.

Table 2. Water management issues and related performance measures

Management Issue	Performance Measure	Applies to: Reservoir/River/Both
Public safety	▪ Perception of safety while engaged in water-based recreation	Both
Maintaining accessibility	▪ Satisfaction with accessibility to boat launch ▪ Satisfaction with accessibility to shoreline ▪ Satisfaction with accessibility to beach	Reservoir
Protecting shoreline condition for recreation	▪ Satisfaction with shoreline condition for recreation	Both
Retaining visitation levels	▪ Frequency of visitation	Both

2.1.2 SAMPLING PLAN AND SITE SELECTION

2.1.2.1 Sampling Frequency

Sampling efforts were designed to ensure that statistical conclusions can be drawn given potential stratification of results. Eight sampling locations were selected with assistance from BC Parks, City of Campbell River, and Recreation and Trails Branch across the study area. Sampling is scheduled to occur across all seasons of the year, including winter (October 22 to March 31), spring (April 1 to June 20), summer (June 21 to September 10) and fall (September 11 to October 21). Total sampling effort has been set to 128 interview days, providing four interview days per site for eight sites across four recreation seasons. Sampling dates have been selected to overlap with public holidays and weekends to maximize sampling during periods of high visitation. Sampling will be completed concurrently at different sampling locations by two employees of the Laich-Kwil-Tach Environmental Assessment Ltd. Partnership (LKT), based in Campbell River, BC. Following the first year of data collection, sampling effort may be adjusted in order to meet the sample size needed to achieve a statistical confidence of 95% (α=0.05, β=0.80). A preliminary sampling schedule is outlined in Table 3.

Table 3. Proposed 2015/2016 sampling schedule for each season

2015/2016 Season	Scheduling
Summer	August 1-August 25, 2015 (Aug 1-4, Aug 7-10, Aug 13-16, Aug 22-25)
Fall	September 19-October 12, 2015 (Sept 19-22, Sept 25-28, Oct 1-4, Oct 9-12)
Winter	March 4-March 28, 2016 (Mar 4-7, Mar 10-13, Mar 19-22, Mar 25-28)
Spring	May 20-June 12, 2016 (May 20-23, May 28-31, Jun 3-6, Jun 9-12)

Two approaches were used for determining a target sample size. The basic approach to estimating sample size is based on desired confidence level and confidence interval. Aiming for a confidence level of 95% (p=0.05), a confidence interval of 4% (e=0.04), and assuming a large population size (20,000 is standard (Roasoft, 2016)), a sample size of 583 is needed. Z-score for 95% confidence level is 1.96. Given that Strathcona Provincial Park alone is noted as receiving approximately 16,000 day-use visitors annually and 4,000 overnight visitors in the busiest month (BC Parks, 1993), assuming a large population size for the study area is appropriate.

The more complex approach to determining a target sample size is completing an *a priori* power analysis. The power analysis focused on the analysis involved with determining a relationship with reservoir water level and visitor satisfaction. Power simulations were used to determine the sample size necessary to detect a change in the proportion of visitors reporting a positive experience (i.e. "very satisfied" and "satisfied") if visitor experience is related to water level. Simulations assumed five water level categories and an average positive response rate of 80% when water levels were in the four highest categories (high-high, high, medium, low). The simulations examined declining positive response rates when water levels are classified as low-low, the scenarios considered reductions in positive response rates from 80% to 20% at intervals of 10%. To account for uncertainty in the number of surveys that will be collected at each water level, the number of surveys within each category were assigned randomly from a uniform distribution on every simulation run. A binomial generalized linear model was used to test if water level category had a significant effect on reported experience for each simulation. Each scenario was run 1000 times and power was calculated based on the proportion of simulations with a significant p-value at $\alpha <= 0.05$.

When sample size is 100, an effect of water level on visitor experience could only be detected 80% of the time once the proportion of positive visitor experiences had dropped to 40%. With a sample size of 500, a 20% decline in visitor experience when water levels were low-low could be detected 80% of the time. These sample recommendations assume that water level has an additive effect on recreation experience. If the effect of water level on visitor experience is similar across sites and years, then 500 surveys is the minimum total sample size needed to detect a 20% decline in visitor experience. If the effect of water level on visitor experience is expected to differ among sites, then a minimum of 500 samples per site is recommended over the course of the entire study. Using fewer water level categories or a continuous water level variable as the predictor would also increase power to detect a change in visitor experience.

2.1.2.2 Sampling Locations

Sampling locations were selected to maximize the number of responses to the survey while also ensuring geographical representation of the area of interest. EDI consulted with contacts at BC Hydro, BC Parks and MFLNRO to determine a list of the most popular recreation sites, including locations along reservoirs, rivers and Elk Canyon Falls. Eight sampling locations were selected for conducting the surveys (see Figure 1).

