Campbell River Project Water Use Plan

Upper and Lower Campbell and John Hart Reservoirs Survey

Implementation Year 3

Reference: JHTMON-2

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

Study Period: 2016/2017

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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 users of the Campbell River Reservoir system. This project forms part of the Campbell River Water Use Plan and aims to monitor a selection of performance measures in order to evaluate public use and perceptions.

The study tools and methods were developed during the first year of implementation, between May 2014 and July 2015. Data collection and analysis began in Year 2, between August 2015 and July 2016. Year 3 of the study included data collection and analysis between August 2016 and December 2017. Unlike Year 2, Year 3 spans a year and a half. This study period was extended in order to synchronize future reporting with the start of the calendar year. This report summarizes the findings from Year 3 (Aug 2016-Dec 2017) of data collection.

A total of 1,076 visitors were surveyed in Year 3. Sampling was completed at eight sites in the project area. Of the eight locations, Elk Falls Lookout had the highest number of survey responses, followed by Quinsam Campsite.

The management questions addressed by the monitoring program explore how different operating regimes may influence public use and perceptions for river and reservoir users. A summary of the management questions, null hypotheses and results are outlined in Table 1.

The management question for reservoirs focused on determining if there was a relationship between the performance measures of public perceptions with average daily water elevations. No significant relationships were noted between daily average water elevation and all performance measures for reservoirs in Year 3. Comparison of results for the management questions between Year 2 and Year 3 saw significant changes in responses, with a general increase in positive responses in Year 3. This shift may be a result of differing water elevations experienced by respondents at the time of sampling in each study year.

For rivers, the key management question focused on identifying if there was a relationship between river discharge and the performance measures of public perceptions at riverine locations. No performance measures resulted in a significant relationship at any of the riverine sample locations. Results were also compared between Year 2 and Year 3. A significant difference was only identified for one measure, with respondents expressing more positive responses towards the influence of water flow on their recreation experience in Year 3 than Year 2.

The final management question focused on determining how riverine discharge might influence the recreation experience at Elk Falls. When visitor impressions and satisfaction were examined in relation to water flows, no significant relationship was identified although responses were overwhelmingly positive.

The relationship between reservoir operations and public perceptions were also examined using a discrete choice experiment (DCE). Year 3 analysis revealed similar preferences to Year 2, where attributes such as water level and type of shoreline substrate are influential on preferences for recreation at reservoirs. Year 3 data indicated that lakebed conditions were now not significant (at p-value < 10%) while type of boat ramp attributes were again not significant when considering all respondents. Boat ramp type was found to be significant at 1% (p-value < 1%) for respondents planning to recreate on the lake, and hikers. Further analysis of the DCE was completed using a selection of known class models (e.g., Campbell River residents, non-residents, campers, etc.) and a latent 4-class model to further explore respondent preferences. These models suggest that while water level is consistently the most significant attribute for respondents, preferences for the various attributes continue to differ when segmenting groups.

Table 1. JHTMON2 - Status of management questions and hypotheses after 2016/2017 Study Period

Management Question	Null Hypotheses	2016/2017 Data Analysis Status
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-A}: Changes in overall satisfaction with the recreation experience, if they occur, are not related to reservoir operations.	1) *Influence on recreation experience* – No significant relationship noted between water levels and influence on recreation experience at reservoir locations from Year 3 data.
		2) *Satisfaction with shoreline conditions* – No significant relationship noted between water levels and satisfaction with shoreline conditions at reservoir locations from Year 3 data.
		3) *Perception of safety* - No significant relationship noted between water levels and perception of safety at reservoir locations from Year 3 data.
		4) *Satisfaction with access to beach* – No significant relationship noted between water levels and satisfaction with beach access at reservoir locations from Year 3 data. *Satisfaction with access to water via boat launch* - No significant relationship noted between water levels and satisfaction with water access via boat launch at reservoir locations from Year 3 data. *Satisfaction with access to water via shoreline* - No significant relationship noted between water levels and satisfaction with water access via shoreline at reservoir locations from Year 3 data.
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-B}: Changes in overall satisfaction with the recreation experience, if they occur, are not related to riverine discharge.	1) *Influence on recreation experience* – No significant relationship noted between river discharge and influence on recreation experience at river locations from Year 3 data.
		2) *Satisfaction with shoreline conditions* – No significant relationship noted between riverine discharge and satisfaction with shoreline conditions at river locations from Year 3 data.
		3) *Perception of safety* - No significant relationship noted between riverine discharge and perception of safety at river locations from Year 3 data.
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-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).	1) *Impressiveness of falls* – No significant relationship noted between riverine discharge and impressiveness of falls from Year 3 data.
		2) *Satisfaction with experience* – No significant relationship noted between riverine discharge and satisfaction with experience at falls from Year 3 data.

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 has included: 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 data collection completed between August 2016 and December 2017. This period is referred to as "Year 3" of analysis despite spanning a year and a half of data collection. The time frame examined during Year 3 was extended in order to synchronize future reporting with the start of the calendar year (i.e., January to December). The previous report summarized data collected in the year between August 2015 and July 2016, and is referred to as Year 2 in this report. Year 1 of the study focused on the development and testing of the sampling design and study tools. The accomplishments of this first year are summarized in the Year 1 implementation report. No data collection was completed during Year 1.

1.1 MANAGEMENT QUESTIONS AND OBJECTIVES

The management questions, objectives and hypotheses to the program were stated in the Terms of Reference (BC Hydro, 2013) and in the Year-1 implementation report (LKT and EDI, 2015). As described in these reports, the Campbell River Recreation Technical Committee identified three management questions to address through the monitoring study. The key management questions were:

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 devised the following research hypotheses to 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.

- $\mathbf{H_{0\text{-}A}}$: 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.

- $\mathbf{H_{0\text{-}B}}$: 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 recreational value and incidence of high spill events at Elk Falls. 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.

- $\mathbf{H_{0\text{-}C}}$: 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

The management questions and associated hypotheses are addressed by measuring specific parameters 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. The first year of the project (2014/2015) focused on the study design. Data collection began in the second year of the project in August 2015, and included sampling sessions in the summer, fall, winter and spring, ending in July 2016. This report picks up after Year 2 of the study, summarizing all data collected between August 2016 and December 2017, referred to as Year 3 in this report.

2.1 STUDY DESIGN

2.1.1 DETERMINATION OF PERFORMANCE MEASURES AND INFLUENTIAL FACTORS

As identified by BC Hydro, this study utilizes 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. 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 were consulted included BC Parks of the Ministry of Environment and the Recreation Sites and Trails Branch of Ministry of Forests, Lands and Natural Resource Operations (MFLNRO). 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 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. Further details on the determination of performance measures are described in the Year 1 Implementation report (LKT and EDI, 2015).

Table 2. Water management issues and related performance measures

Management Issue	Performance Measure	Applies to: Reservoir/River/ Both	Applicable Management Hypotheses*
Public safety	▪ Perception of safety while engaged in water-based recreation	Both	H_{0-A} (reservoirs) H_{0-B} (rivers)
Maintaining accessibility	▪ Satisfaction with accessibility to boat launch ▪ Satisfaction with accessibility to shoreline ▪ Satisfaction with accessibility to beach	Reservoir	H_{0-A} (reservoirs)
Protecting shoreline condition for recreation	▪ Satisfaction with shoreline condition for recreation	Both	H_{0-A} (reservoirs) H_{0-B} (rivers)
Maintaining quality recreation experience	▪ Influence of water levels/flows on recreation	Both	H_{0-A} (reservoirs) H_{0-B} (rivers)

* Management hypotheses outlined in Section 1.2

2.1.2 SAMPLING PLAN AND SITE SELECTION

2.1.2.1 Sampling Locations

Eight locations were selected for conducting surveys within the Campbell Reservoir system (see Figure 1). Sample sites were selected with the aim of maximizing sample size. BC Parks, Recreation Sites and Trails Branch of MFLNRO, and the City of Campbell River were consulted to identify the busiest recreation sites. Sampling was only conducted at sites that were officially open. As such, sampling did not occur at some locations during the off-season.

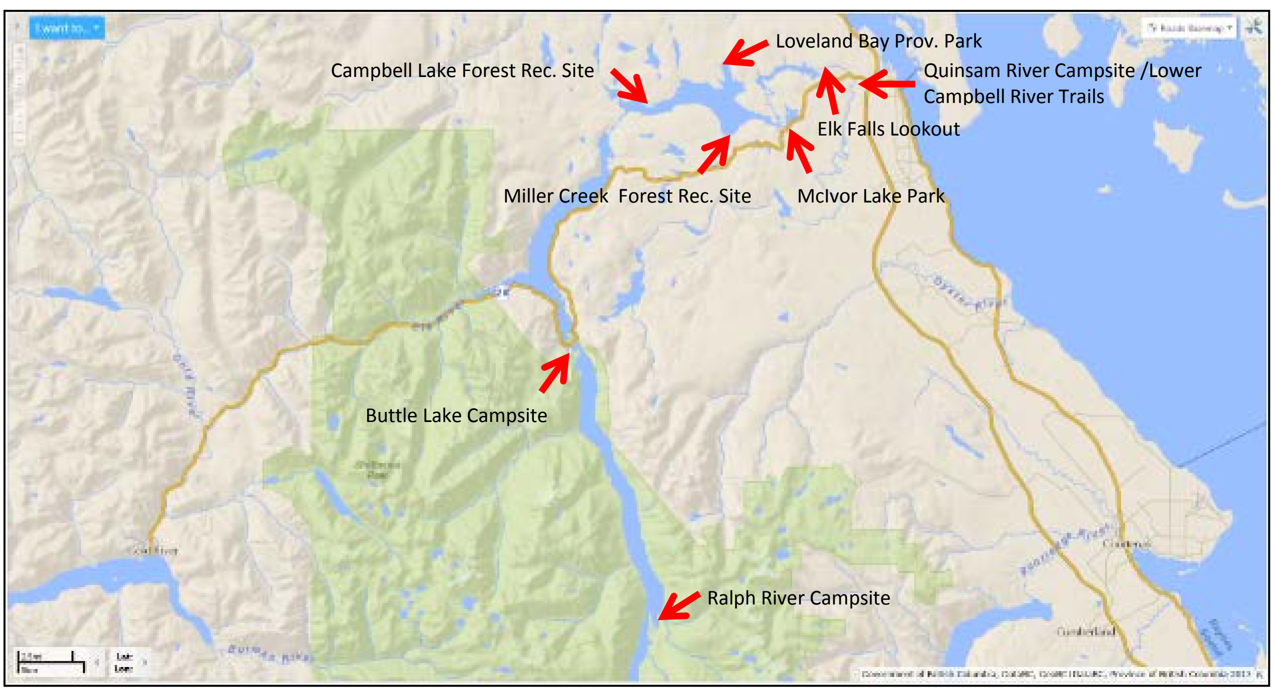

Figure 1. Map of sample locations (adapted from iMapBC)

2.1.2.2 Sampling Frequency

Sampling over the course of the monitor has been 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 was set to 128 interview days per calendar year, providing four interview days per site for the eight sites across four recreation seasons. Sampling dates were selected to overlap with public holidays and weekends to maximize sampling during periods of high visitation. Two sites were sampled concurrently by two employees the Laich-Kwil-Tach Environmental Assessment Ltd. Partnership (LKT), based in Campbell River, BC to promote spatial and temporal coverage.

Unlike Year 2, Year 3 spans a year and a half. This study period was extended in order to synchronize future reporting with the start of the calendar year. This report summarizes the data collected from Summer 2016 to the end of Fall 2017. The sampling schedule for Year 3 is outlined in Table 3.

Table 3. Year 3 (Aug 2016-Dec 2017) sampling schedule for each season

Season	Scheduling
Summer (2016)	July 30-August 23, 2016 (July 30-Aug 2, Aug 5-8, Aug 11-14, Aug 20-23)
Fall (2016)	September 10-October 10, 2016 (Sept 10-11, Sept 19-20, Sept 23-26, Sept 29-Oct 2, Oct 7-10)
Winter (2017)	March 4-March 28, 2017 (Mar 4-7, Mar 10-13, Mar 16-19, Mar 25-28)
Spring (2017)	May 19-June 12, 2017 (May 19-22, May 26-29, Jun 2-5, Jun 9-12)
Summer (2017)	August 5-August 29, 2017 (Aug 5-8, Aug 11-14, Aug 18-21, Aug 26-29)
Fall (2017)	September 18-October 22, 2016 (Sept 18-19, Sept 22-25, Sept 28-29, Oct 6-9, Oct 14-15, Oct 21-22)

2.2 SURVEY DELIVERY

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

A standard introduction statement that summarized the cover letter accompanying the questionnaire was made to all prospective participants. If asked how the surveys would be used, people were told that the information would provide insights into public use and preferences for water management for BC Hydro. Contact information for the BC Hydro technical lead was provided on the survey in the event that anyone had 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) and Vaske (2008). 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 as for other waterbody types they may have visited most recently on the same trip (e.g., at a river the previous day). This approach allowed for gathering more responses regarding each location type, as respondents often visited 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).

The questionnaire utilized 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 was collected, both in the survey and through external data sources. Within the survey, questions were included to characterize respondents in terms of their demographics, recreational interests and habits. Further supplemental data is collected by surveyors in the field such as water levels and weather. Data for these influential factors is also gathered directly from BC Hydro (e.g., reservoir water levels and discharge, as available).

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 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, satisfaction with their recreation experiences, 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 reservoir of the Campbell River reservoir system.

Photos were digitally manipulated from a source photo to represent the varying levels and conditions shown in Table 4 were chosen in consultation of the above described process and are explained in the following:

Table 4. 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 4). An "opt out" option was also given. Table 4 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 5), 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 5. 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 5. 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
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

[1] Photo 18 and 47 are intentionally out of order so that no photo set presented two "HIGH HIGH" water conditions. This swap does not affect the DCE as the original photos were developed from a randomized block design.

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 was 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.

<u>For Reservoirs:</u>

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

We 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.

<u>For Rivers:</u>

$H_{0\text{-}B}$: 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.

<u>For Falls:</u>

$H_{0\text{-}C}$: 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 ENTRY AND MANAGEMENT

The task of data entry and management is a key component of this project and required an organized database to store and manage data and facilitate statistical analyses. Data from the questionnaires and discrete choice experiment were entered into a common database (i.e., Microsoft Excel) as they were collected to the extent possible. The database was examined periodically through the data entry process to ensure consistency and highlight any potential data collection and entry issues. The database was designed to be easily exported to the preferred statistical analysis software packages, IBM SPSS Statistics and Latent Gold, and required appropriate variable labeling and coding of responses. Data were entered by technicians and checked by the study lead. Once all data were entered, the data were examined for outliers, protest votes and any obvious erroneous entries. Outliers were 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 was then used to determine whether to throw out the outliers. Four surveys were removed during the analysis of the management questions given extreme or unrealistic answers. In particular, the variables that seemed to be prone to extreme or unrealistic answers were associated with respondents recounting when they had visited different locations on their trip. Based on the outliers, it is evident that some respondents were reporting visits to different locations based on previous trips in the area, rather than their current trip. In these cases, the most extreme outliers resulted in the removal of the associated survey from the analysis.

2.5 DATA ANALYSIS

2.5.1 BASIC QUESTIONNAIRE

Data analysis of the basic questionnaire questions focused on providing basic descriptive statistics and comparative analysis as was appropriate for the different types of data. Descriptive statistics were tabulated for each question. Categorical data was tabulated according to frequency of each potential response. Mean response, standard deviation and standard error were calculated for all questions that used interval data. All questionnaire responses are presented in Appendix A. When appropriate to the discussion of results, some data have been tabulated or presented graphically in the body of the report.

Analysis of the management questions involved identifying potential relationships between the performance indicators and the respective reservoir operations metrics. For reservoirs, correlations were examined between the indicators of safety, satisfaction and experience, and reservoir elevations; for rivers and Elk Falls, correlations were examined between indicators of satisfaction and experience, and discharge. Data for reservoir elevations and discharge were provided as daily averages by BC Hydro. The statistical tests used for investigating these relationships were determined based on the type of statistical data (e.g. interval, ordinal or categorical), the nature of the relationship (e.g. linear, monotonic or non-linear), and type of distribution (e.g. parametric or non-parametric). Results for relevant survey questions were graphed using scatterplots in relation to the average daily elevation or discharge. The variables were tested for normal distribution and the appropriate correlation test selected (e.g., Pearson product-moment correlation or Spearman rank-order correlation coefficient).

When appropriate, comparisons across the different study years have been provided. The statistical tests used for investigating any significant differences were determined based on such factors as the type of data, nature of the distribution, and the homogeneity of variance. In general, the means of interval data (e.g. length of trip) were compared across time using independent t-tests, while categorical data (e.g. satisfaction with recreational experience) was examined using Pearson Chi-Square.

2.5.2 DISCRETE CHOICE EXPERIMENT

Year 3 data was analyzed using Latent Gold 5.0 to estimate multiple multinomial logit models. As with Year 2 data, a single class multinomial logit model was prepared focusing on the main effects of the experiment's attributes including Quantity of Debris, Water Level, Shore Line Features, Lakebed Features, and Boat Ramp Type.

Multiple single 'known class' segmentation models were again prepared and differences between the following segment groups are reported: people who plan to recreate on the reservoir, Campbell River residents, non-Campbell River residents, campers only, Sightseeing falls, and hikers.

A latent 4-class multinomial logit model was prepared for comparison to Year 2 data however as with Year 2 analysis this latent class model is not discussed in detail. A latent class model relates preferences for the reservoir features in the discrete choice experiment to a set of latent variables. A class is characterized by similarities among recreationists that indicate like preference for reservoir features. The latent class model is presented to highlight differences but latent variables are not described.

3 RESULTS

3.1 GENERAL

Between July 2016 and October 2017, a total of 3,316 people were asked if they would complete the survey. Of those, 186 individuals responded that they had completed the survey in the past year and were not eligible to participate, while 2024 individuals did not want to participate. In total, 1,076 people agreed to complete the survey, which represents a response rate of 34%. This represents a substantial drop in the number of participants in the study over the second study period. Across the study year, summer had the highest number of responses (n=661), followed by fall (n=176) (Figure 3).

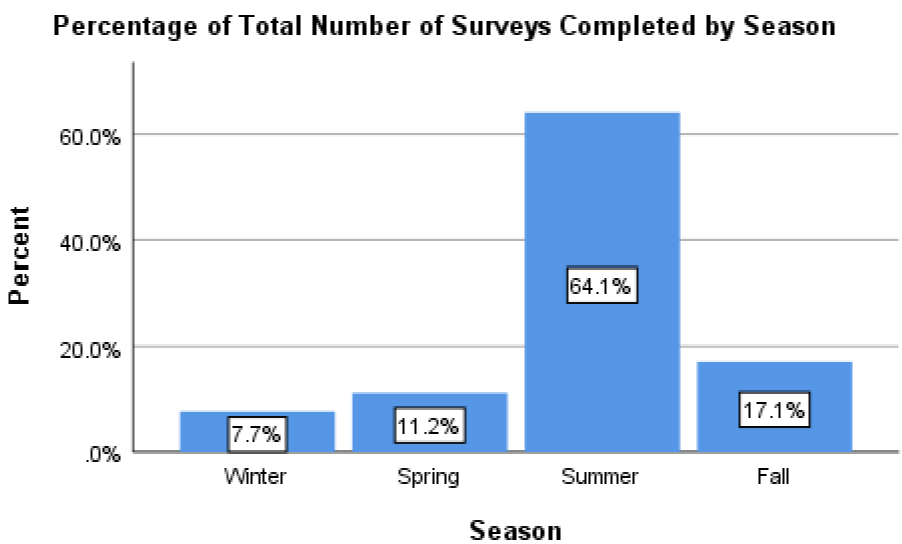

Figure 3. Percentage of the total number of questionnaires completed by season (n=1031)

Surveys were conducted at eight locations across the study area. Elk Falls Lookout had the highest number of survey responses (n=850). This location is close to Campbell River, receives high numbers of day users, has an extensive trail system that is an attraction to both local residents and visitors, and is open year-round. The areas with the second highest survey responses, Quinsam Campsite, is also located in Elk Falls Provincial Park, and is close to town, open year-round and a popular area for walking.

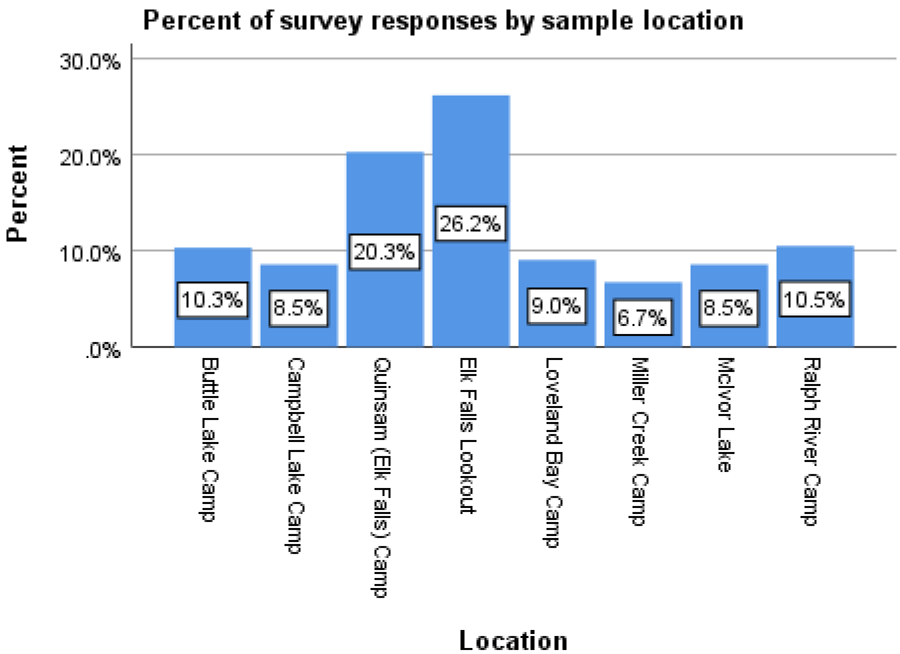

Figure 4. Percent of survey responses according to sample location (n=1031)

The average trip length spent in the Campbell River reservoir system by respondents was 4.40 days (n=989, s=5.199), with a median of 3 and mode of 1 day. Average trip length was significantly higher in Year 3 (t=-2.368, df=2823, p=0.018) than in Year 2, where average trip length was 3.59 days (n=1836, s=10.038). This difference is largely explained by the reduced response rate at Elk Falls which is comprised largely of day visitors and who overwhelmingly dominated the responses in Year 2.

As with Year 2, most respondents in Year 3 of the study (27.0%) reported not staying in the area, although this proportion was less than Year 2, in which 38.6% of respondents reported not staying in the area. Again, this decrease in respondents who reported they were not staying in the area is likely attributable to the reduced participation by day visitors.

The most popular form of accommodation for those staying in the area was tent (21.0%). Camping was most frequently noted (53.7%) as the most important activity in respondents' decision to visit the Campbell River reservoir system, followed by sight-seeing of the waterfalls (17.9%).

Most respondents (57.8%) reported visiting the study area before while 42.2% were visiting for the first time. Of those who had visited the area before, the highest frequency of visits were reported in the summer; 76.7% of respondents who had visited the Campbell River reservoir system before reported visiting for 4 days or more on average annually in the summer.

The frequencies for all survey questions are summarized in the appendices. In addition, the following sections examine those survey questions that specifically address the management hypotheses for this project.

3.2 MANAGEMENT HYPOTHESIS – LAKES/RESERVOIRS

The management hypothesis for lakes/reservoirs in the Campbell River reservoir systems is stated as:

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

We tested this hypothesis by comparing perceptions of safety, satisfaction and experience with average daily water elevations at three reservoirs: Buttle Lake, Upper Campbell Reservoir and Lower Campbell Reservoir. Responses to Q9, Q11, Q12 and Q14 in Section B: Visit to a Lake/Reservoir (Appendix B) of the survey were graphed using scatterplots in relation to the average daily elevation.

Correlations between water elevations and the various performance measures were tested using the Spearman's rank-order correlation coefficient (Spearman's correlation, for short). Spearman's correlation is a non-parametric measure of the strength and direction of association that exists between two variables measured on at least an ordinal scale. Unlike Pearson product-moment correlation, variables in the Spearman's correlation can be ordinal, as well as interval or ratio. Spearman's correlation also assumes that there is a monotonic relationship between the two variables. A monotonic relationship is when either the variables increase in value together, or as one variable value increases, the other variable value decreases. The scatterplots show this general trend.

3.2.1 WATER ELEVATION OF RESERVOIRS

Water levels, measured as daily average elevation in metres, were gathered from BC Hydro Generation Operations. Water levels were only available for three reservoirs in the study area: Buttle Lake, Lower Campbell Reservoir and Upper Campbell Reservoir. Analyses were completed separately for each reservoir as differences in operational water levels (e.g., maximum reservoir elevation) and topography prevent direct comparisons between reservoirs. A summary of water elevations from the BC Hydro data set are provided in Table 6.

Table 6. Summary of water elevation data (in meters) for reservoirs in Year 3 (Aug 2016-Dec 2017)

	Upper Campbell Reservoir (meters)	Buttle Lake (meters)	Lower Campbell Reservoir (meters)
Mean	217.583	217.558	177.227
Median	217.395	217.362	177.409
Std. Deviation	1.418	1.420	.444
Variance	2.012	2.017	.198
Minimum	215.233	215.225	176.031
Maximum	221.144	221.163	177.898

Using monitoring data attained through BC Hydro, the mean daily average elevations for Year 3 of the study were 217.5828 m for Buttle Lake, 217.5578 m for Upper Campbell Reservoir, and 177.2269 m for Lower Campbell Reservoir. Buttle Lake and Upper Campbell Reservoir are expected to share similar water elevations due to their direct connectivity.

Water elevations measured throughout the year were compared to those water elevations encountered during the sampling at each reservoir to identify how representative sampling was of the true range of water elevations. As water elevation data was not normally distributed, a One-Sample Wilcoxon Signed Rank Test was used to determine if the median daily water elevations that were encountered during sampling were the same as those actually observed for the entire year. A significant difference in median water elevation was observed between the times sampled and actual water elevations for all three reservoirs, including Buttle Lake (n=158, p=0.007), Upper Campbell Reservoir (n=33, p=0.009) and Lower Campbell Reservoir (n=180, p=0.000).

Comparisons of Year 3 to Year 2 identified no significant difference in mean daily average elevations overall between years for Buttle Lake and Upper Campbell Reservoir. Although the mean water elevations were the same between study years at Buttle Lake and Upper Campbell Reservoir, the ranges in water elevations (i.e., minimum and maximum) differed. As depicted in Figure 5, the elevations were generally lower in Year 2 for Buttle Lake and Upper Campbell Reservoir than in Year 3 despite having approximately the same average water elevation.

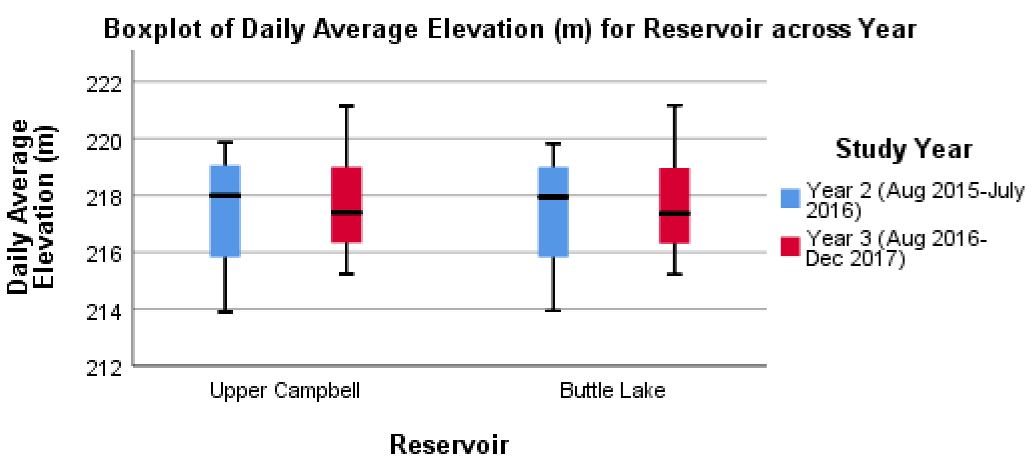

Figure 5. Boxplot of daily average elevation by reservoir for study year

Unlike Buttle Lake and Upper Campbell Reservoir, the mean elevation for Lower Campbell Reservoir was significantly different between Year 2 and Year 3 (t=-2.058, df=732.410, p=0.040), although the difference was marginal. The upper and lower ranges of water elevation at Lower Campbell Reservoir were similar for both years although the range was slightly larger in Year 2 of the study (see Figure 6).

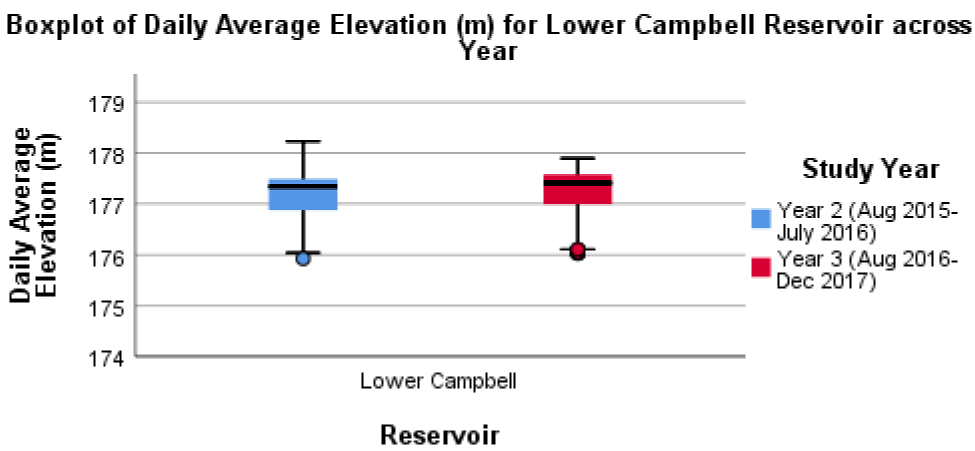

Figure 6. Boxplots of daily average elevation for Lower Campbell Reservoir for study year

When water elevation is compared between Year 2 and Year 3 during the sampled periods only, mean daily average elevations were significantly higher in both Buttle Lake ($t=-13.177$, $df=271.620$, $p=0.000$) and Upper Campbell Reservoir ($t=-5.407$, $df=48.782$, $p=0.000$) in Year 3 of the study compared to Year 2. The range of water elevations encountered during the sampled periods was also different, with Buttle Lake and Upper Campbell Reservoir both having a greater range of water elevation in Year 2 than in Year 3 (Figure 7).

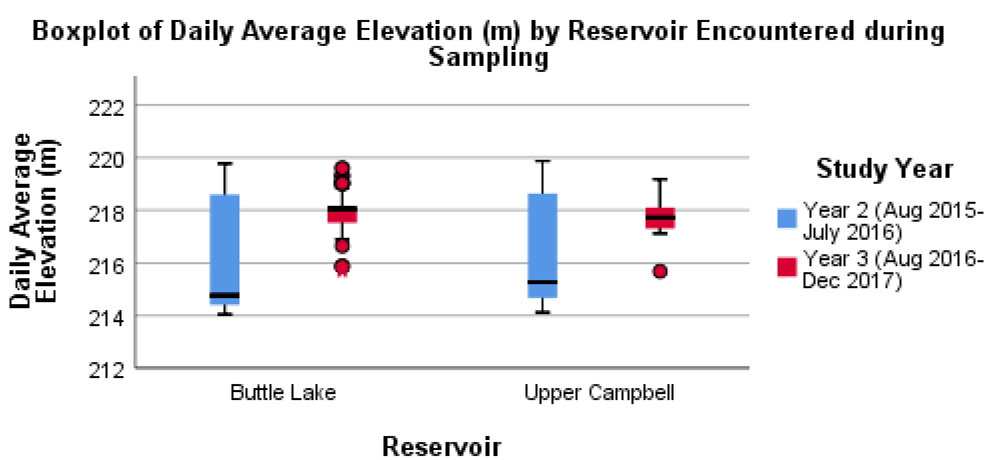

Figure 7. Boxplots of daily average elevation by reservoir during each sampling period

An examination of water elevations at Lower Campbell Reservoir during only the sampling periods reveals a significant difference in mean daily average elevation ($t=1.970$, $df=407$, $p=0.050$) between study years, with the average being slightly higher in Year 2 than Year 3. When comparing the range of water elevations encountered during the sampling to actual water elevations throughout the year, the sampling encountered a narrower range of daily average elevations than those observed for the full year, particularly in Year 3.

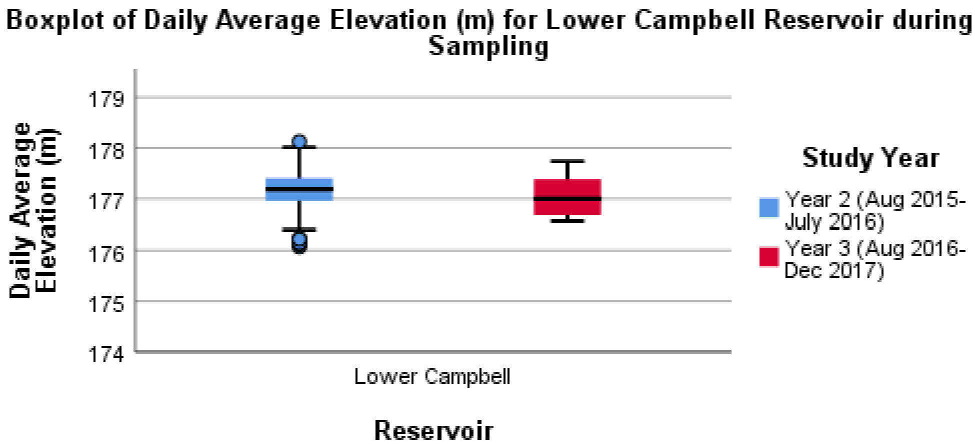

Figure 8. Boxplots of daily average elevation for Lower Campbell Reservoir during each sampling period

3.2.2 INFLUENCE OF WATER LEVEL ON RECREATION EXPERIENCE

In Question 9 of the survey, respondents were asked to rate how water levels influenced their recreation experience at the time of their visit on a scale of 1 to 5 (with 1 being "very negative" and 5 being "very positive"). During this study period, over 60% of all respondents reported that water levels at the time of their visit had either a "somewhat positive" or "very positive" influence on their recreation experience at the reservoir, while only 10.1% of respondents reported that water levels had a "somewhat negative" or "very negative" influence on their recreation experience (Figure 9). The responses in Year 3 were significantly different (Pearson's χ^2=43.329, df=4, p=0.000) than Year 2, with respondents in Year 3 generally reporting a more positive recreation experience.

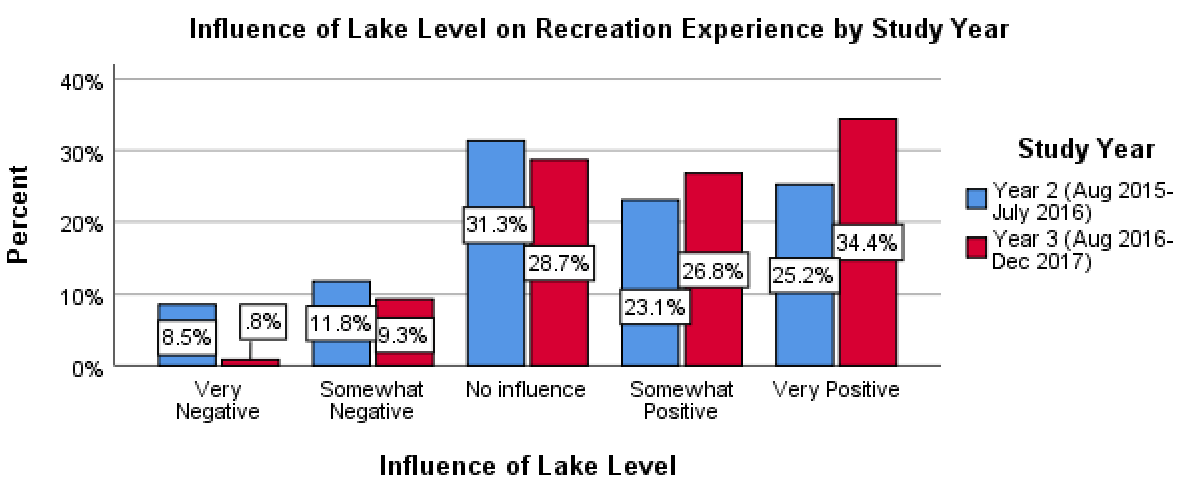

Figure 9. Frequency of responses for influence of water level on recreation experience at reservoirs (n=1211)

Scatterplots were developed to depict the influence of water levels on respondents' recreation experience in relation to daily average water elevation for the reservoirs (see Figure 10, Figure 11 and Figure 12). No strong trends are evident at the three reservoirs where lake elevations are available. A Spearman's rank-order correlation was run to examine this relationship. Unlike in Year 2 of the study, no significant correlations were identified between influence on recreation experience and water levels for any of the three reservoirs with elevation data available.