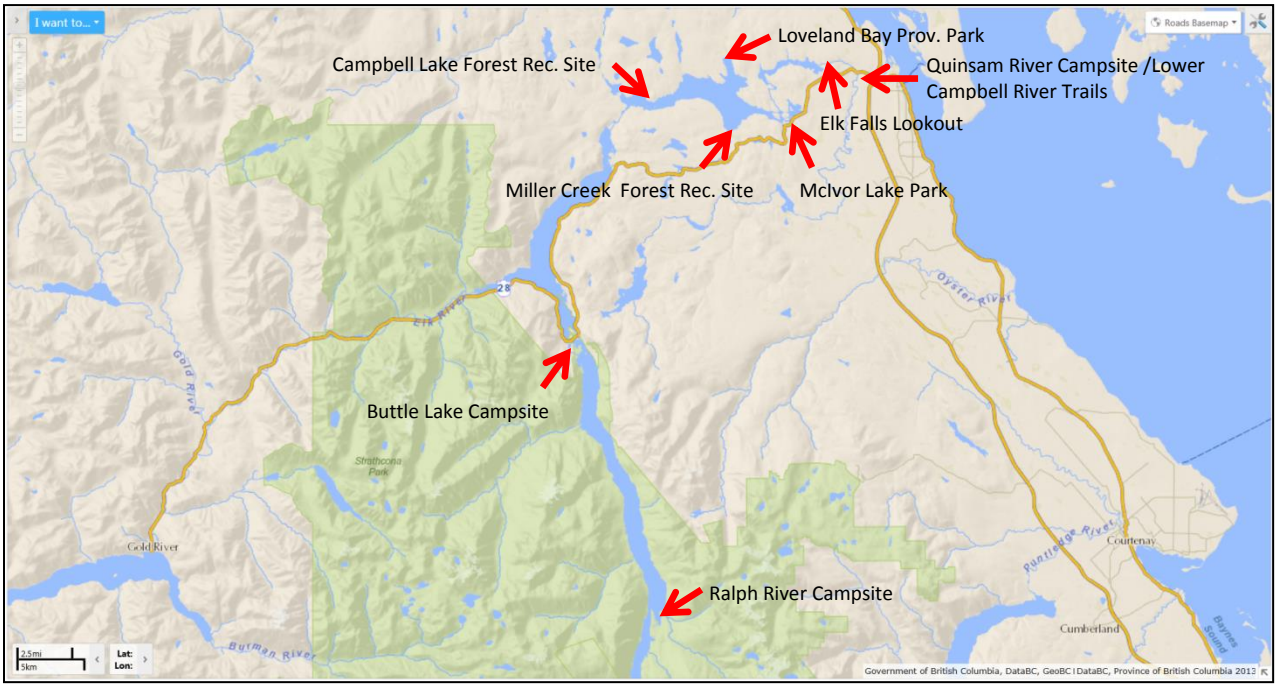

Figure 1. Map of sample locations (adapted from iMapBC)

The number of sampling sites was reduced to accommodate seasonal site closures. Site closures are described in Table 4. For example, during the fall sampling season, several of the popular sample locations close for the season. Sampling will occur at these sites when possible. However, when these sites close, sampling efforts will be moved to those sites that are still open.

Table 4. Sample locations and availability for sampling

Sample Location	Open for Sampling (Yes/No/Limited)				Waterbody Represented
	Summer	Fall	Winter	Spring	
Quinsam River Campsite/Lower Campbell River trails (Elk Canyon Falls Provincial Park)	Yes	Yes	Yes	Yes	River
Elk Falls Look-out/Day-Use Area (Elk Canyon Falls Provincial Park)	Yes	Yes	Yes	Yes	Falls
McIvor Lake Park	Yes	Yes	Yes	Yes	Reservoir
Loveland Bay Provincial Park	Yes	Limited	No	Yes	Reservoir
Ralph River Campsites (Strathcona Provincial Park)	Yes	Limited	No	Yes	Reservoir
Buttle Lake Campsite (Strathcona Provincial Park)	Yes	Yes	No	Yes	Reservoir
Miller Creek Forest Recreation Site	Yes	Limited	No	Yes	Reservoir
Campbell Lake Forest Recreation Site	Yes	No	No	Yes	Reservoir

2.2 SURVEY DELIVERY

The public use and perceptions survey is designed to be delivered as an onsite survey, administered to visitors at sample sites. As practical, all parties at a sample site will be approached for inclusion in this study. People will be approached at all times during the sampling session. Sampling sessions will occur on site between 9AM and 5PM. When possible, participation is requested after engaging in recreational activities although the survey is designed to be administered at any point during their trip. A representative from each party will be asked to participate in the survey. Respondents are to complete the questionnaire onsite. People who refuse to participate will be thanked for their time and were not engaged further. Surveyors will keep track of the number of individuals they asked to complete the survey, the number who refuse and the number who have already taken the survey in the past year. This information will be used to calculate a response rate.

A standard introduction statement that summarizes the cover letter accompanying the questionnaire will be made to all prospective participants. If asked what the surveys are to be used for, people are to be told that the information will provide insights into public use and preferences for water management for BC Hydro. Contact information for the BC Hydro technical lead has been provided on the survey in the event that anyone has questions or concerns about the project.

2.3 SURVEY DESIGN

The key components during the design phase of the base questionnaire and discrete choice analysis (DCE) included the following:

- Consultation with BC Hydro and the associated management agencies
- Determination of the Discrete Choice Experiment framework
- Design of the questionnaire and DCE survey tool
- Survey testing and refinements

2.3.1 PUBLIC USE AND PERCEPTIONS SURVEY

The main component of the public use survey was developed following social science best principles including those found in Dillman (2007) *Mail and Internet Surveys: The Tailored Design Method* and Vaske (2008) *Survey Research and Analysis: Applications in Parks, Recreation and Human Dimensions*. Considerations were given towards ease of understanding and maximizing survey completion and return rates. The survey was designed to follow a logical flow of questioning and providing instructions to respondents that were clear and concise as possible. A key challenge to the development of the survey was that the same survey needed to be able to collect information about visitors' experiences at various types of waterbodies (e.g. reservoir, river, falls).

The survey was designed so that respondents could relay perceptions about their experiences at multiple waterbody types, rather than just the one they were encountered at; individuals were asked to reply based on their experiences at the place they were encountered at that day (e.g., at a reservoir), as well for other waterbody types they may have visited most recently on the same trip (e.g., at a river the previous day). This approach allows for gathering more responses regarding each location type, as many visitors will visit multiple waterbody types and locations during the same trip.

Testing of a draft survey was completed in April 2015 with a small focus group. The aim of the testing was to use a small number of test surveys to reveal overarching problems, such as awkward wordings, missing response categories, leading statements and issues with duration (e.g. survey too long). Following these revisions, several iterations of the survey were circulated and reviewed between May and July 2015 in order to discuss question content, ordering, wording, range of answer options, and question instructions. Review was conducted primarily by representatives from BC Hydro, BC Parks and BC Recreation Sites and Trails. The survey went through numerous drafts and formats, until a preferred design was established. The questionnaire was printed in a booklet-style, with each page of the booklet being 5.5" by 8.5" (i.e., an 8.5" by 11" page, folded in half).

In general, the questionnaires utilize a variety of survey question types, including check-list, Likert scale, and some open-ended quantitative questions. The full questionnaire has been designed to take a maximum of 15 minutes although most respondents will typically complete it much faster as only some sections will apply.