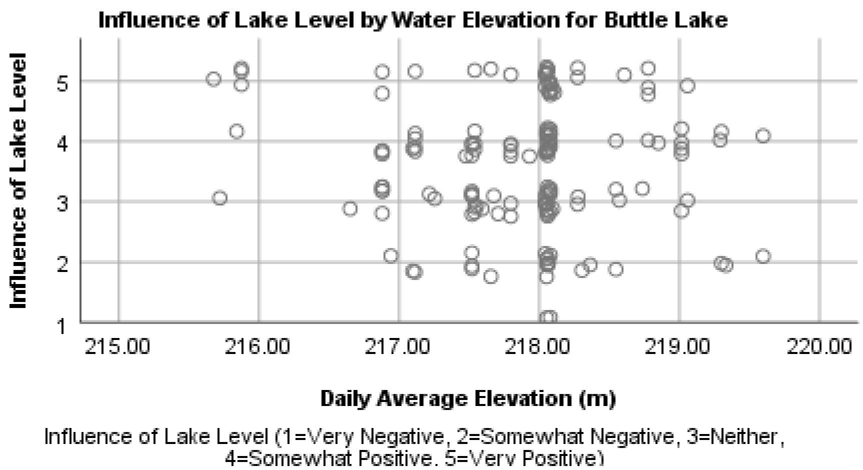

Figure 10. Influence of water level on recreation experience in relation to average daily water level for Buttle Lake (n=157)

In Year 2 of the study, a positive correlation was identified between recreation experience and water levels for Buttle Lake. Based on the data from Year 2, respondents at Buttle Lake associated decreases in water elevation with more negative recreational experiences. Neither Lower Campbell nor Upper Campbell Reservoirs resulted in a significant correlation. The change in significance in Year 3 maybe a result of a reduced range in water elevations experienced by respondents at the time they were surveyed.

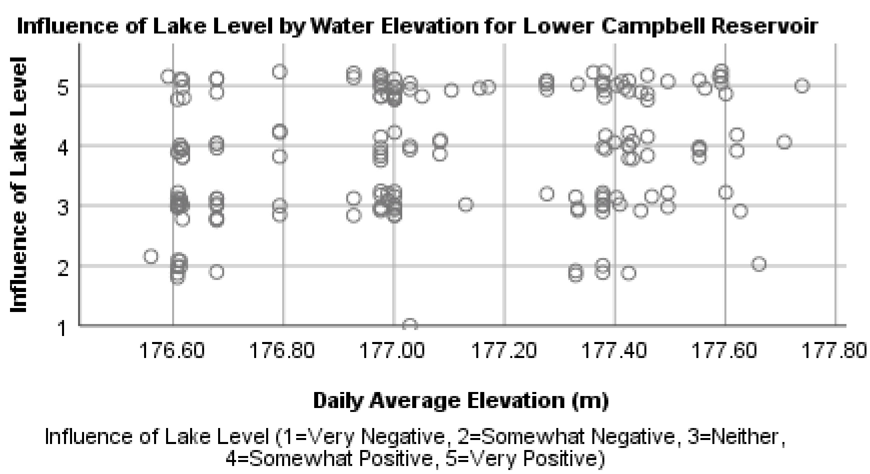

Figure 11. Influence of water level on recreation experience in relation to average daily water level for Lower Campbell Reservoir (n=179)

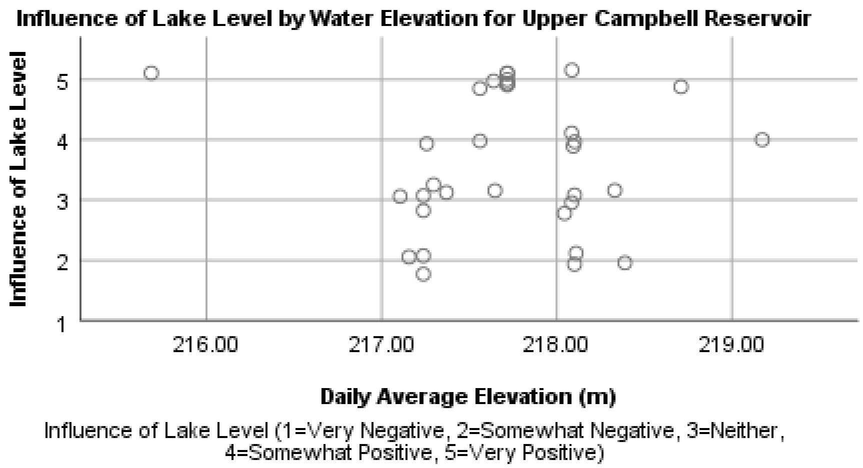

Figure 12. Influence of water level on recreation experience in relation to average daily water level for Upper Campbell Reservoir (n=33)

3.2.3 SATISFACTION WITH SHORELINE CONDITIONS

In Question 11, respondents were asked to rate how satisfied they were with shoreline conditions while engaged in water-based recreation at the time of their visit on a scale of 1 to 5 (with 1 being "very dissatisfied" and 5 being "very satisfied"). Respondents were generally satisfied with shoreline conditions at the reservoirs, with the majority (77.4%) of respondents reporting that they were either "somewhat satisfied" or "very satisfied" (Figure 13). The responses in Year 3 were significantly different (Pearson's χ^2=30.500, df=4, p=0.000) than Year 2, with respondents in Year 3 reporting a greater proportion of satisfaction with shoreline conditions.

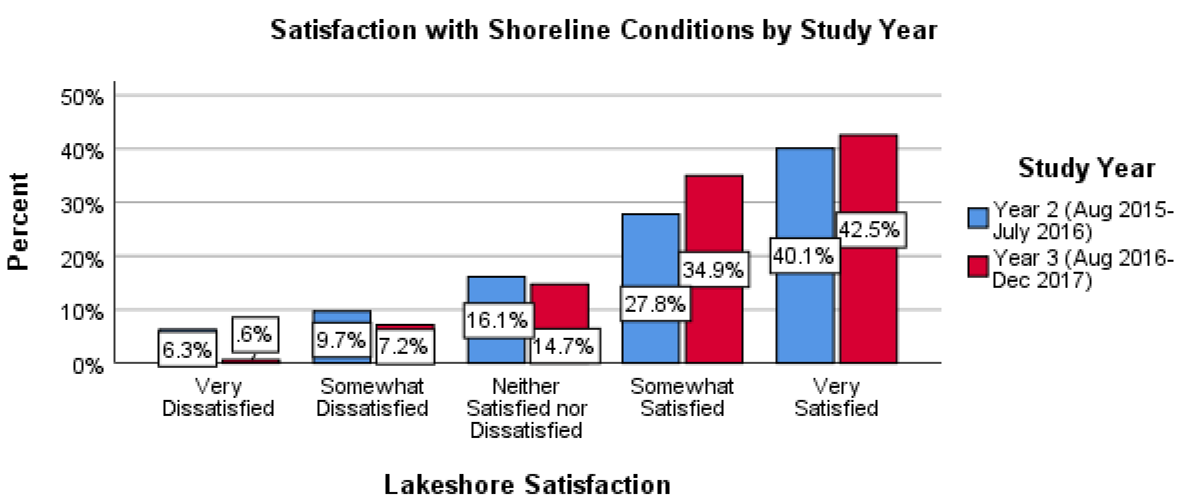

Figure 13. Frequency of responses for satisfaction with shoreline conditions at reservoirs by study year (n=1206)

Scatterplots were developed to depict the satisfaction with shoreline conditions in relation to daily average water elevation for the reservoirs (see Figure 14, Figure 15 and Figure 16). No strong trends were evident in the scatterplots at Buttle Lake, Lower Campbell Reservoir or Upper Campbell Reservoirs. A Spearman's rank-order correlation was run to examine any potential relationships although no significant relationships were detected at the 95% confidence level.

At Buttle Lake, a weak correlation between satisfaction with shoreline conditions and water level was detected, but only at the 90% confidence level (n=157, r_s=0.152, p=0.057). As in Year 2, the correlation suggests a potential relationship where decreasing water elevations results in decreased satisfaction with shoreline conditions, particularly at Buttle Lake.

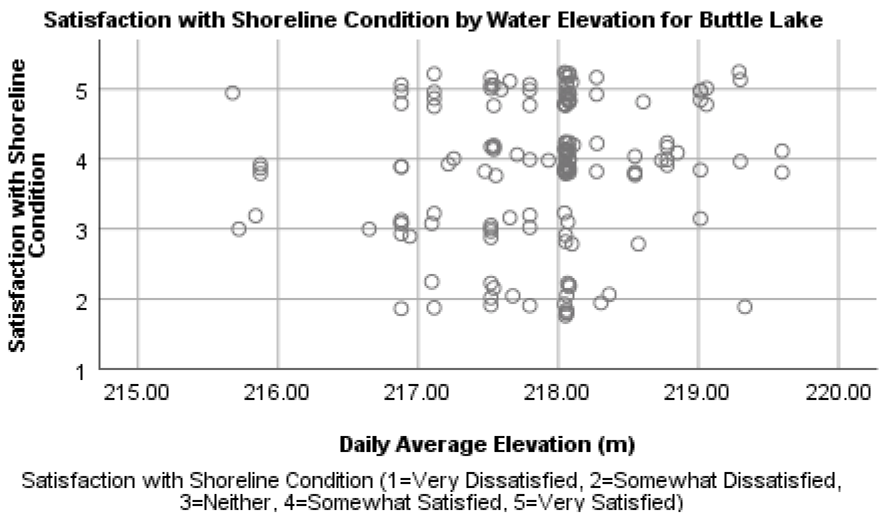

Figure 14. Satisfaction with shoreline conditions in relation to daily average water level for Buttle Lake (n=157)

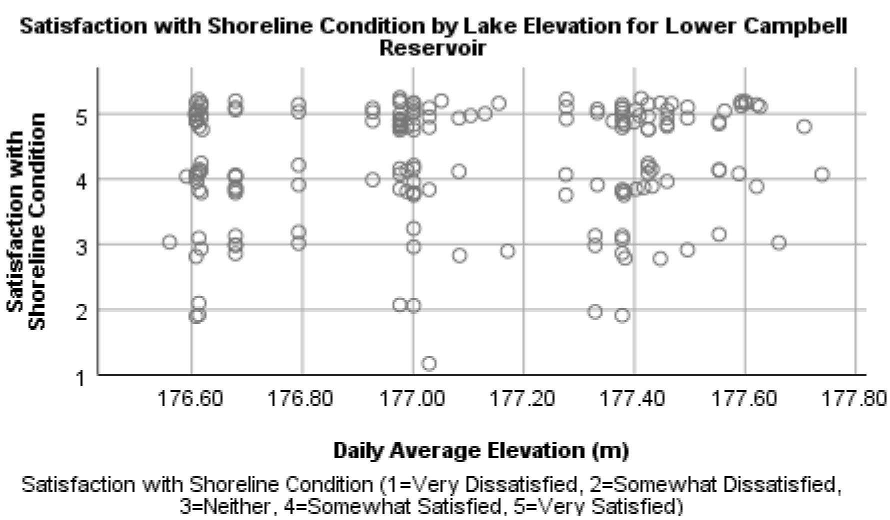

Figure 15. Satisfaction with shoreline conditions in relation to daily average water level for Lower Campbell Reservoir (n=180)

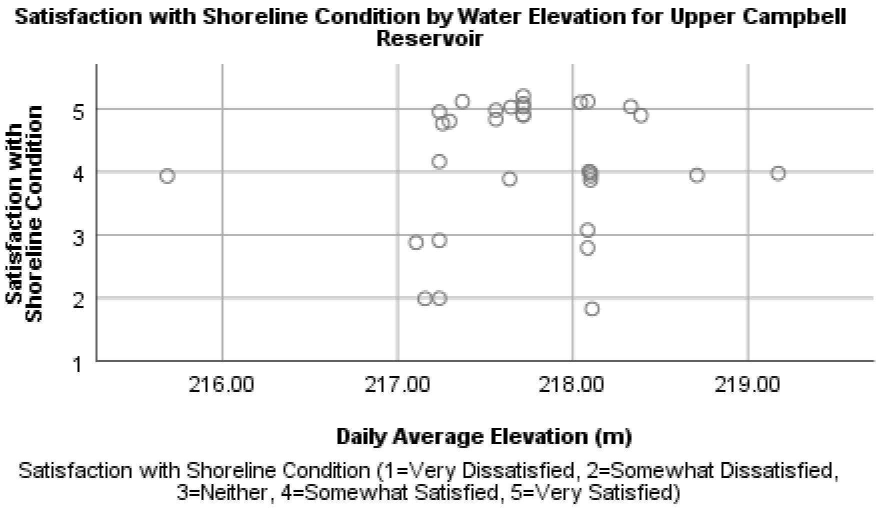

Figure 16. Satisfaction with shoreline conditions in relation to daily average water level for Upper Campbell Reservoir (n=32)

3.2.4 PERCEPTION OF SAFETY

Question 12 asked respondents to rate how safe they felt engaging in water-based activities on a scale of 1 to 5 (with 1 being "very unsafe" and 5 being "very safe") given water levels at the time of their visit. The majority of respondents (55.1%) reported feeling "very safe" while recreating at a reservoir within the Campbell Reservoir system (Figure 17).

When compared to Year 2, the responses in Year 3 were significantly different (Pearson's χ^2=16.489, df=4, p=0.002), with a greater proportion of respondents responding that water levels at the time of their visit had a positive effect on their perception of safety.

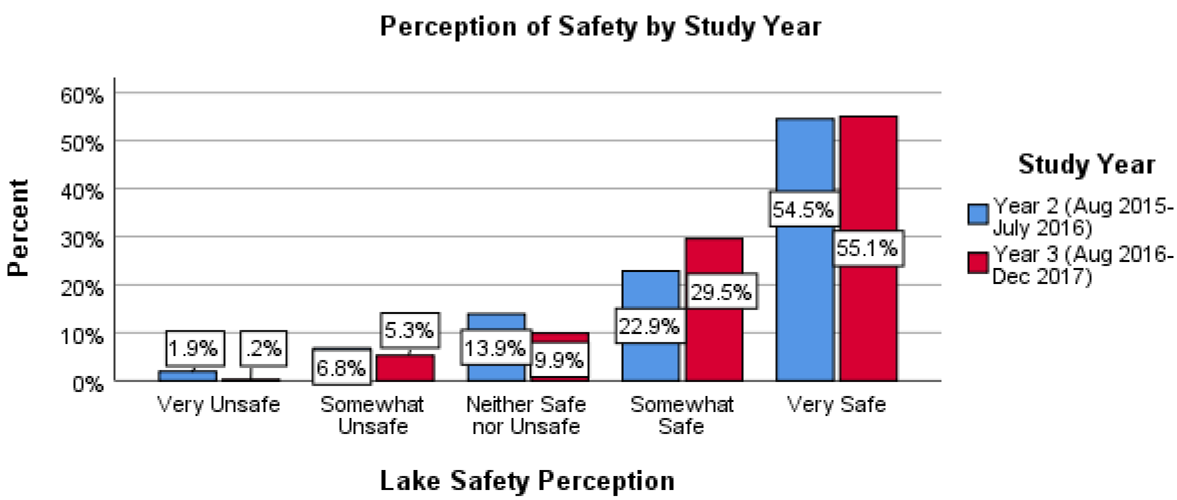

Figure 17. Frequency of responses for perception of safety while recreating at reservoirs by study year (n=1213)

Scatterplots were developed to depict respondents' perception of safety in relation to daily average water elevation for the reservoirs (see Figure 18, Figure 19 and Figure 20). A Spearman's rank-order correlation was used to examine any potential relationship between perceptions of safety and daily average elevations at the three reservoirs, but no significant relationships were identified (Figure 18). In Year 2, a weak but significant correlation between perceptions of safety and water levels was observed for Buttle Lake (n=199, r_s=0.374, p=0.000), although this was not detected in Year 3.