Questions were included in the survey to ensure that the impact hypotheses, outlined in Section 1.2 are addressed. The specific questions and how the questions relate to the impact hypotheses are described in further detail in Section 2.3.3. Questions were also included in the survey to directly address the performance measures developed in consultation with the regulatory agencies. Performance measures were addressed using Likert-type rating scales where respondents' attitudes are measured directly. Likert-type scales use fixed choice response formats and are designed to measure attitudes or opinions, typically on a 5 to 7 point scale. These ordinal scales measure levels of satisfaction/dissatisfaction, positive/negative influence, agreement/disagreement, etc.

In order to provide further context to recreational use within the study area, supplemental data will be collected, both in the survey and through external data sources. Within the survey, questions have been included to characterize respondents in terms of their demographics, recreational interests and habits. Further supplemental data will be collected by surveyors in the field such as water levels and weather. Data for these influential factors will also be gathered directly from BC Hydro (e.g., reservoir water levels) and other external data sources (e.g., Environment Canada weather archives).

The questionnaire is composed of seven sections:

Section A: Current visit to the Campbell River Reservoir System

Section B: Visit to a Lake/Reservoir

Section C: Future Lake/Reservoir Visits

Section D: Visit to Elk Falls

Section E: Visit to a River

Section F: Past Visits to Campbell River Reservoir System

Section G: About You and Your Party

2.3.2 FUTURE LAKES/RESERVOIR VISITS DISCRETE CHOICE EXPERIMENT

In addition to the standard line of questioning, the survey has integrated a stated preference feature (e.g., discrete choice experiment) to measure attitudes and preferences for different levels of environmental conditions.

The project uses stated preference surveys to examine decision influences by presenting respondents with hypothetical, but realistic situations that may influence their choice to recreate. The project team constructed a discrete choice experiment (DCE) to identify preferences for recreational features affected by water use operations and to gather information about public use and perceptions on recreation in the Campbell Reservoirs to inform BC Hydro's Campbell River Water Use plan.

Choice experiment methods were chosen as they allow respondents to simultaneously evaluate different conditions one might observe in a watershed, and address associated trade-offs in a comprehensive fashion. Choice experiments are used widely in resource management problems and environmental valuation settings (Adamowicz et al., 1998), as well as in limited water resource contexts (Haider and Rasid, 2002; Willis et al., 2005; Barton & Bergland, 2010, Thacher, 2011).

The research team designed and implemented a choice experiment using the following steps:

1. Adapt key recreational performance measures for application in a choice experiment

This step involved the translation of performance measures to variables that can be presented to survey respondents. The project completed this task by working with technical experts, recreation groups, and through extensive testing. Initial options were reviewed and prioritized in technical focus groups and refined in recreational and non-recreational focus groups. One-on-one testing further refined the attributes in the choice experiments described in step 2.

2. Design the survey instrument, including the stated preference choice sets

The project utilized the prioritized list of performance measures from step 1 to develop a recreational questionnaire. The primary purpose of the questionnaire is to present the stated preference choice experiment and collect relevant data into public use and preferences for water management. Design of the questionnaire included preparing questions to collect current recreational activities, satisfactions, and preferences as well as "warm" respondents to the conditions expressed in the choice experiment. Draft surveys were pre-tested to ensure lucidity and clarity of the questionnaire and choice experiment.

Discrete Choice Experiment Design

Within the choice experiment section of the survey, respondents are presented with the following scenario:

> *You will now be presented with six pairs of photos representing different hypothetical lake/reservoir conditions.*
>
> *The conditions of Site A and Site B will differ in each of the following photo pairs. While some of the photos may not seem ideal, each one of them could occur under certain circumstances.*
>
> *For each set of pictures please select whether you would choose to recreate in the area represented in Site A or Site B, or neither of them.*
>
> *There are no right or wrong answers to these special type of research questions but it is important to regard them as real-world situations, in which the selected conditions are available to you. You will be asked to complete a total of six evaluations.*

The scenario was developed based on outcomes from earlier consideration of lake/reservoir recreational values and performance measures. In the experiment, respondents are shown a set of two photos representing differing conditions in a representative lake of the Campbell River reservoir system.

Photos were digitally manipulated from a source photo to represent the varying levels and conditions shown in Table 5 were chosen in consultation of the above described process and are explained in the following:

Table 5. Attribute values in choice experiment

Attribute	Performance Measure	Levels
Quantity of Debris	Perception of safety	1) No Debris 2) Little Debris 3) Average Debris 4) A lot of Debris
Water Level	Protecting Visual Aesthetic	1) Low Low 2) Low 3) Average 4) High 5) High High
Shoreline Condition	Shoreline Condition for Recreation	1) Rocky 2) Sandy
Lakebed Condition		1) Sediment 2) Grass/Woody environment
Type of Boat Ramp	Access Features	1) None 2) Gravel road 3) Concrete pad

The operationalization of the choice experiment was through a statistical design that presented two photos in choice sets. Each choice set presents two recreational alternatives consisting of 5 elements (see Table 5). An "opt out" option was also given. Table 5 presents the photo elements as well as their levels and coding. The attributes of Quantity of Debris (4 levels), water level (5 levels), shoreline (2 levels), lake bed (2 levels)

and boat ramp (3 levels) represents a 4x5x2x2x3 design with 240 possible combinations. To reduce the number of different combinations we used the SAS 9.3 experimental design macro *MktEx* to produce an orthogonal main effects fractional factorial design with minimal overlapping of attribute levels. Use of this macro reduced the number of possible combinations to 48 combinations (see Table 6), blocked into four different versions of six choice sets (2 photos per set), reported as being optimally balanced with 99% D-efficiency.

Photo book preparation

The resulting 48 combinations are represented in Table 6. To prepare the photo representation of each combination, we utilized a base photo and layered in digital representations of each level. The result was a set of 48 photos numbered 1 – 48. Utilizing Adobe InDesign we prepared 4 photobooks containing photos 1-12, 13-24, 25-36, and 37-48. Photo sets were matched to Q15-Q20 in the questionnaire.