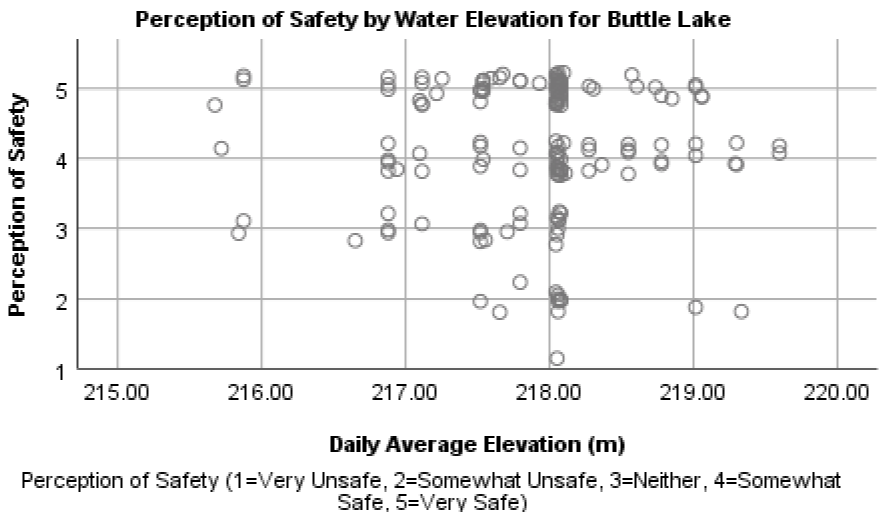

Figure 18. Perception of safety in relation to daily average water level for Buttle Lake (n=155)

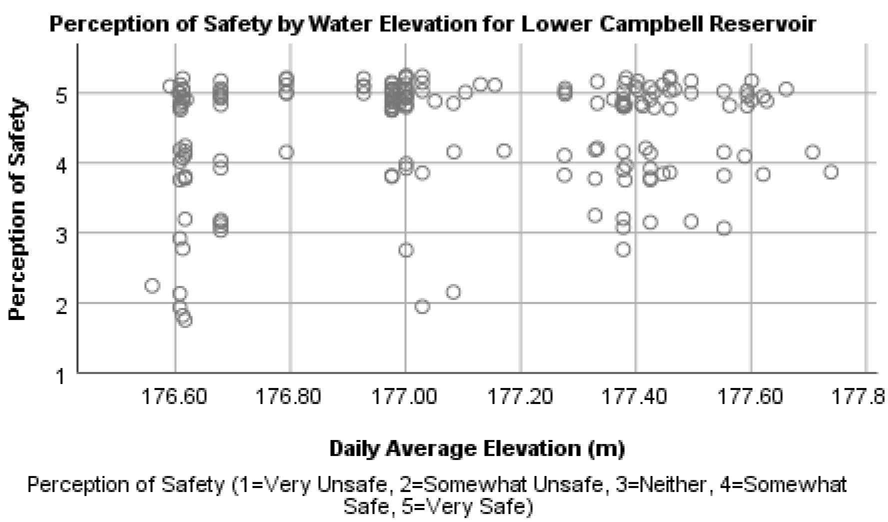

Figure 19. Perception of safety in relation to daily average water level for Lower Campbell Reservoir (n=178)

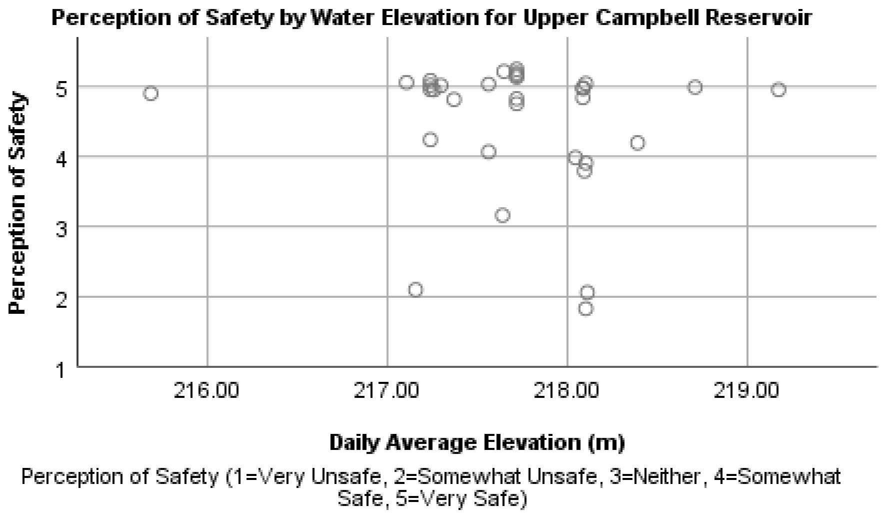

Figure 20. Perception of safety in relation to daily average water level for Upper Campbell Reservoir (n=32)

3.2.5 SATISFACTION WITH ACCESS

Question 14 of the survey asked respondents to rate how satisfied they were with access to the reservoir on a scale of 1 to 5 (with 1 being "very dissatisfied" and 5 being "very satisfied") at the time of their visit. Three options for access were rated, including access to beach, access to the water via a boat launch, and access to the water via the shoreline.

3.2.5.1 Access to Beach

Collectively, the majority of respondents at reservoirs (74.1%) were either "very satisfied" or "somewhat satisfied" with access to the beach (Figure 21). The responses in Year 3 were significantly different (Pearson's χ^2=20.7333, df=5, p=0.001) than Year 2, with a greater proportion of negative responses being reported in Year 2.

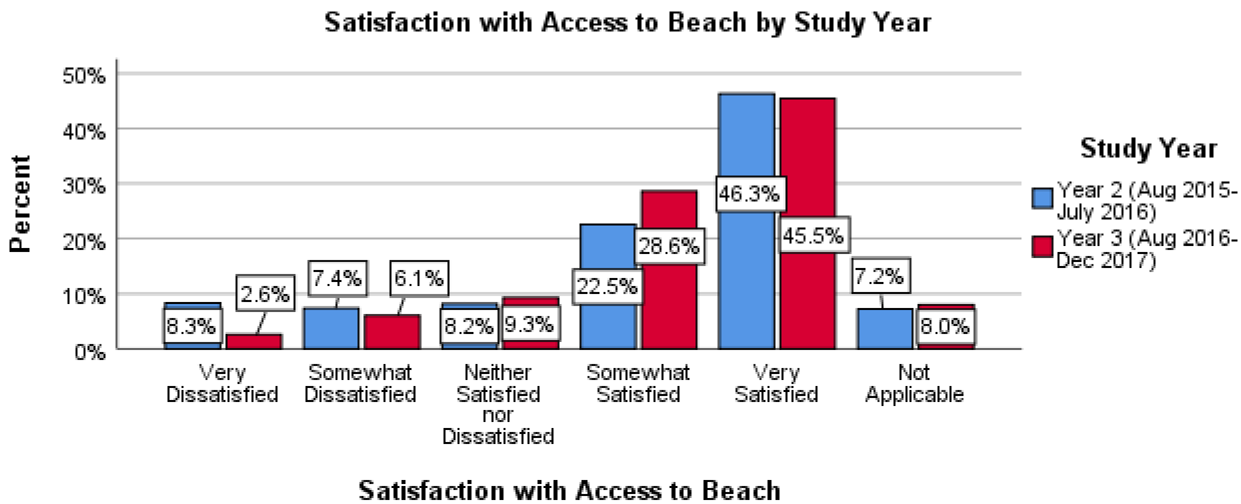

Figure 21. Satisfaction with access at reservoirs to beach for all respondents (n=1181)

Scatterplots were developed for Buttle Lake, Upper Campbell and Lower Campbell to depict satisfaction with access to the beach in relation to daily average water elevation for the reservoirs (see

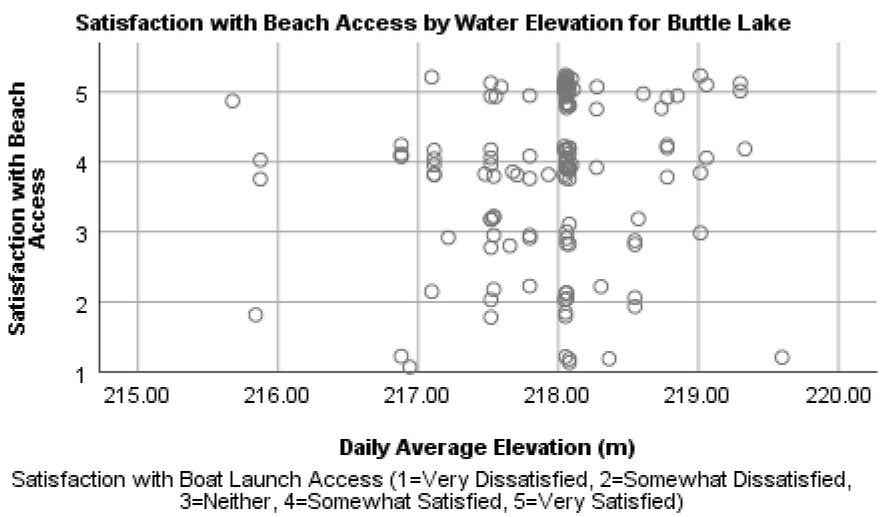

Figure 22, Figure 23 and Figure 24). No significant correlation was identified between satisfaction with beach access and water levels at any of the three reservoirs at the 95% confidence level.

At Buttle Lake, a weak correlation between satisfaction with beach access and water levels was detected, but only at the 90% confidence level (n=137, r_s=0.1606, p=0.061). This relationship was identified as significant at the 99% confidence level in Year 2, but again, only at Buttle Lake (n=183, r_s=0.553, p=0.000).

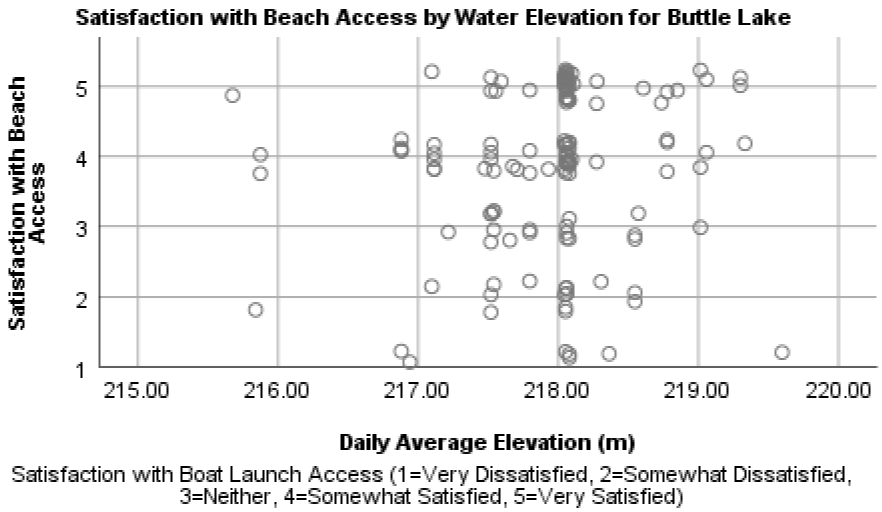

Figure 22. Satisfaction with access to the beach in relation to daily average water level for Buttle Lake (n=137)

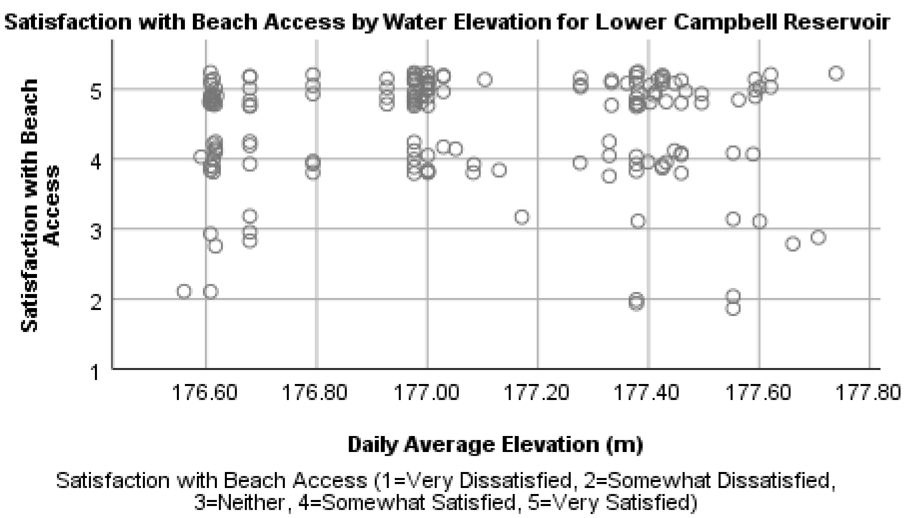

Figure 23. Satisfaction with access to the beach in relation to daily average water level for Lower Campbell Reservoir (n=169)

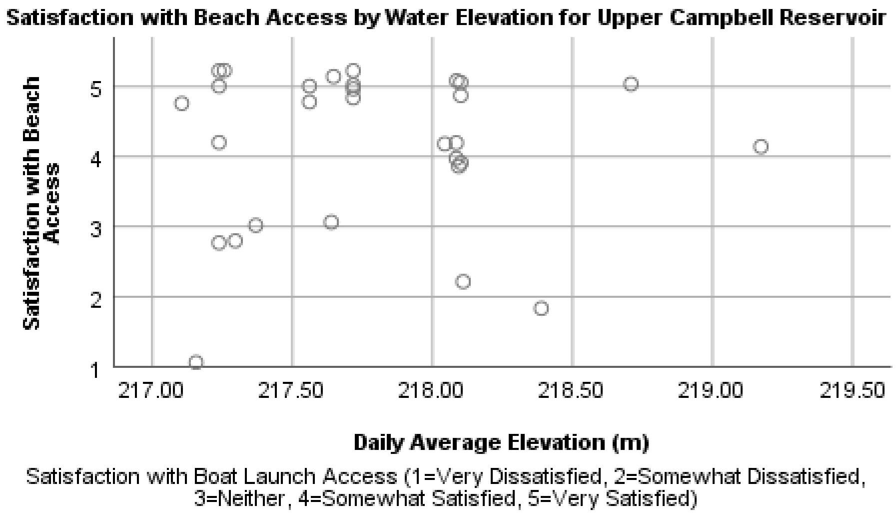

Figure 24. Satisfaction with access to the beach in relation to daily average water level for Upper Campbell Reservoir (n=29)

3.2.5.2 Access to Water via Boat Launch

When respondents were asked to rate their satisfaction with access to the water via boat launches, the greatest proportion of respondents (32.4%) reported that this did not apply, implying that a large proportion of people did not use boat launches while recreating at reservoirs. A total of 46.5% of respondents reported that they were either "very satisfied" or "somewhat satisfied" with access to water via boat launches.

Although with similar distributions, the responses in Year 3 were significantly different than Year 2 (Pearson's χ^2=38.421, df=4, p=0.000). A larger proportion of respondents in Year 3 reported being satisfied with access to the water from boat launches at the time of their visit compared to Year 2 (Figure 25).

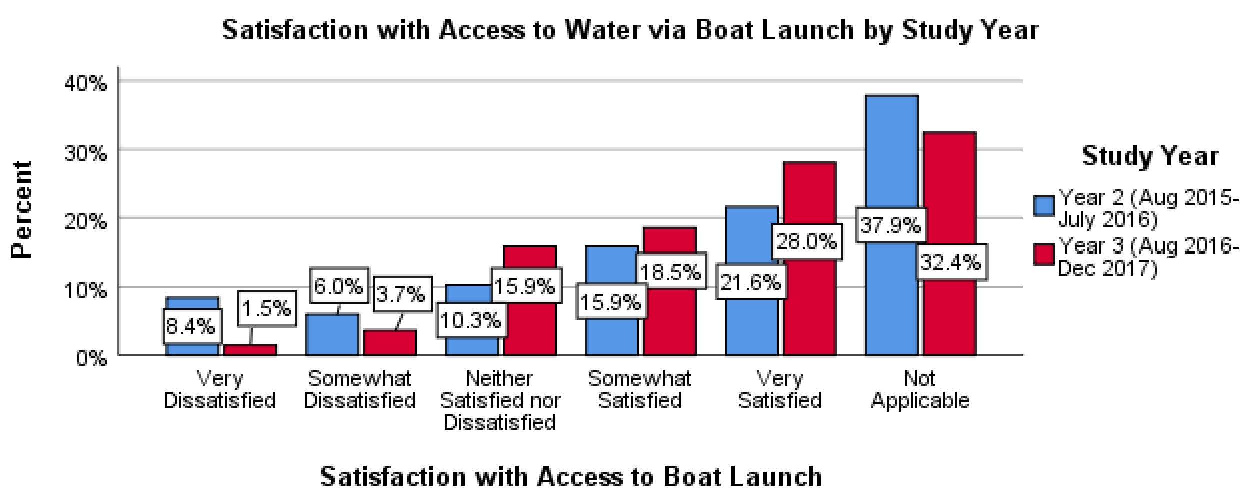

Figure 25. Satisfaction with access at reservoirs to water via boat launch for all respondents (n=1110)

Scatterplots were developed to depict respondents' satisfaction with access to the reservoirs via boat launches in relation to daily average water elevation (see Figure 26, Figure 27 and Figure 28). No trends were apparent at the three reservoirs examined in the scatterplots, nor were any significant relationships identified from the Spearman's rank-order correlation. In Year 2, a significant correlation was identified between lake level and satisfaction with boat launch access to the water at Buttle Lake (n=130, r_s=0.586, p=0.000), however a similar result was not detected in Year 3.