Table 6. Resulting combinations of features presented in choice experiment[1]

Photo Number	Debris Quantity	Water Level	Shoreline	Lakebed	Boat Ramp
1	(1)No Debris	(4) High	(2) Sand	(2) Grass/Woody environment	(1) None
2	(2)Little Debris	(5) High High	(1) Rocks	(1) Sediment	(2) Gravel road
3	(1)No Debris	(2) Low	(1) Rocks	(1) Sediment	(3) Concrete pad
4	(3)Average Debris	(2) Low	(1) Rocks	(1) Sediment	(3) Concrete pad
5	(4)A lot of Debris	(1) Low Low	(2) Sand	(2) Grass/Woody environment	(2) Gravel road
6	(3)Average Debris	(3) Average	(2) Sand	(2) Grass/Woody environment	(1) None
7	(4)A lot of Debris	(1) Low Low	(2) Sand	(1) Sediment	(3) Concrete pad
8	(3)Average Debris	(5) High High	(1) Rocks	(2) Grass/Woody environment	(1) None
9	(2)Little Debris	(2) Low	(2) Sand	(1) Sediment	(2) Gravel road
10	(4)A lot of Debris	(3) Average	(2) Sand	(2) Grass/Woody environment	(3) Concrete pad
11	(1)No Debris	(4) High	(1) Rocks	(1) Sediment	(2) Gravel road
12	(2)Little Debris	(1) Low Low	(1) Rocks	(2) Grass/Woody environment	(1) None
13	(3)Average Debris	(3) Average	(1) Rocks	(1) Sediment	(2) Gravel road
14	(2)Little Debris	(4) High	(2) Sand	(2) Grass/Woody environment	(3) Concrete pad
15	(1)No Debris	(1) Low Low	(2) Sand	(1) Sediment	(1) None
16	(4)A lot of Debris	(2) Low	(1) Rocks	(1) Sediment	(1) None
17	(3)Average Debris	(5) High High	(1) Rocks	(2) Grass/Woody environment	(3) Concrete pad
47	(4)A lot of Debris	(4) High	(1) Rocks	(1) Sediment	(3) Concrete pad
19	(2)Little Debris	(5) High High	(2) Sand	(1) Sediment	(2) Gravel road
20	(4)A lot of Debris	(3) Average	(1) Rocks	(1) Sediment	(1) None
21	(3)Average Debris	(2) Low	(2) Sand	(2) Grass/Woody environment	(2) Gravel road
22	(1)No Debris	(1) Low Low	(1) Rocks	(1) Sediment	(1) None
23	(2)Little Debris	(3) Average	(2) Sand	(2) Grass/Woody environment	(3) Concrete pad
24	(1)No Debris	(4) High	(1) Rocks	(2) Grass/Woody environment	(3) Concrete pad
25	(3)Average Debris	(1) Low Low	(2) Sand	(1) Sediment	(3) Concrete pad
26	(1)No Debris	(2) Low	(2) Sand	(2) Grass/Woody environment	(1) None
27	(3)Average Debris	(4) High	(1) Rocks	(1) Sediment	(2) Gravel road
28	(2)Little Debris	(3) Average	(2) Sand	(1) Sediment	(3) Concrete pad

[1] Photo 17 and 47 are intentionally out of order

29	(4)A lot of Debris	(4) High	(1) Rocks	(2) Grass/Woody environment	(2) Gravel road
30	(4)A lot of Debris	(5) High High	(1) Rocks	(2) Grass/Woody environment	(1) None
31	(1)No Debris	(5) High High	(2) Sand	(1) Sediment	(3) Concrete pad
32	(4)A lot of Debris	(4) High	(2) Sand	(1) Sediment	(1) None
33	(2)Little Debris	(3) Average	(1) Rocks	(1) Sediment	(1) None
34	(1)No Debris	(3) Average	(2) Sand	(2) Grass/Woody environment	(2) Gravel road
35	(3)Average Debris	(2) Low	(1) Rocks	(2) Grass/Woody environment	(3) Concrete pad
36	(2)Little Debris	(1) Low Low	(1) Rocks	(2) Grass/Woody environment	(2) Gravel road
37	(4)A lot of Debris	(5) High High	(2) Sand	(2) Grass/Woody environment	(3) Concrete pad
38	(1)No Debris	(3) Average	(1) Rocks	(1) Sediment	(3) Concrete pad
39	(3)Average Debris	(1) Low Low	(2) Sand	(1) Sediment	(2) Gravel road
40	(4)A lot of Debris	(1) Low Low	(1) Rocks	(2) Grass/Woody environment	(2) Gravel road
41	(2)Little Debris	(4) High	(2) Sand	(1) Sediment	(1) None
42	(2)Little Debris	(2) Low	(1) Rocks	(2) Grass/Woody environment	(1) None
43	(3)Average Debris	(4) High	(2) Sand	(2) Grass/Woody environment	(1) None
44	(1)No Debris	(3) Average	(1) Rocks	(2) Grass/Woody environment	(2) Gravel road
45	(2)Little Debris	(1) Low Low	(1) Rocks	(2) Grass/Woody environment	(3) Concrete pad
46	(3)Average Debris	(5) High High	(2) Sand	(1) Sediment	(1) None
18	(1)No Debris	(5) High High	(2) Sand	(2) Grass/Woody environment	(2) Gravel road
48	(4)A lot of Debris	(2) Low	(2) Sand	(1) Sediment	(2) Gravel road

Figure 2 presents an example photo set from Book 1 of the field photo books. Site A represents conditions of *no debris*, *high water level*, *a sandy shoreline*, *grass/woody lakebed* (not visible), and *no boat ramp*. Site B represents *average debris*, *low water level*, *rocky shoreline*, *sediment lakebed* (not visible) and a *concrete boat ramp*.

Figure 2. Example photo comparison

3. Data Collection

Once the choice experiment was designed, data collection occurred through the use of the field survey. Recreationists participating in the study are shown a blocked set of six photo pairs from the four blocked

sets. For the next respondent, another block of six choice pairs are drawn, until the pool of blocked sets is exhausted; upon which another round of the photo sets would start. Respondents selected the recreation site they would most like visit (or neither) and continued to the next set until they completed six choice sets. The full questionnaire and sampling is described in the previous section.

2.3.3 IMPACT HYPOTHESES AND SURVEY DESIGN

The survey has been designed to address the impact hypotheses while also incorporating the performance measures determined at the initial stages of the study design. The impact hypotheses have been divided according to location type within the reservoir system, including: reservoirs, rivers and Elk Falls.