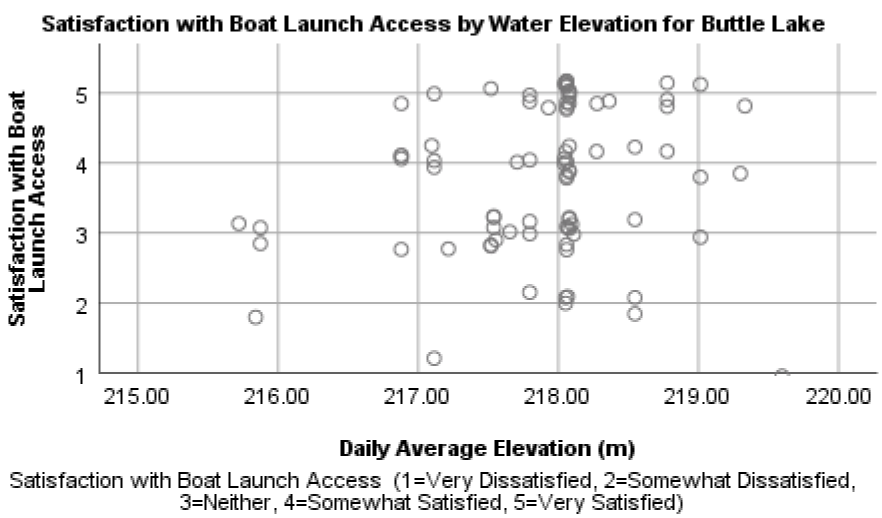

Figure 26. Satisfaction with access to the water via boat launch in relation to daily average water level for Buttle Lake (n=85)

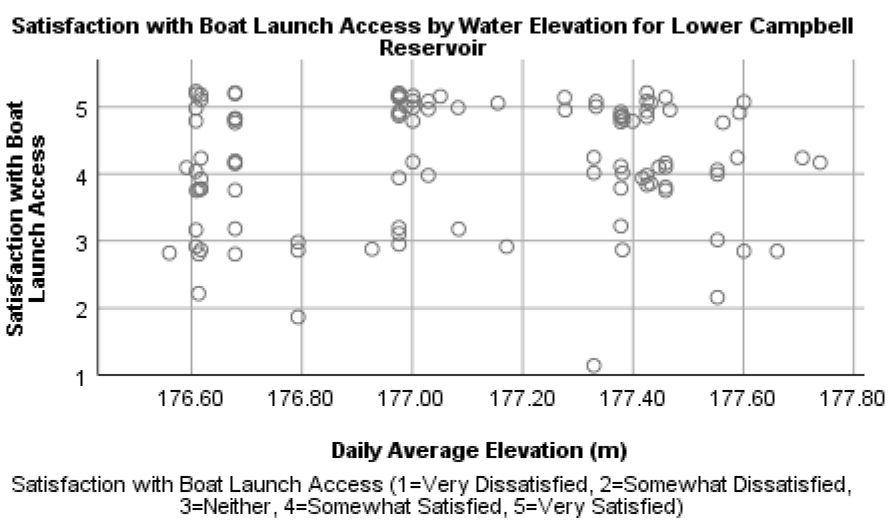

Figure 27. Satisfaction with access to the water via boat launch in relation to daily average water level for Lower Campbell Reservoir (n=109)

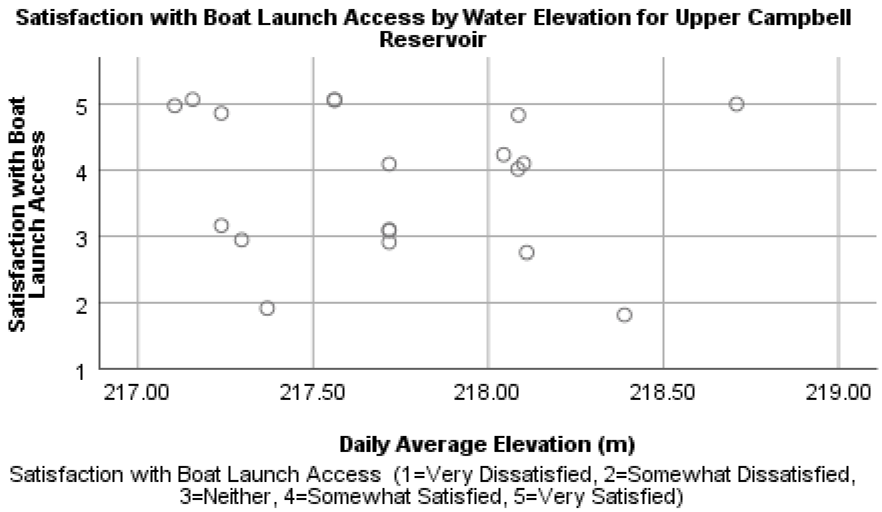

Figure 28. Satisfaction with access to the water via boat launch in relation to daily average water level for Upper Campbell Reservoir (n=19)

3.2.5.3 Access to Water via Shoreline

A total of 69.5% of respondents reported that they were either "very satisfied" or "somewhat satisfied" when respondents were asked to rate their satisfaction with access to the water via the shoreline (see Figure 29). The distribution of responses in Year 3 was significantly different than those in Year 2 (Pearson's χ^2=37.195, df=5, p=0.000), with a greater proportion of positive responses by those surveyed in Year 3.

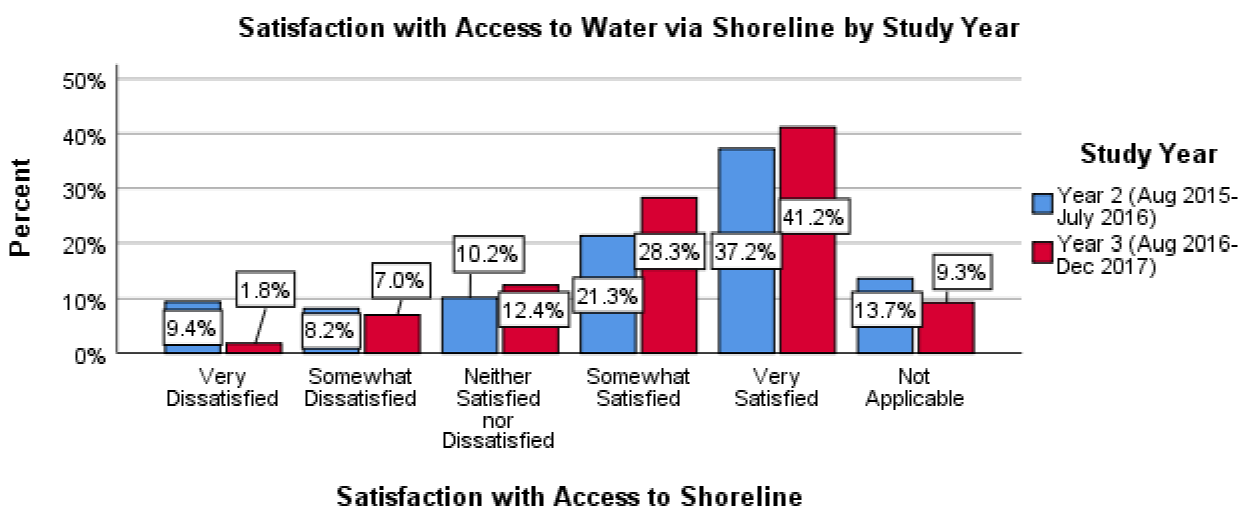

Figure 29. Satisfaction with access at reservoirs to water via shoreline for all respondents (n=1151)

Satisfaction with access to the water via the shoreline was graphed in relation to daily average water elevation in scatterplots for Buttle Lake, Upper Campbell Reservoir and Lower Campbell Reservoir (see Figure 30, Figure 31 and Figure 32). As with the other reservoir performance measures in Year 3, no significant correlations were identified between satisfaction with access to the water via the shoreline and water levels at the three reservoirs.

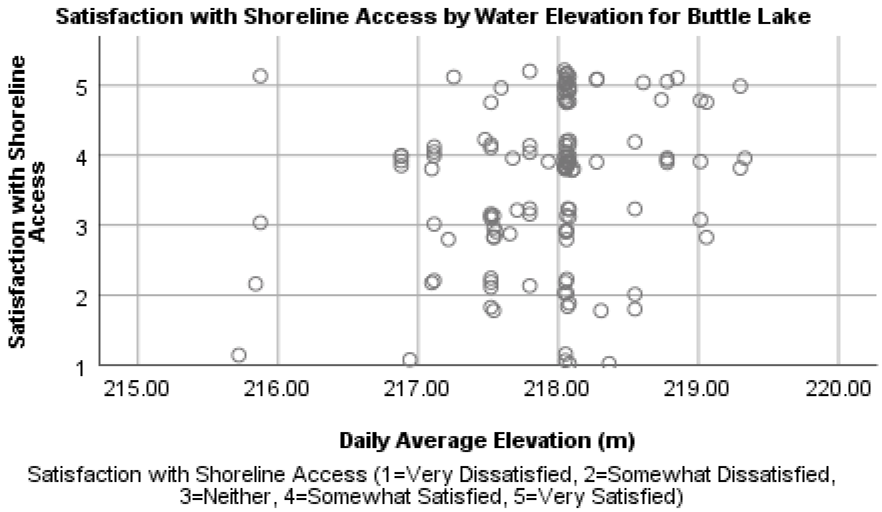

Figure 30. Satisfaction with access to the water via shoreline in relation to daily average water level for Buttle Lake (n=132)

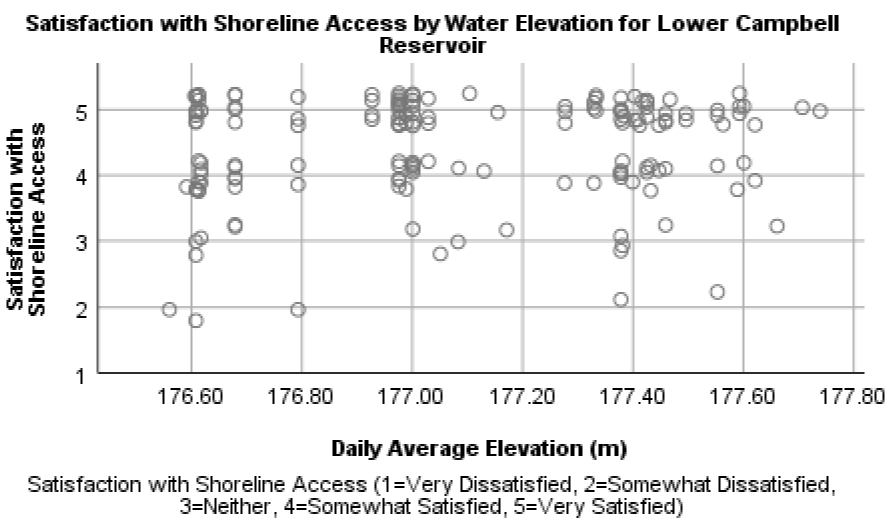

Figure 31. Satisfaction with access to the water via boat launch in relation to daily average water level for Lower Campbell Reservoir (n=161)

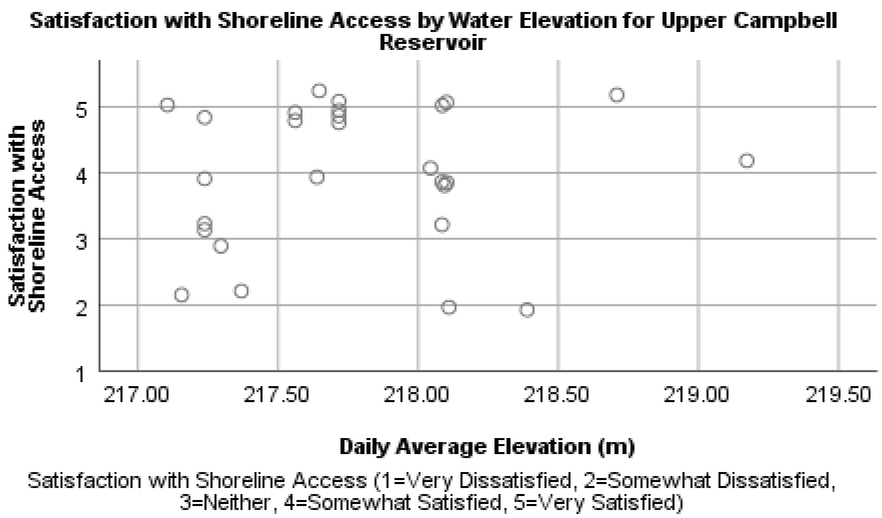

Figure 32. Satisfaction with access to the water via boat launch in relation to daily average water level for Upper Campbell Reservoir (n=27)

3.3 MANAGEMENT HYPOTHESIS – RIVERS

The management hypothesis for rivers in the Campbell River reservoir systems is stated as:

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

We tested this hypothesis by comparing perceptions of safety, satisfaction and experience with average daily flow rates for two rivers in the study area: Quinsam River and Campbell River. Responses to Q30, Q31 and Q32 in Section E: Visits to Rivers (Appendix B) of the survey were graphed using scatterplots in relation to the average daily water flow. Correlations between average daily flow rates and the various performance measures were tested using the Spearman rank-order correlation coefficient.

3.3.1 FLOW RATES OF RIVERS

River discharge or flow rate, measured as daily average flow rate in cubic metres per second (m^3/s), was gathered for two rivers: Quinsam River and Campbell River. The water flow data was provided from BC Hydro Generation Operation, and were collected from the following stations:

- For Quinsam River: Quinsam R nr Campbell R
- For Campbell River: Campbell R nr Campbell R

Analyses had to be completed separately for the two rivers as volumes differ greatly between the two systems, and thus were not directly comparable. A summary of water flows from the BC Hydro data set are provided in Table 7. Based on the monitoring data, the mean daily average flow rates for Year 3 of the study were 100.03 m^3/s for Campbell River and 9.98 m^3/s for Quinsam River.

Table 7. Summary of water flow data (in cubic meters/second) for rivers in Year 3 (Aug 2016-Dec 2017)

	Campbell River (m^3/s)	Quinsam River (m^3/s)
Mean	100.03	9.98
Median	91.30	6.00
Std. Deviation	74.26	11.90
Variance	5514.04	141.66
Minimum	32.22	1.97
Maximum	626.62	88.40

Water flow data measured throughout the year were compared to those flowrates encountered during the sampling at Campbell River and Quinsam River to identify how representative sampling was of the true range of water flows. As water flow data was not normally distributed, a One-Sample Wilcoxon Signed Rank Test was used to determine if the median daily water flow that were encountered during sampling were the same as those actually observed for the entire year. A significant difference in median water flow rates was observed between the times sampled and actual water flows for Campbell River (n=23, p=0.000) and Quinsam River (n=35, p=0.001).

Comparisons of Year 3 to Year 2 identified no significant difference in mean daily average elevations overall between years for Quinsam River (t=-0.283, df=917, p=0.877). The range of flow rates (e.g. minimum and maximum flows) was also similar between study years (see Figure 33).

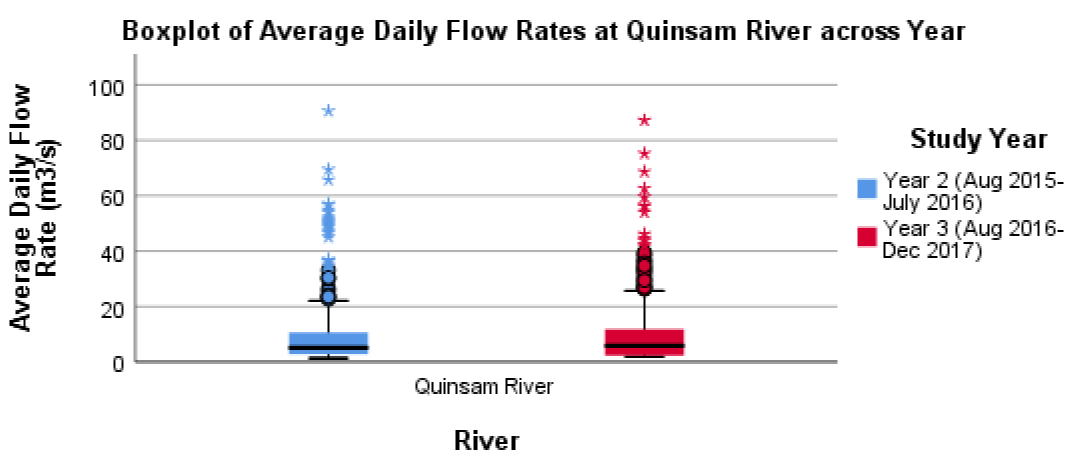

Figure 33. Boxplot of average daily flow rates at Quinsam River by study year

Unlike in Quinsam River, a significant difference in mean flow rate was identified for Campbell River (t=-2.934, df=856, p=0.003) between study years. The ranges in flow rates also differed, with numerous days having substantially higher flows in Year 3 than were observed in Year 2 (see Figure 34).

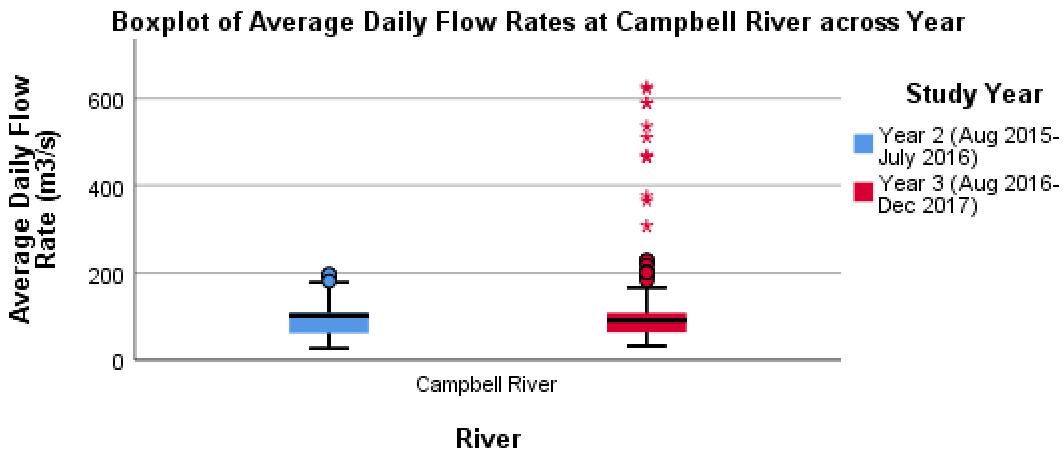

Figure 34. Boxplot of average daily flow rates at Campbell River for study year

When flow rate is compared between Year 2 and Year 3 during the sampled periods only, mean flow rates were significantly lower in Quinsam River (t=2.039, df=68.854, p=0.045) in Year 3 than Year 2 (see Figure 35). Also evident in Figure 35, the range of flow rates encountered at Quinsam River during sampling in Year 3 was narrower.

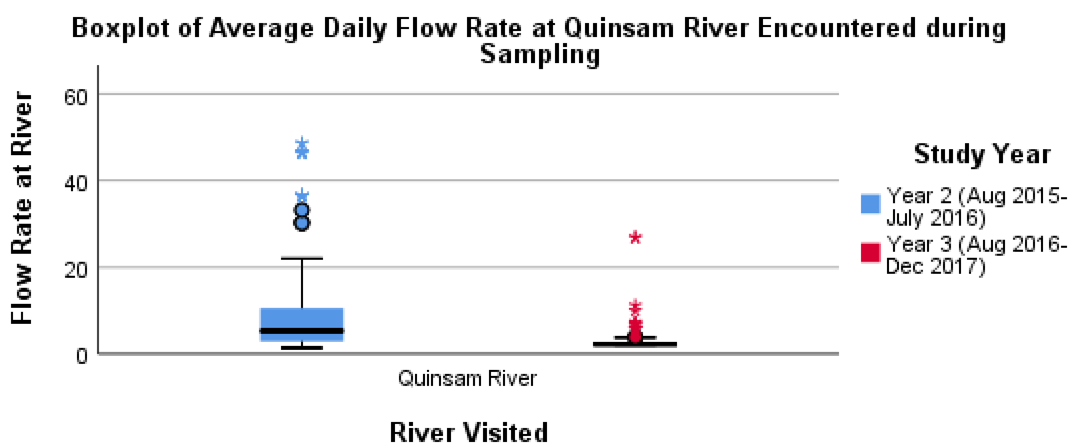

Figure 35. Boxplots of daily average flow rate at Quinsam River encountered during each sampling period

No significant difference in mean flow rates was noted for Campbell River between the two sampling periods (t=1.968, df=74.383, p=0.053) (see Figure 36). Similar to Quinsam River, the range of water elevations encountered at Campbell River during sampling was also narrower in Year 3 than Year 2.