For Reservoirs:

$H_{0\text{-}A}$: Changes in overall satisfaction with the recreation experience at reservoirs, if they occur, are not related to reservoir operations.

We have used a two-pronged approach to address the changes in overall recreation benefits as they relate to reservoir operations. The first approach for testing this hypothesis uses respondents' perceptions and opinions regarding the performance indicators as gauges for recreation benefits. Q9, Q10, Q11, Q12 and Q14 in Section B: Visit to a Lake/Reservoir (Appendix B) of the survey present respondents with an opportunity to reflect on the conditions encountered and rate their experiences in relation to the performance measures. These performance measures, indicators of key elements of water management within the reservoirs, include perceptions as they relate to water levels, shoreline conditions, safety and access.

Additionally, the discrete choice experiment provides an alternative approach to addressing this hypothesis, albeit using a stated preference approach instead. The stated preference approach presents respondents with hypothetical scenarios of reservoir operations, represented by digitally altered pictures of a reservoir. This approach presents an alternative method to determining how changes to reservoir operations may change the desire for a recreationist to visit an area. Q15-Q20 in Section C: Future Lakes/Reservoir Visits provide the opportunity to evaluate changes in overall recreation benefits associated with reservoir operations using this approach.

For Rivers:

$H_{0\text{-}B}$: Changes in overall satisfaction with the recreation experience at rivers, if they occur, are not related to riverine discharge.

The approach for testing this hypothesis uses respondents' perceptions and opinions regarding the performance indicators as gauges for recreation benefits. Q30, Q31, and Q32 in Section E: Visit to a River of the survey present respondents with an opportunity to reflect on the conditions encountered on rivers in the reservoir system and rate their experiences in relation to relevant performance measures. These performance measures, indicators of key elements of water management within the reservoirs, include perceptions as they relate to water flows, shoreline conditions and safety.

For Falls:

$H_{0\text{-}C}$: Changes in overall satisfaction with the recreation experience of visitors to Elk Canyon Falls is not related to riverine discharges (i.e. spill events).

The approach for testing this hypothesis uses respondents' perceptions and opinions as gauges for recreation benefits. Q23 and Q24 in Section D: Visit to Elk Falls of the survey present respondents with an opportunity to reflect on the conditions encountered at the falls and rate their experiences. The proxy measures of benefits focus on satisfaction of their experience and how impressive they found the viewing experience to be.

Supporting Questions

Throughout the survey, a number of questions do not directly contribute to answering the impact hypotheses; rather, these other questions support the survey in a variety of manners. Some questions are included to guide respondents to the relevant sections of the survey. These skip logic instructions guide respondents through the questionnaire, directing respondents past sections that may not apply to them (e.g. Q5, Q21, Q25 and Q34). Other questions are included to provide opportunities to relate the respondents' answers to specific times and places (e.g. Q7, Q22 and Q27). This will allow respondents' experiences to be associated to actual BC Hydro data on reservoir/river conditions. Additional questions have been included to allow for additional segmentation and as explanatory variables, such as the activities respondents' participated in and demographic questions. Others allow for more detailed exploration of some of the perceptions of respondents, including the types of safety hazards encountered and activities that were precluded due to water conditions.

2.4 DATA MANAGEMENT AND ANALYSES

Data management and analyses will involve the entry of results into a database, quality control of the data, and the actual analysis methods to be used in addressing the research hypotheses.

2.4.1 DATA ENTRY AND MANAGEMENT

Data will be entered in a Microsoft Excel spreadsheet as the data is collected at the end of each field season. The spreadsheet has been designed to allow for export to other statistical software packages, particularly SPSS. The spreadsheet is password protected and stored on the local network server at EDI Vancouver office as per requirements from the Privacy Impact Assessment process of BC Hydro. A backup of the password protected file will be maintained on a separate external hard-drive. No cloud-based storage will be utilized. At the end of each year, the raw data will be sent to BC Hydro.

At the end of each year, the data will be examined for data outliers and any evident protest responses. Outliers will be determined using an examination of box and whisker plots, a method for identifying data

points that fall outside the usual range of values. A qualitative assessment will then be used to determine whether to "throw out" outliers.

2.4.2 DATA ANALYSIS

Data analysis will utilize a number of descriptive and comparative statistical tests, as is appropriate for the different types of data. Descriptive statistics will be tabulated for each question. For categorical data, we will calculate the proportion for each possible response; for numeric data, we will calculate the mean response, standard deviation and standard error, or other descriptive statistics as is appropriate. Comparative analyses will be used to explore differences between segments as they relate to impact hypotheses (e.g. differences between reservoir and riverine users) when appropriate. Comparative analyses will include such tests as the Pearson's Chi-square test for categorical data and t-test/Analysis of the Variance (ANOVA) for numeric data.

As the study progresses, further analysis will be used to examine temporal changes in the data. Trend analysis may require the use of parametric or non-parametric regression statistics to examine the relationship between variables and time, and correlation analysis to examine time trends and how it relates to other influential variables that are outside the control of BC Hydro (e.g. weather).

The DCE component of the questionnaire will be analysed using Latent GOLD Choice software program. Through analysis of responses and analyzing the data with a multinomial logit regression, it is possible to derive part-worth utility functions for each attribute. These estimates will then be used to calculate the likely support for any possible feature informing future management activities. Additionally, the software can be used to identify and compare latent classes based on respondents' preferences or compare the preferences of known segments (e.g. analysis segmented based on preferred recreational activity). Later reports will describe the outcome of this analysis.

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APPENDIX A. KEY INFORMANT QUESTIONS REGARDING PERFORMANCE MEASURES AND PUBLIC USE IN CAMPBELL RIVER RESERVOIR SYSTEM

Exploring Water Management and Public Use and Perceptions in the Campbell Reservoir System

BC Hydro has contracted Environmental Dynamics Inc. as part of the Laich-Kwil-Tach Environmental Assessment Ltd. Partnership (LKT) to examine how BC Hydro water management at the Campbell Reservoir System influences public use and perceptions. This study intends to monitor public use and perceptions at the reservoir area over the course of 10 years. As part of this study, we are seeking input from those land managers who have a mandate to provide and manage recreation opportunities in the area, particularly those activities that may be affected by BC Hydro water management. Water management is generally seen as having an influence on the following elements: water levels (reservoirs), flow rates (rivers, falls) and diversion flows. System operations also include debris management within the reservoirs. The study aims to monitor and gauge success of water management for public use using performance measures that are meaningful indicators to the relevant management agencies (e.g. BC Parks, MFLNRO).

At this stage in the study development, we are reaching out to representatives from these agencies with experience and knowledge in the study area. My hope is to elicit some feedback to help identify meaningful performance measures (i.e. indicators) that will then be integrated into our public use and perceptions study, to be used as measures across the 10 year study.

Performance Measures

Performance measures should address specific management objectives and key issues of the area in question. In this case, we are seeking to identify what are the management objectives for recreation as it may apply to the reservoirs, and any issues that are specifically related to BC Hydro systems operations. These issues may differ depending on whether you are considering reservoir-based recreation and river-based recreation.

1) What are your key management objectives when managing for public use and recreation in the Campbell Reservoir system?

<insert response>

2) Please list and briefly describe the key issues you face for public use and recreation related to BC Hydro systems operations in the Campbell Reservoir Systems? (These issues are anticipated to be associated to such things controlled by BC Hydro system operations, such as water levels, flow rates and debris management).

<insert response>

Given the issues and management objectives for the Campbell Reservoir system, we would now like to focus on how these might be measured and monitored. Examples of performance measures may include: estimated visitation, satisfaction with water access, ratings of visual quality, and satisfaction with flows for achieving recreational goals.

3) What performance measures, if any, does your agency currently use to evaluate public use and recreation in the study area?

<insert response>

4) Considering the issues and management objectives you identified above for the Campbell Reservoir system, what performance measures do you envision for monitoring public use and recreation in the reservoir?

(TIP: In order to be effective performance measures, the selected measures should be: relevant to the issues/management objectives, relatively easy to measure, credible and reliable, clear and easy to understand, and comparable over time. We will use a Public Use and Perceptions survey as the primary mode of data collection).

<insert response>

Additionally, we would like to take this opportunity to take advantage of your local knowledge to help design the study. One area of interest is in the determination of survey locations. We intend to do intercept surveys with visitors across the four seasons. We have a limited number of days per season and are hoping to identify eight locations for conducting surveys. We would like to identify locations that meet the following criteria: maximize the number of potential respondents, provide regional representation (locations in the Upper and Lower Reservoirs, along rivers and Elk Canyon Falls), and provide representation of different type of waterbodies (reservoirs, rivers and Elk Canyon falls).

5) Please recommend notable locations for conducting intercept surveys with visitors to the Campbell Reservoir system (in addition to one survey location pre-determined to be at Elk Falls Provincial Park).

<insert response>

Last, I would like your opinion on those factors that might be most influential to the recreational experience of visitors to the area. This monitor is focused on how BC Hydro systems operations effects public use and perceptions. However, we are also interested in identifying other factors that influence visitation and public perceptions of recreation in order to provide some context.

6) Given your experience, please list some of the factors that are likely to influence an individual's recreational experience while visiting the Campbell Reservoir system in addition to those controlled by BC Hydro system operations.

<insert response>

APPENDIX B. CAMPBELL RESERVOIRS PUBLIC USE AND PERCEPTIONS SURVEY

Campbell Reservoirs Public Use and Perceptions Study - 2015

On behalf of BC Hydro and Power Authority Act, the Laich-Kwil-Tach Environmental Assessment Ltd. Partnership (LKT) is conducting a study about public use and perceptions on recreation in the Campbell Reservoirs. We would appreciate if you could complete this survey. The results will provide insights into public use and preferences for water management.

Participation in the survey is voluntary and you may refuse to participate at any time. You may skip any questions if you are not comfortable answering, although we encourage you to complete the survey as thoroughly as possible.

All information that you provide are confidential and anonymous; results will only be presented in tabulated form and not individually. Please do not write your name anywhere on this questionnaire.

If you have any questions about why BC Hydro is conducting this research, please contact Phil Bradshaw – Project Manager, BC Hydro at 604-528-1693.

Thanks for your time and enjoy your stay!

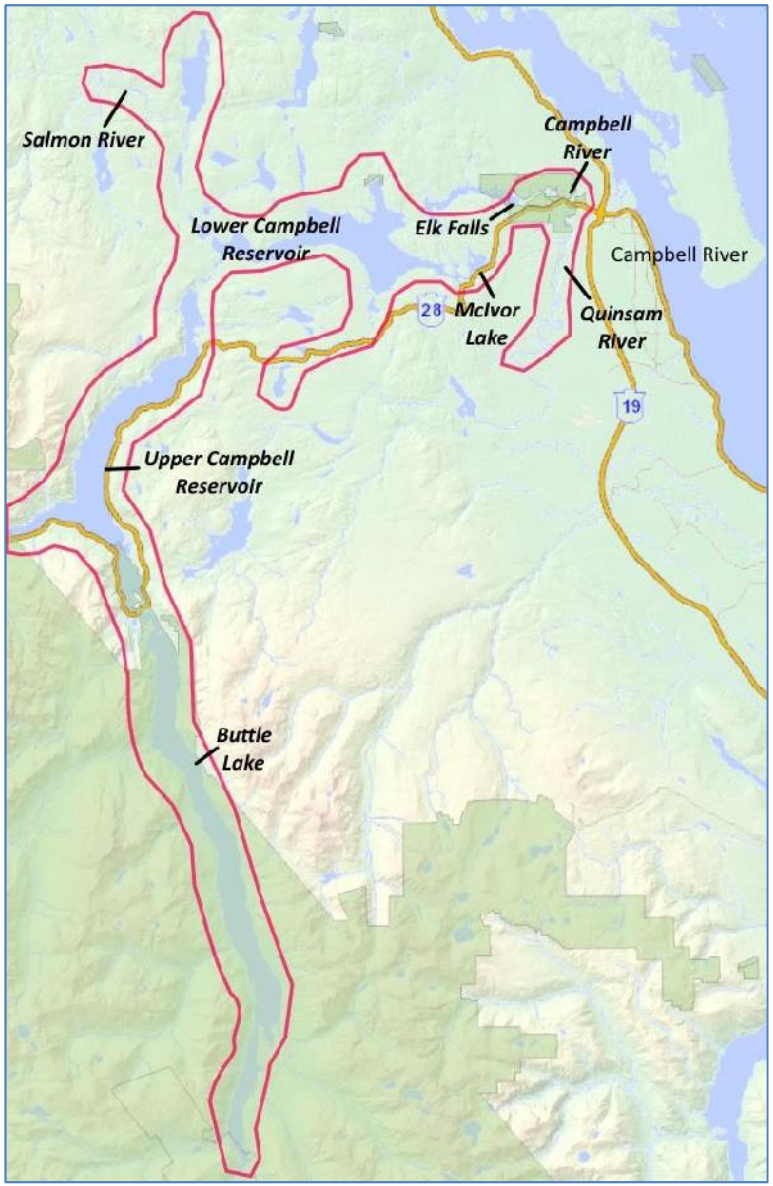
Laich-Kwil Tach Environmental Assessment Ltd. Partnership