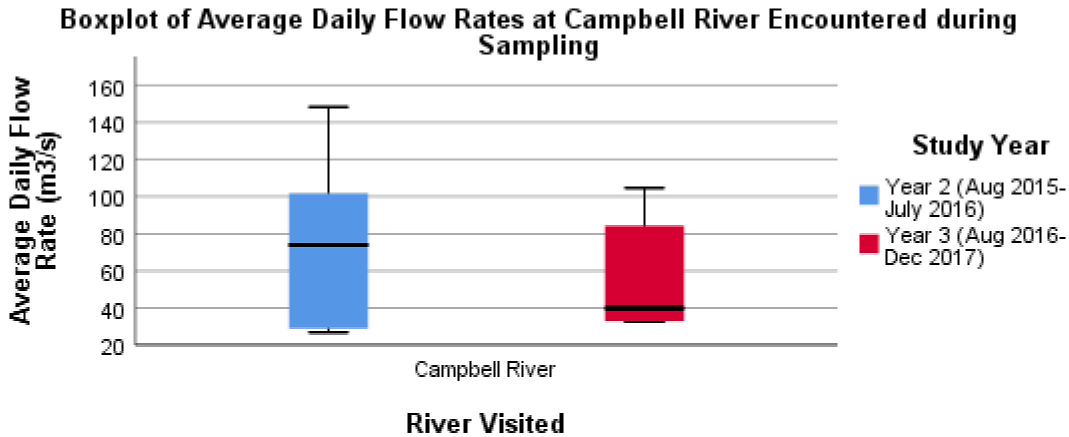

Figure 36. Boxplots of daily average flow rate for Campbell River encountered during each sampling period

3.3.2 INFLUENCE OF WATER FLOW ON RECREATION EXPERIENCE

Question 30 asked respondents to rate how water flows influenced their recreation experience on a scale of 1 to 5 (with 1 being "very negative" and 5 being "very positive") given river conditions at the time of their visit. Approximately 75% of respondents reported that water flow had either a "somewhat positive" or "very positive" influence on their recreation experience at the rivers.

The responses in Year 3 were significantly different than those in Year 2 (Pearson's χ^2=27.365, df=4, p=0.000). The responses in Year 2 included a much larger proportion of individuals who reported that river flows had no influence on their recreation experience (Figure 37). In comparison, a much greater proportion of respondents expressed that flow rates had a positive influence on their experience in Year 3.

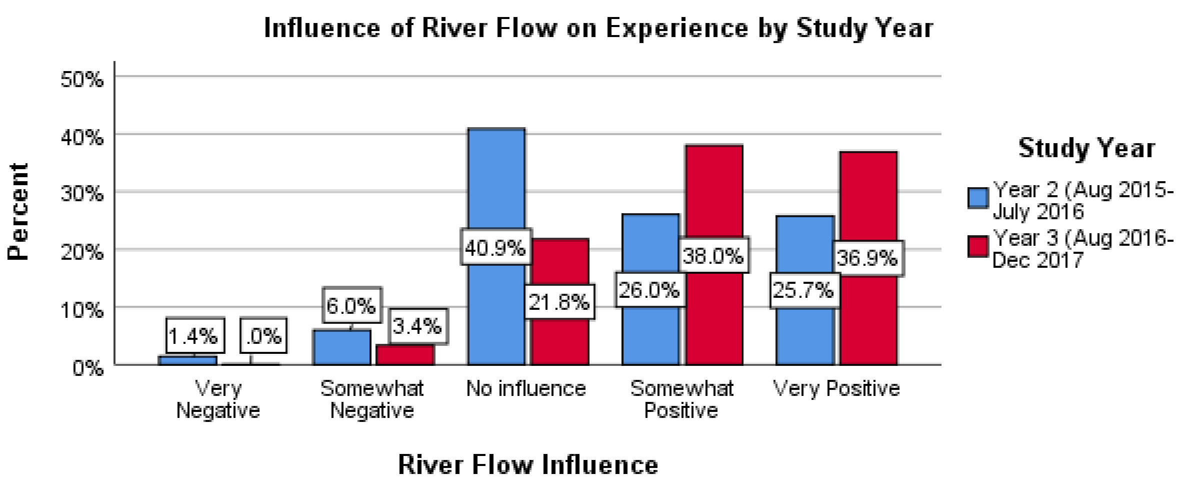

Figure 37. Frequency of responses for influence of river flow on experience while recreating at the river (n=529)

The influence of water flows on respondents' recreation experience was graphed in relation to daily average water flows for the rivers as scatterplots (see Figure 38 and Figure 39). No strong trends were apparent in the scatterplots for Quinsam River and Campbell River. A Spearman's rank-order correlation was run to examine this relationship. No significant relationships were noted at either location.

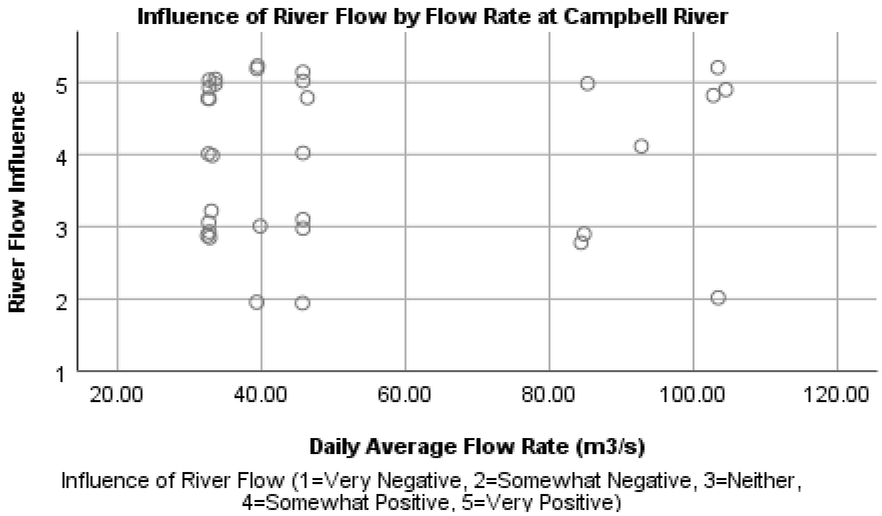

Figure 38. Influence of water flows on recreation experience in relation to average daily water flow for Campbell River (n=32)

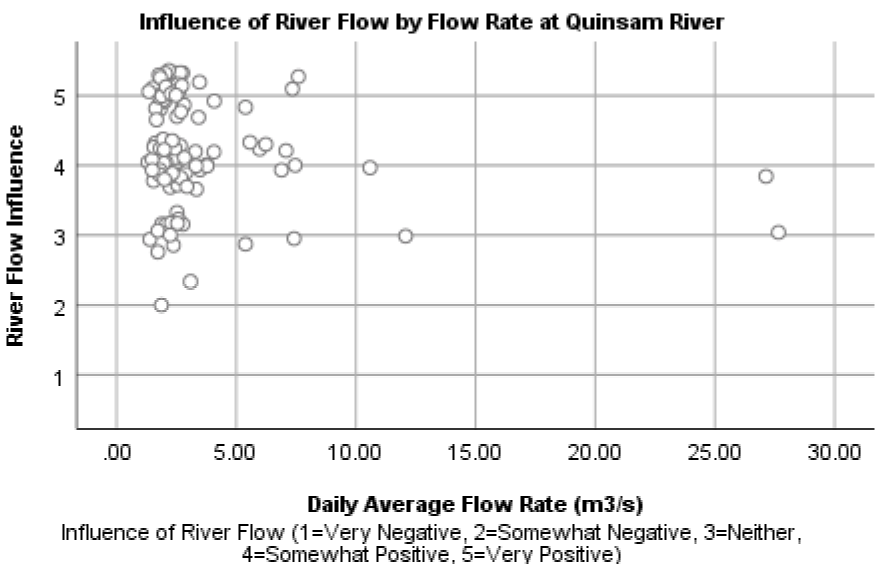

Figure 39. Influence of water flows on recreation experience in relation to average daily water flow for Quinsam River (n=112)

3.3.3 SATISFACTION WITH SHORELINE CONDITIONS

Question 31 asks riverine visitors to rate how satisfied they were with shoreline conditions while engaged in water-based recreation at the time of their visit on a scale of 1 to 5 (with 1 being "very dissatisfied" and 5 being "very satisfied"). Respondents were generally satisfied with shoreline conditions along the rivers, with the majority (80.4%) of respondents reporting that they were either "somewhat satisfied" or "very satisfied".

Responses in Year 3 were similar to those in Year 2, and no significant difference in the distribution of answers was identified (Pearson's χ^2=7.888, df=4, p=0.096).

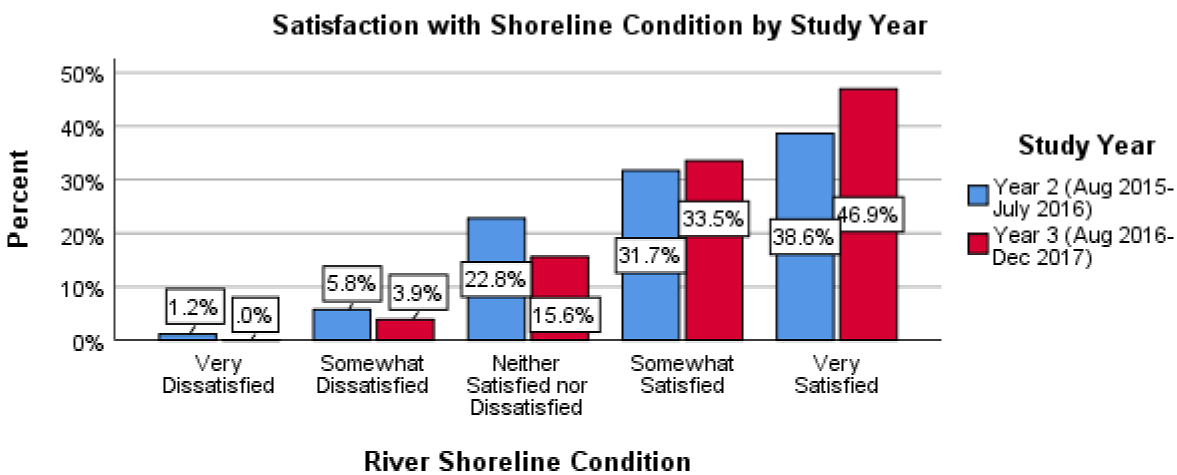

Figure 40. Frequency of responses for satisfaction with shoreline conditions at rivers (n=526)

Scatterplots were developed to depict the satisfaction with shoreline conditions in relation to daily average water flows for the rivers although no clear trend was noted (see Figure 41 and Figure 42). A Spearman's rank-order correlation was used to examine this relationship but no significant correlation was identified for either river.

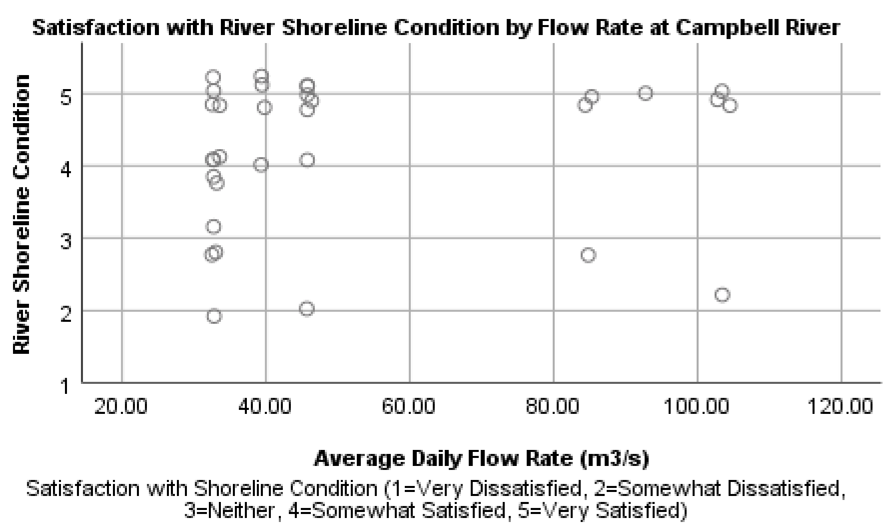

Figure 41. Satisfaction with shoreline conditions in relation to daily average water flow for Campbell River (n=32)

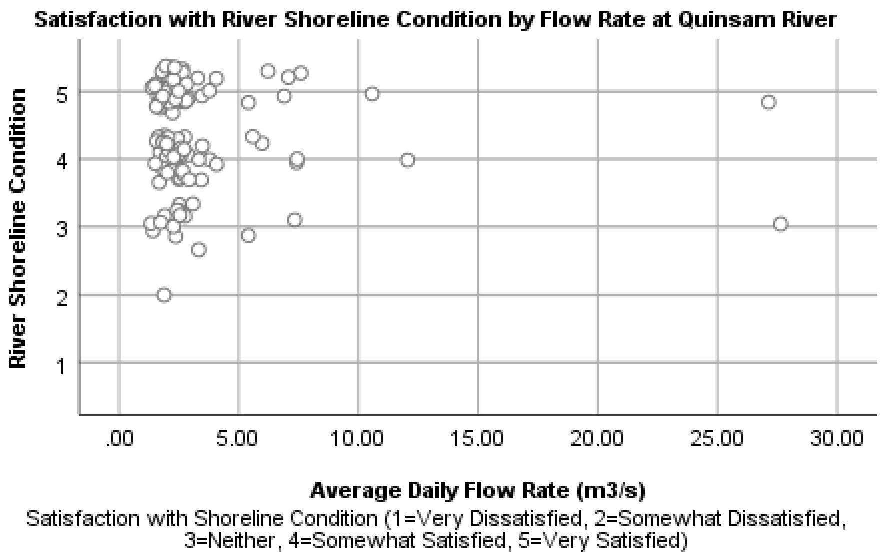

Figure 42. Satisfaction with shoreline conditions in relation to daily average water flow for Quinsam River (n=112)

3.3.4 PERCEPTION OF SAFETY

In Question 32, respondents were asked to rate how safe they felt engaging in water-based activities at the rivers on a scale of 1 to 5 (with 1 being "very unsafe" and 5 being "very safe") given water levels at the time of their visit. Approximately half of respondents (49.7%) reported feeling "very safe" while recreating at a reservoir within the Campbell Reservoir system, with another 26.6% reported feeling "somewhat safe". A comparison between Year 2 and Year 3 identified no significant difference in the distribution of answers (Pearson's χ^2=5.307, df=4, p=0.257).

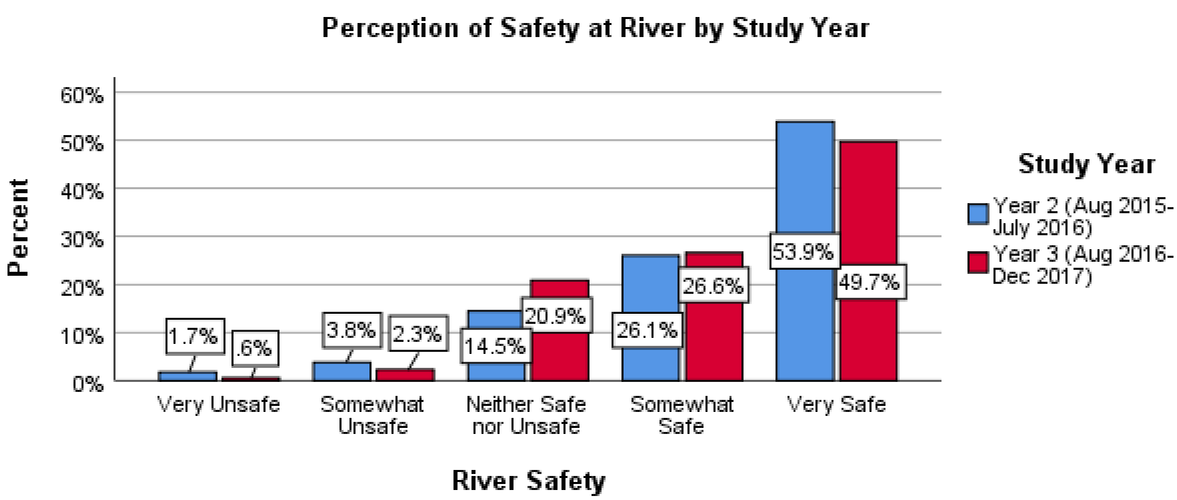

Figure 43. Frequency of responses for perception of safety while recreating at rivers (n=522)

Scatterplots were developed to depict respondents' perception of safety in relation to daily average water flows for the rivers (see Figure 44 and Figure 45). A Spearman's rank-order correlation was run to examine this relationship but no significant correlation was identified for either river.