EDI

BC hydro

Map of Campbell River Reservoir System

The Campbell River system is outlined in red below and is comprised of a number of lakes/reservoirs and rivers that are used by outdoor recreationists.



To Be Completed By Surveyor:		
Date: dd/mm/yyyy	**Time:**	**Number:**
Location:	**Location Type:** Reservoir/River/Falls	
Weather: sun / mixed / cloud / rain / snow / wind		
Water level/flow rate: high / medium / low		
Completed Survey This Year: yes / no		
Reservoir Photo Book #: 1 / 2 / 3 / 4		

SECTION A: Current Visit to the Campbell River Reservoir System

1. How many days are you spending in the Campbell River Reservoir System on this trip? _____ day(s)

Please refer to the map on Page 2 for the Campbell River system area.

2. If staying overnight in the Campbell River system area, what type of accommodation are you using? (*Check all that apply*)

- ☐ Tent
- ☐ Camper/Van/Tent Trailer
- ☐ Motorhome
- ☐ Cabin/Lodge
- ☐ Trailer/5th Wheel
- ☐ Other *[Explain]:*_____
- ☐ Not staying in area

3. What **one** activity was the **most important** for you in your decision to visit the Campbell River Reservoir system for this trip? (*Check only one*)

- ☐ Camping
- ☐ Power boating
- ☐ Canoeing
- ☐ Windsurfing
- ☐ Fishing
- ☐ Hiking/walking
- ☐ Waterskiing
- ☐ Kayaking
- ☐ Wildlife viewing
- ☐ Swimming
- ☐ Picnicking
- ☐ Sailing
- ☐ Beach activities
- ☐ Dog-walking
- ☐ Other: _____ (please specify)
- ☐ Sight-seeing (falls)
- ☐ Sight-seeing (dam)

4. Which areas in the Campbell River system have you visited or anticipate visiting for recreational activities on this trip?

Please refer to the map on Page 2 if it will assist you.

- ☐ Elk Falls
- ☐ Quinsam River
- ☐ Campbell River
- ☐ Salmon River
- ☐ Lower Campbell Reservoir
- ☐ McIvor Lake
- ☐ Upper Campbell Reservoir
- ☐ Buttle Lake
- ☐ Other (please specify):_____

SECTION B: Visit to a Lake/Reservoir

This next section of the survey asks about your most recent visit to a lake/reservoir within the Campbell River Reservoir System.

5. Have you recreated on the water or on the shore of any **lakes/reservoirs** in the Campbell River system during this trip?

- ☐ No → **Skip to Section C: Future Lake/Reservoir Visits**
- ☐ Yes → **Continue to next question**

6. Which **lake/reservoir** did you recreate at most recently on this trip? (*Check only one*)

Please refer to the map on Page 2 if it will assist you.

- ☐ McIvor Lake
- ☐ Upper Campbell Reservoir
- ☐ Lower Campbell Reservoir
- ☐ Buttle Lake
- ☐ Other (please specify):_____

7. When was your most recent visit to this **lake/reservoir**?

- ☐ Today
- ☐ Yesterday
- ☐ Two days ago
- ☐ Other: _____ days ago (please specify)

8. During your most recent visit to this **lake/reservoir**, what activities did you participate in? (*Check all that apply*)

☐ Camping	☐ Power boating	☐ Canoeing
☐ Windsurfing	☐ Fishing	☐ Hiking/walking
☐ Waterskiing	☐ Kayaking	☐ Wildlife viewing
☐ Swimming	☐ Picnicking	☐ Sailing
☐ Beach activities	☐ Dog-walking	☐ Other: _____ (please specify)
☐ Sight-seeing (falls)	☐ Sight-seeing (dam)	

9. Based on your most recent activities at the **lake/reservoir**, how did water levels influence your recreation experience? (*Check only one*)

☐ Very positive influence
☐ Somewhat positive influence
☐ No influence
☐ Somewhat negative influence
☐ Very negative influence

10. Thinking of the **lake/reservoir** that you recreated at most recently, were there any water-based or shore-based activities that you were going to participate in that you were unable to do specifically because of the water level?

☐ No
☐ Yes → Activity Type: _____

11. Based on your most recent activities at the **lake/reservoir**, how satisfied were you with the shoreline conditions while engaged in water-based recreation? (*Check only one*)

Shoreline conditions refer to the type of substrate, presence of woody debris, presence of vegetation, etc.

☐ Very satisfied
☐ Somewhat satisfied
☐ Neither satisfied nor dissatisfied
☐ Somewhat dissatisfied
☐ Very dissatisfied

12. Based on your most recent activities at the **lake/reservoir**, how safe did you feel engaging in water-based recreation given water levels at that time? (*Check only one*)

☐ Very safe
☐ Somewhat safe
☐ Neither safe nor unsafe
☐ Somewhat unsafe
☐ Very unsafe

13. What conditions, if any, did you encounter during your time recreating at the **lake/reservoir** that posed a safety concern to you? (*Check all that apply*)

☐ Floating debris	☐ Boat launch conditions
☐ Visible stumps	☐ Other:_____
☐ Hidden stumps	☐ No safety concerns

14. Given the water levels at the time, how satisfied were you during your most recent activities at the reservoir with access to the… (*Check only one for each*)

	…beach?	…water via a boat launch?	…water via the shoreline?
Very satisfied	☐	☐	☐
Somewhat satisfied	☐	☐	☐
Neither satisfied nor dissatisfied	☐	☐	☐
Somewhat dissatisfied	☐	☐	☐
Very dissatisfied	☐	☐	☐
Not applicable	☐	☐	☐

SECTION C: Future Lake/Reservoir Visits

You will now refer to the photo book you received, where you will be presented with six pairs of photos representing different hypothetical lake/reservoir conditions.

The conditions of Site A and Site B will differ in each of the following photo pairs. While some of the photos may not seem ideal, each one of them could occur under certain circumstances.

For each set of pictures please select whether you would choose to recreate in the area represented in Site A or Site B, or neither of them.

There is no right or wrong answers to these special types of research questions but it is important to regard them as real-world situations, in which the selected conditions are available to you. You will be asked to complete a total of six evaluations.

After you complete this section, please resume the survey at ***Section D: Visit to Elk Falls.***

Book #:_____ (*please enter Book number*)

15. For photo pair 1, I would choose to recreate at:
☐ Site A ☐ Site B ☐ Neither site

16. For the photo pair 2, I would choose to recreate at:
☐ Site A ☐ Site B ☐ Neither site

17. For photo pair 3, I would choose to recreate at:
☐ Site A ☐ Site B ☐ Neither site

18. For photo pair 4, I would choose to recreate at:
☐ Site A ☐ Site B ☐ Neither site

19. For photo pair 5, I would choose to recreate at:
☐ Site A ☐ Site B ☐ Neither site

20. For photo pair 6, I would choose to recreate at:
☐ Site A ☐ Site B ☐ Neither site

SECTION D: Visit to Elk Falls

21. Have you visited **Elk Falls** during this trip?
☐ No → **Skip to Section E: Visits to Rivers**
☐ Yes → **Continue to next question**

22. When was your most recent visit to Elk Falls?
☐ Today ☐ Yesterday
☐ Two days ago ☐ Other: _____ days ago (please specify)

23. Just based on the water flows you observed at the falls on your most recent visit, how impressive would you rate Elk Falls?
☐ Very impressive
☐ Somewhat impressive
☐ Neither impressive nor unimpressive
☐ Somewhat unimpressive
☐ Very unimpressive

24. How satisfied were you with your viewing experience of Elk Falls? (*Check only one*)
☐ Very satisfied
☐ Somewhat satisfied
☐ Neither satisfied nor dissatisfied
☐ Somewhat dissatisfied
☐ Very dissatisfied

SECTION E: Visits to Rivers

25. Have you recreated on the water or on the shore of any **rivers** in the Campbell River system during this trip?

☐ No → **Skip to Section F: Past Visits to Area**
☐ Yes → **Continue to next question**

26. Which **river** did you recreate at most recently on this trip (*Check only one*)?

Please refer to the map on Page 2 if it will assist you.

☐ Quinsam River
☐ Campbell River
☐ Salmon River
☐ Other (please specify):_____

27. When was your most recent visit to this **river**?

☐ Today
☐ Yesterday
☐ Two days ago
☐ Other: _____ days ago (please specify)

28. During your most recent visit to this **river**, what activities did you participate in? (*Check all that apply*)

☐ Camping
☐ Power boating
☐ Canoeing
☐ Fishing
☐ Hiking/walking
☐ Kayaking
☐ Swimming
☐ Picnicking
☐ Wildlife viewing
☐ Beach activities
☐ Dog-walking
☐ Sight-seeing
☐ Other: _____ (please specify)

29. Thinking of the **river** that you recreated at most recently, were there any water-based activities that you were going to participate in that you were unable to do specifically because of the river-flow conditions?

☐ No
☐ Yes → Activity Type: _____

30. Based on your most recent activities at the **river**, how did **water flows** influence your recreation experience? (*Check only one*)

☐ Very positive influence
☐ Somewhat positive influence
☐ No influence
☐ Somewhat negative influence
☐ Very negative influence

31. Based on your most recent activities at the **river**, how satisfied were you with the **shoreline conditions** while engaged in water-based recreation? (*Check only one*)

Shoreline conditions refer to the type of substrate, presence of woody debris, presence of vegetation, etc.

☐ Very satisfied
☐ Somewhat satisfied
☐ Neither satisfied nor dissatisfied
☐ Somewhat dissatisfied
☐ Very dissatisfied

32. Based on your most recent activities at the **river**, how safe did you feel engaging in water-based recreation given the current **water flow**? (*Check only one*)

☐ Very safe
☐ Somewhat safe
☐ Neither safe nor unsafe
☐ Somewhat unsafe
☐ Very unsafe

33. What conditions, if any, did you encounter during your time recreating on the **river** that posed a safety concern to you? (*Check all that apply*)

☐ High flows
☐ Exposed hazards (rocks, logjam)
☐ Floating debris
☐ Other:_____
☐ Poor access conditions
☐ None

SECTION F: Past Visits to Campbell River Reservoir System

34. Is this your first visit to the Campbell River system?

☐ Yes → **Skip to Section G: About You and Your Party**
☐ No → **Continue to next question**

35. On average, how many days per season do you typically visit the Campbell River system? (*Check only one per season*)

	Never	Less than once	Once	2-3 days	4 days or more
Spring	☐	☐	☐	☐	☐
Summer	☐	☐	☐	☐	☐
Winter	☐	☐	☐	☐	☐
Fall	☐	☐	☐	☐	☐

SECTION G: About You and Your Party

36. What is your gender?

☐ Male ☐ Female

37. What is your current age?

☐ Under 25 ☐ 45-54
☐ 25-34 ☐ 55-64
☐ 35-44 ☐ 64+

38. How many people are in your party today? _____ people

39. Where do you currently reside (i.e., where you have lived for more than 6 months out of the past year)? (*Check all that apply*)

City/Town:_____ Country: _____

40. Do you have any additional comments about recreation on the water in the Campbell River system? (*In consideration of privacy, do not identify yourself or other specific individuals in your written comments. Any comments including self-identification or identification of third parties will be discarded.*)

Thank you again for your participation