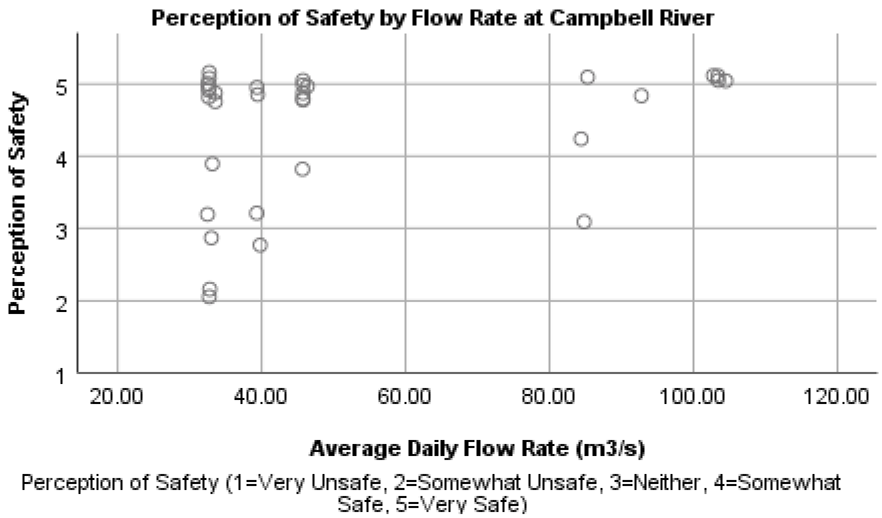

Figure 44. Perception of safety in relation to daily average water flows for Campbell River (n=32)

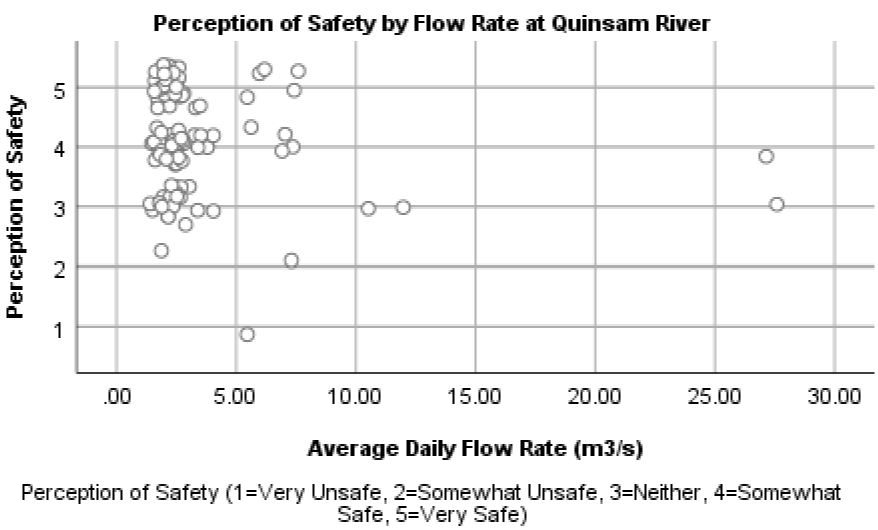

Figure 45. Perception of safety in relation to daily average water flows for Quinsam River (n=112)

3.4 MANAGEMENT HYPOTHESIS – FALLS

The management hypothesis for rivers in the Campbell River reservoir systems is stated as:

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

We tested this hypothesis by comparing visitor satisfaction and impressiveness at Elk Falls with average daily flow rates for Campbell River. Responses to Q23 and Q24 in Section D: Visit to Elk Falls (Appendix B) of the survey were graphed using scatterplots in relation to the average daily water flow. A line of best fit was applied on the scatterplots to illustrate the general trends, although the method used to apply the line of best fit, the Pearson product-moment correlation, is not appropriate for this type of data. As noted in the sections on reservoirs and rivers, a more appropriate test for examining correlation between ordinal variables (i.e., Likert scales) and interval data (i.e., average daily elevation) is Spearman rank-order correlation coefficient.

River discharge for Elk Falls, measured as daily average flow rate, was gathered from BC Hydro for Campbell River using data from the "Campbell River near Campbell River" station.

3.4.1 IMPRESSIVENESS OF FALLS

Question 32 asks respondents to rate how impressive Elk Falls were at the time of their visit on a scale of 1 to 5 (with 1 being "very unimpressive" and 5 being "very impressive"). Most respondents reported that they were either "very impressed" (61.0%) or "somewhat impressed" (34.3%) by Elk Falls at the time of their visit (Figure 46). No statistical difference was identified between the distribution of responses in Year 3 compared to Year 2 (Pearson's χ^2=3.506, df=4, p=0.462).

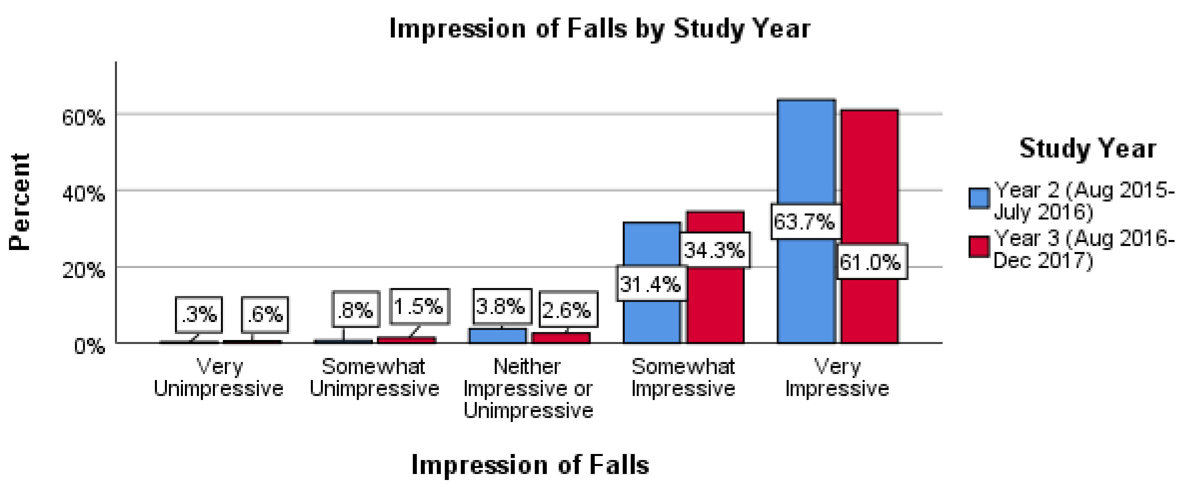

Figure 46. Frequency of responses for impressiveness of Elk Falls (n=1260)

A scatterplot was developed to depict respondents' ratings of impressiveness of the falls in relation to daily average water flows for Campbell River (see Figure 47). A Spearman's rank-order correlation was run to examine this relationship but no significant correlation was identified suggesting that discharge does not influence visitors' impression of Elk Falls.

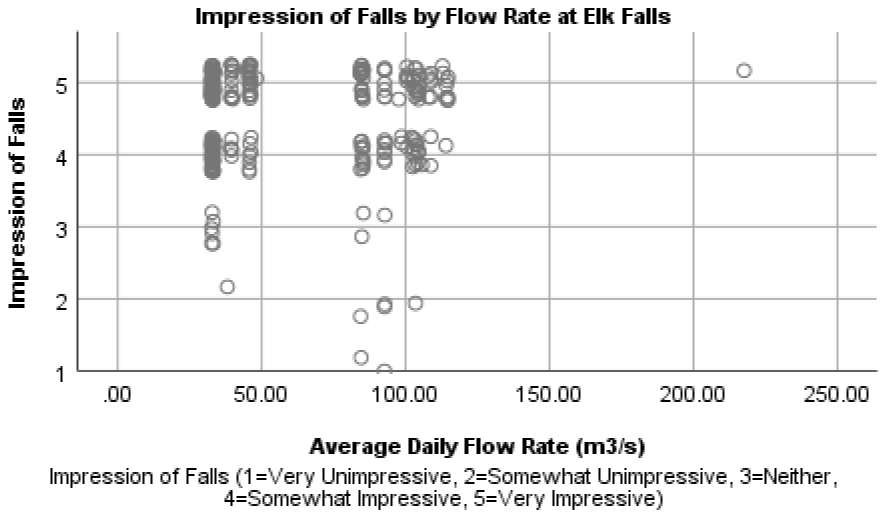

Figure 47. Impressiveness of falls in relation to daily average water flows for Elk Falls (n=323)

3.4.2 SATISFACTION WITH EXPERIENCE AT FALLS

In Question 24, respondents were asked to rate how satisfied they were with the viewing experience at Elk Falls on a scale of 1 to 5 (with 1 being "very dissatisfied" and 5 being "very satisfied"). Respondents reported a high degree of satisfaction with their experience at Elk Falls with 80.9% stating they were "very satisfied" (Figure 46). No statistical difference was identified between the distribution of responses in Year 3 compared to Year 2 (Pearson's $\chi 2=1.987$, df=4, p=0.738).

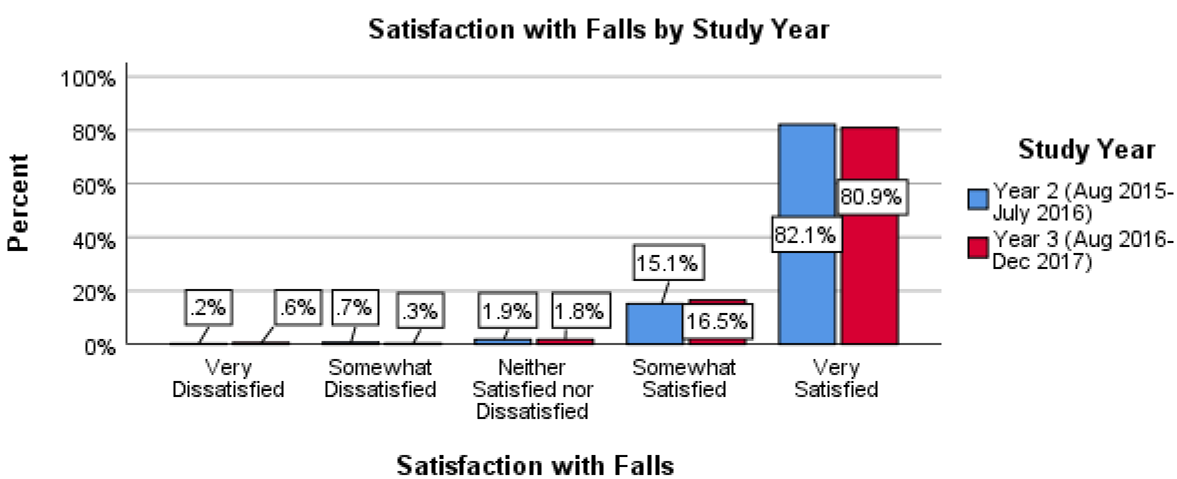

Figure 48. Frequency of responses for satisfaction with experience at Elk Falls (n=1258)

A scatterplots of respondents' ratings of satisfaction at the falls in relation to daily average water flows for Campbell River does not indicate any notable trend (see Figure 49). A Spearman's rank-order correlation was run to examine this relationship but no significant correlation was identified suggesting that discharge does not influence visitors' impression of Elk Falls.

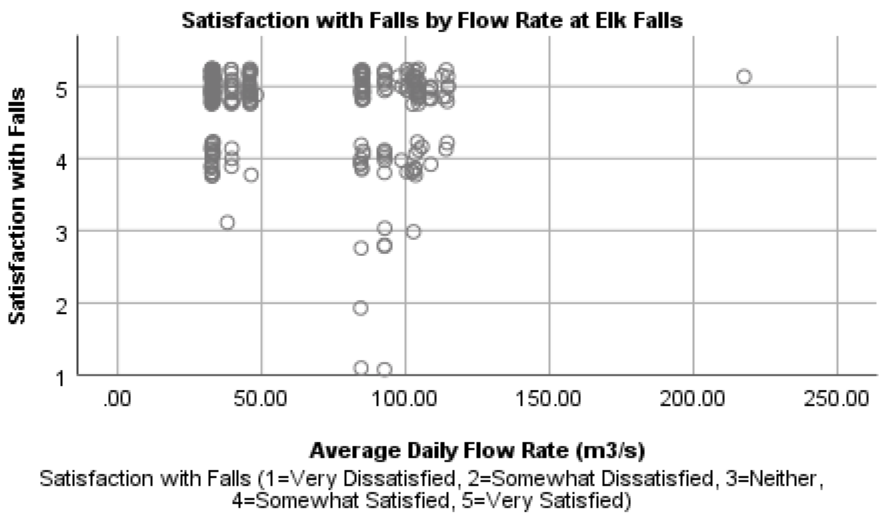

Figure 49. Satisfaction with experience at falls in relation to daily average water flow (n=322)

3.5 DISCRETE CHOICE EXPERIMENT

Year 3 results are organized as follows: first, the single class multinomial logit model is presented, showing overall recreationist attitudes and preferences toward reservoir features; second, the 'known class' multinomial logit models profiling different preferences segmented groups is presented and discussed; third, the 4-class multinomial logit model is presented but not discussed. A total of 809 respondents completed (compared to 1130 for Year 2) the full choice experiment and provide data for the analysis.

The 1-class multinomial logit model of the responses to the six choice tasks for Year 3 is shown in Table 8. The model provides three significant observations similar to Year 2. First, respondents continue to indicate significant preferences for water levels that were not 'LOW LOW' or 'HIGH HIGH'. That is, respondents continue to be more likely to choose reservoir conditions that did not include these water levels. Excluding 'LOW LOW' and 'HIGH HIGH' conditions, respondents were more likely to prefer Average water levels. This is a change from Year 2 where respondents indicated more utility from High water conditions. Second, the Year 3 model continues to indicate that sandy shorelines were preferred over rocky shorelines and that no debris was most preferred by respondents, although some respondents continue to indicate a preference for higher levels of debris (average debris for Year 2 respondents and a lot of debris for Year 3 respondents). The 4-class latent model also indicates that several groups expressed preferences for lake conditions with debris, while only 1 (as in Year 2) unidentified latent class preferred low water levels.

Third, the 1-class model for Year 3 sample continues to indicate that the type of boat ramp is not significant in respondents' choice of reservoir recreation. The lack of significance may again indicate a highly heterogeneous group (also suggested by the model's low, yet improved over Year 2, Rho^2 value) as boat ramp type is significant in the latent class model (see Table 11) showing that boat ramp type continues to be significant for some recreationists.

Table 8. Results of the 1-Class multinomial logit model testing effects of reservoir features (n=809)

Attribute and Attribute Level	Estimate	p-value
Quantity of Debris		
(1) No Debris	0.1072	3.50E-03
(2) Little Debris	0.0215	
(3) Average Debris	-0.0884	
(4) A lot of Debris	-0.0403	
Water Level		
(1) LOW LOW	-0.6725	8.50E-59
(2) Low	0.1979	
(3) Average	0.4281	
(4) High	0.2613	
(5) HIGH HIGH	-0.2148	
Shoreline Features		
(1) Rocks	-0.1504	1.40E-11
(2) Sand	0.1504	
Lakebed Features		
(1) Sediment	-0.0025	0.91
(2) Grass/Woody environment	0.0025	
Boat Ramp Type		
(1) None	0.0536	0.26
(2) Gravel road	-0.0141	
(3) Concrete pad	-0.0396	

[a]Rho^2=.207

Differences in respondent preferences between Year 2 (shown in blue) and Year 3 (shown in red) samples are shown in Figure 50. As indicated, utility curves are similar across years. A notable difference is the sharp decline in the utility coefficient shown for concrete pads and the overall decrease in utility for High water level.

Figure 50. Comparison of Year 2 and Year 3 1-class multinomial logit model coefficients

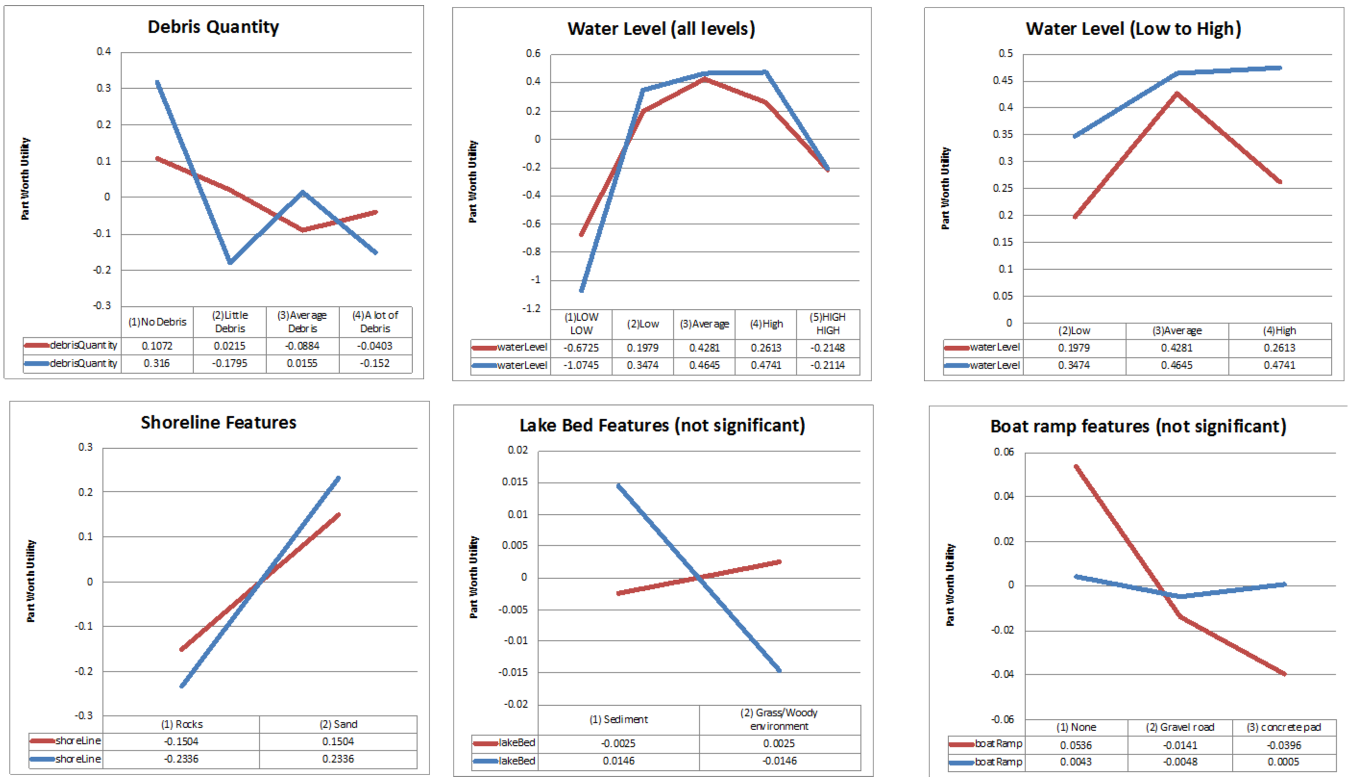

Table 9 presents a comparison of multiple 'known class' models with set membership based on respondent identification as people who plan (or do not plan) to recreate on the reservoir, Campbell River residents, non-Campbell River residents, campers only, people planning on sightseeing the falls, and hikers. As with Year 2's samples, there are differences between these known classes and the 1-class model. The known class comparison for Year 3 shows that respondents continue to be homogenous in their preferences for 'LOW LOW' and 'HIGH HIGH' water conditions and shoreline features (with respondents preferring sand over rocky shorelines), differences are present between respondent types for debris quantity, lakebed features, and boat ramp types. Recreationists who were planning to recreate on the reservoir continue to prefer average water levels above all other water levels (note boaters have similar preferences except they express negative preference for no boat ramp). These recreationists did not prefer reservoir conditions with average or a lot of debris (a slight change from Year 2 where any debris was negatively preferred). As in Year 2 recreationists planning to visit the falls preferred HIGH levels of water. Other groups, by contrast, preferred AVERAGE water levels over HIGH water levels, although this preference was less pronounced for boaters.

Table 9. Results of the "known class" multinomial logit model testing effects of reservoir features

Attribute and attribute level	People who plan to recreate on the lake	People who do not plan to recreate on the lake	Campbell River residents	Non-Campbell River residents	Campers only	Sightseeing falls	Hikers only
	n=417	n=354	n=297	n=387	n=483	n=86	0
Quantity of Debris	**Part-worth utility estimates**						
(1) No Debris	0.1846	0.0760	0.0969	0.2321	0.0969	0.2321	0.0969
(2) Little Debris	0.1416	-0.1012	0.0259	0.0680	0.0259	0.0680	0.0259
(3) Average Debris	-0.2615	0.0484	-0.0823	-0.2230	-0.0823	-0.2230	-0.0823
(4) A lot of Debris	-0.0647	-0.0231	-0.0405	-0.0771	-0.0405	-0.0771	-0.0405
Water Level							
(1) LOW LOW	-1.1442	-0.2371	-0.5328	-0.9820	-0.5328	-0.9820	-0.5328
(2) Low	0.3856	0.0754	0.1514	0.3205	0.1514	0.3205	0.1514
(3) Average	0.6526	0.2147	0.4188	0.5040	0.4188	0.5040	0.4188
(4) High	0.4592	0.0042	0.1746	0.3515	0.1746	0.3515	0.1746
(5) HIGH HIGH	-0.3533	-0.0572	-0.2120	-0.1941	-0.2120	-0.1941	-0.2120
Shore Line Features							
(1) Rocks	-0.2045	-0.1184	-0.1869	-0.1577	-0.1869	-0.1577	-0.1869
(2) Sand	0.2045	0.1184	0.1869	0.1577	0.1869	0.1577	0.1869
Lakebed Features							
(1) Sediment	-0.0495	0.0280	-0.0178	0.0084	-0.0178	0.0084	-0.0178
(2) Grass/Woody environment	0.0495	-0.0280	0.0178	-0.0084	0.0178	-0.0084	0.0178
Boat Ramp Type							
(1) None	0.0311	0.0832	-0.0180	0.1026	-0.0180	0.1026	-0.0180
(2) Gravel road	0.1079	-0.1263	0.0149	-0.0386	0.0149	-0.0386	0.0149
(3) Concrete pad	-0.1390	0.0431	0.0031	-0.0640	0.0031	-0.0640	0.0031

[a] Preference differences from 1-class model shown in bold

Table 10 highlights changes in preferences between Year 2 and Year 3 by indicating whether there was a change moving from either previously expressing positive preference for the attribute level and then shifting to negative or the reverse. Ignoring lakebed features and boat ramp type is the shift from recreationists previously accepting (by indicating positive preferences) average levels of debris (over little debris) to now indicating little if negative preference for lakes featuring any level of debris.

Table 10. Preference changes between Year 2 and Year 3 samples (from either positive to negative or negative to positive)

Attribute and attribute level	People who plan to recreate on the lake	People who do not plan to recreate on the lake	Campbell River residents	Non-Campbell River residents	Campers only	Sightseeing falls	Hikers only
Quantity of Debris							
(1) No Debris							
(2) Little Debris	YES		YES	YES	YES	YES	YES
(3) Average Debris				YES	YES	YES	
(4) A lot of Debris							
Water Level							
(1) LOW LOW							
(2) Low							
(3) Average							
(4) High							
(5) HIGH HIGH							
Shore Line Features							
(1) Rocks							
(2) Sand							
Lakebed Features							
(1) Sediment					YES		YES
(2) Grass/Woody environment					YES		YES
Boat Ramp Type							
(1) None			YES	YES	YES		YES
(2) Gravel road			YES	YES	YES		
(3) Concrete pad						YES	

The expression of preferences in Table 9 and Table 10 suggests that water level continues to be most significant for recreationists considering reservoir features. A sandy shoreline with no debris is most preferred but some differences do exist between recreationists. Table 11 highlights the results of a 4-class latent model in which all (except lakebed) reservoir features are highly significant (p <.01) and differences between classes exist. The 4-class latent model suggests that for 50% (up from 29%) of recreationists, 'HIGH HIGH' water levels are most preferred (see Class 1). Those same recreationists also prefer concreate boat ramps. For 12% (see Class 3) of recreationists, LOW levels of water is highly preferred. Those same recreationists indicate negative preference for HIGH and HIGH HIGH water levels (the only group expressing negative preferences for HIGH water). As no classification of latent classes with Year 2 data was conducted a comparison between years is not possible. However, given how different these classes present their preferences for water level, further analysis of latent variables could help explain differences between classes.

Table 11. Results of the 4-Class latent class model testing effects of reservoir features

Attribute and Attribute Level	Class 1	Class 2	Class 3	Class 4	p-value
Proportion of recreationists	**0.5030** **n≅407**	**0.2625** **n≅212**	**0.1191** **n≅96**	**0.1155** **n≅93**	
	Part-worth utility estimates				
Quantity of Debris					
(1) No Debris	-0.1178	-0.1178	-0.1178	-0.1178	13E-9
(2) Little Debris	-0.0011	-0.0011	-0.0011	-0.0011	
(3) Average Debris	-0.0217	-0.0217	-0.0217	-0.0217	
(4) A lot of Debris	0.1406	0.1406	0.1406	0.1406	
Water Level					
(1) LOW LOW	-0.1713	-3.6289	0.8110	-1.1165	5.7E-28
(2) Low	-0.2887	0.9769	4.9617	0.5357	
(3) Average	0.1612	1.4033	1.3707	0.5777	
(4) High	0.0713	1.0175	-1.7443	0.7081	
(5) HIGH HIGH	0.2276	0.2311	-5.3990	-0.7050	
Shore Line Features					
(1) Rocks	-0.0255	-0.6821	-2.5155	-0.1435	0.00076
(2) Sand	0.0255	0.6821	2.5155	0.1435	
Lakebed Features					
(1) Sediment	0.0159	-0.0655	-3.7287	-0.0635	0.31
(2) Grass/Woody environment	-0.0159	0.0655	3.7287	0.0635	
Boat Ramp Type					
(1) None	0.0602	0.6016	-1.3554	-0.0675	0.0016
(2) Gravel road	-0.0860	0.3001	0.7939	-0.0903	
(3) Concrete pad	0.0258	-0.9017	0.5615	0.1578	

4 DISCUSSION

Investigations of public use and perceptions of the Campbell Reservoir system have now been completed for 2.5 years, revealing some interesting developments since the first year of data analysis. Building on analysis from Year 2, continued data collection has provided a deeper understanding of public perceptions of recreational use in the study area and revealed further insights into how different operating regimes may influence perceptions. The analysis has also provided a general characterization of the people, activities and patterns of use in the study area.

In general, respondents had favourable perceptions of their experiences at the reservoirs, rivers and waterfalls as gauged by the performance measures. For reservoirs, the performance measure with the highest frequency of positive responses was regarding perceptions of safety, where a total of 55.1% of reservoir visitors reported feeling "very safe" while engaged in recreation at a reservoir. In contrast, the performance measure with the highest frequency of negative responses was the influence of water level on visitors' experience at the reservoirs, where a total of 10.1% of respondents were either "somewhat dissatisfied" or "very dissatisfied". Regarding the influence of water level on visitor experience, the frequency of positive responses (61.2% of respondents replied "very positive" or "somewhat positive") still was greater than the negative responses (10.1% of respondents replied "somewhat negative" or "very negative") although a large proportion (28.7%) of respondents reported that water level had no influence on their recreation experience. This implies that water levels are not that influential to a substantial proportion of reservoir visitors. These visitors could have been engaged in activities that are not as sensitive to water levels at the reservoirs, such as hiking and camping. The performance measure for satisfaction with access to water via boat launches was noted as having the fewest positive responses but this was due to the high proportion of respondents (32.4%) who responded that the question did not apply.

Responses to the performance measure questions from Year 3 of the study were compared to Year 2 to determine if there had been any changes between study years. A significant difference was identified between study years in how respondents rated all of the performance measures related to the recreation at the reservoirs. In all cases, responses for the performance measures were more positive in Year 3 than in Year 2. One potential explanation for this shift in perceptions could be associated with the lack of sampling in Year 3 with extreme low water events in the study area. Although sampling occurred at the same locations during the same time periods, the water elevations that were experienced by respondents were generally more moderate in Year 3 than Year 2. Based on the results from the previous study year, lower water conditions have generally been associated with more negative experiences; thus, the results in Year 3 may have been generally more positive due to less sampling during periods of low water.

The management question for reservoirs involved comparing the performance measures with average daily water elevations. Unlike in Year 2 of the study, no significant correlations were identified in Year 3 between daily average water elevation and the various performance measures for the three reservoirs. In Year 2, significant relationships were identified between water elevations and the various performance measures, although these relationships were only observed at Buttle Lake. No significant relationships were noted for Upper or Lower Campbell Reservoirs. The rationale for why no significant relationships were noted in Year 3 is uncertain. One possible explanation could be associated with the reduced range of water elevations that were experienced by respondents during sampling in Year 3 compared to Year 2. Comparisons of water elevation data from Year 2 to Year 3 identified that water elevations were significantly different during the sampling periods, with Year 3 sampling never coinciding with very low water elevations that were experienced by respondents in Year 2. This possible explanation is supported by results from the Discrete Choice Experiment, which demonstrated that respondents' choices are most influenced by extreme water levels (e.g. LOW LOW, and HIGH HIGH). This observation suggests that correlations between water elevation and performance measures were not detected in Year 3 as a result of respondents not being sampled during periods of very low water elevation (unlike in Year 2), when water levels are most influential.

The frequency of responses for performance measures at the river locations indicate that respondents generally had positive perceptions regarding their recreational experience at riverine environments in the Campbell River reservoir system. For all three riverine performance measures, over 70% of respondents responded positively. As with the reservoirs, perception of safety at rivers had the highest frequency of very positive responses, with 49.7% of river visitors reporting feeling "very safe" while engaged in recreation at a river. Also similar to the responses at the reservoirs, the influence of water flow on riverine recreation resulted in a moderately high frequency (21.8%) of respondents replying that water flows had no influence on their recreation experience. This could be as a result of a large proportion of river visitors being engaged in recreational activities that are not necessarily water-based (e.g. hiking and dog-walking).

As with the results for reservoirs, responses to the performance measure questions associated with river recreation were compared between Year 2 and Year 3 to identify any significant changes. A significant difference was only detected between study years for one riverine performance measure: influence of river flow on experience. A much greater proportion of respondents expressed that flow rates had a positive influence on their experience in Year 3 than in Year 2. The rationale for this significant shift in opinion was not explored, although it may be associated with differing flow regimes experienced at the time of sampling.

In order to address the management questions for riverine environment, correlations were explored between water flow rates and the responses to the riverine performance measure questions. No significant relationships were observed for these performance measures, suggesting water flows in the riverine locations do not correlate with changes in public perceptions.

Compared to the river and reservoir locations, Elk Falls had the highest frequency of positive responses overall. Over 97% of respondents at Elk Falls reported being "very satisfied" or "somewhat satisfied" with their recreation experience, and 95.3% of respondents at Elk Falls described the waterfalls as being "very impressive" or "somewhat impressive". When these performance measures were examined in relation to water flows, as per the management question for Elk Falls, it is evident that flow rate does not appear to have any significant relationship to the impression or satisfaction of visitors to the falls. Rather, visitors to Elk Falls seem to have a positive experience regardless of the flow, based on the flow conditions experienced by respondents in Year 3. Comparisons of results for the Elk Falls performance measures identified no significant differences in the frequency of responses between Year 2 and Year 3.

In addition to findings specific to each location type (i.e., reservoirs, rivers, falls), the study aims to identify any potential relationships and trade-offs for visitor experience between location types as a result of water management in the reservoir system. Of particular interest is how reservoir operations may influence visitor experiences at riverine locations. The hypothesis is that management of riverine flows may often come with a trade-off to water levels in the reservoirs, and vice versa. Retaining higher water elevations within the reservoirs, for example, generally requires a reduction in water flows in the rivers downstream; similarly, maintaining base flows in the rivers often requires drawing down reservoir water elevations. As noted in the results, no relationships between water flows and satisfaction of riverine-based recreationists were identified. The relationship between visitor satisfaction and water elevations at reservoirs was inconclusive. Results from Year 2 of the study suggested that higher water elevations at reservoirs were associated with more positive recreational experiences, but only at Buttle Lake, although this relationship was not significant in Year 3. With no significant relationship identified between water flows and satisfaction with riverine recreation, water management in the reservoirs should not significantly result in a trade-off of satisfaction at riverine locations. Given the lack of significant relationship in all locations, this conclusion still needs to be explored further. Potential avenues for improving this analysis may come with increased sampling at a broader range of water elevations and a larger sample size at some locations (e.g. Upper Campbell Reservoir, Campbell River).

The discrete choice experiment provides additional insights regarding different management scenarios in the reservoirs and supported many of the observations made with the basic questionnaire. Although some differences in results are noted, the general findings of the discrete choice experiments support the observed relationship between water levels and public perceptions. While the 1-class multinomial logit model indicated significant preferences for water levels that were not in the extremes (i.e., not 'LOW LOW' or 'HIGH HIGH'), when these extreme conditions were excluded from the DCE analysis, respondents were more likely to prefer higher water levels. This finding was consistent for the 1-class multinomial logit model as well as for all the 'known class' models that were tested (i.e, the known and multi-latent classes models indicate that only a smaller group of respondents had a negative perception of 'LOW LOW' conditions while another group had a negative perception of 'HIGH HIGH' conditions). The responses from the basic questionnaire do not indicate a decline in positive perceptions at the highest water levels, although the rational for this could be that respondents never experienced extreme 'High High' levels at any of the reservoirs during the survey.

Beyond the preferences for water levels, the analysis of the DCE presented some interesting results in regards to the other reservoir attributes that were explored. Not surprisingly, the 1-class model indicates that respondents tend to prefer sandy shorelines over rocky shorelines, and that no debris was most preferred by respondents. Contrary to expectations, the 1-class model indicates that neither lakebed features nor the type of boat ramp were significant in respondents' choice of reservoir. The explanation for this could lie in the broad diversity of recreation activities respondents were involved with, ranging from more land-based activities (e.g., camping, hiking) to water-based activities (e.g., fishing, power boating). Preferences for different lake features are anticipated to be significant depending on recreation activities. This hypothesis was tested briefly with a latent 4-class model (e.g., a model which groups similar answers into 4 groups of respondents), with results suggesting that lakebed features and boat ramp type are significant for some recreationists. This analysis suggested that there are significant differences between recreationists and as such, further analysis of known class and latent 4-class models may provide a more refined portrayal and additional insights of reservoir preferences, providing some direction for potential future analysis with the DCE.

To date, the analysis associated with this monitor contributes to our understanding of public use and perceptions in the Campbell Reservoir system but also highlights areas for further investigation or refinement. The lack of significant results for some of the management questions at some locations may highlight the potential value in sampling across a broader range of reservoir and riverine conditions (i.e., sample during extreme water levels and discharge events). Additionally, some locations (Upper Campbell Reservoir, Campbell River) could be surveyed more intensely to increase sample size to improve statistical power. A statistical power analysis is currently underway to evaluate sampling effort and provide greater direction for refining the sampling design. In addition to changes to the sampling approach, future comparative analysis may also be expanded to help explain some of the current results. Examples of potential explanatory variables could include preferred recreation activity or location of residence.

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APPENDIX A. BASIC DESCRIPTIVE STATISTICS OF RESPONSES FOR SURVEY QUESTIONS

1. How many days are you spending in the Campbell River Reservoir System on this trip?

N	Valid	989
	Missing	42
Mean		4.40
Median		3.00
Mode		1
Std. Deviation		5.199
Variance		27.028
Minimum		1
Maximum		90

2. If staying overnight in the Campbell River system area, what type of accommodation are you using?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cabin	24	2.3	2.4	2.4
	Camper	93	9.0	9.4	11.9
	Motorhome	129	12.5	13.1	24.9
	Multiple	22	2.1	2.2	27.2
	No	266	25.8	27.0	54.2
	Other	94	9.1	9.5	63.7
	Tent	207	20.1	21.0	84.7
	Trailer	151	14.6	15.3	100.0
	Total	986	95.6	100.0	
Missing	System	45	4.4		
Total		1031	100.0		

3. What activity was the most important for you in your decision to visit the Campbell River Reservoir system for this trip?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Beach	8	.8	.8	.8
	Boat	12	1.2	1.2	2.0
	Camp	533	51.7	53.7	55.7
	Canoe	2	.2	.2	55.9
	Dam	10	1.0	1.0	57.0
	Dog	42	4.1	4.2	61.2
	Falls	178	17.3	17.9	79.1
	Fish	28	2.7	2.8	82.0
	Hike	54	5.2	5.4	87.4
	Kayak	7	.7	.7	88.1
	Other	1	.1	.1	88.2
	Picnic	3	.3	.3	88.5
	Sailing	1	.1	.1	88.6
	Sight-seeing	38	3.7	3.8	92.4
	Swim	63	6.1	6.4	98.8
	Waterski	2	.2	.2	99.0
	Wildlife	9	.9	.9	99.9
	Windsurf	1	.1	.1	100.0
	Total	992	96.2	100.0	
Missing	System	39	3.8		
Total		1031	100.0		

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

		Responses N	Responses Percent	Percent of Cases
Areas visited during trip[a]	Elk Falls	327	22.6%	33.5%
	Campbell River	132	9.1%	13.5%
	Lower Campbell Reservoir	238	16.5%	24.4%
	Upper Campbell Reservoir	99	6.8%	10.1%
	Quinsam River	236	16.3%	24.2%
	Salmon River	25	1.7%	2.6%
	McIvor Lake	133	9.2%	13.6%
	Buttle Lake	246	17.0%	25.2%
	Other	10	0.7%	1.0%
Total		1446	100.0%	148.2%

a. Group

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	493	47.8	52.2	52.2
	Yes	451	43.7	47.8	100.0
	Total	944	91.6	100.0	
Missing	System	87	8.4		
Total		1031	100.0		

6. Which lake/reservoir did you recreate at most recently on this trip?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Buttle Lake	161	15.6	34.4	34.4
	Lower Campbell	181	17.6	38.7	73.1
	McIvor Lake	88	8.5	18.8	91.9
	Upper Campbell	36	3.5	7.7	100.0
	Other	2	.2	.4	92.3
	Total	468	45.4	100.0	
Missing	System	563	54.6		
Total		1031	100.0		

Other lakes/reservoirs:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fry Lake	1	.1	100.0	100.0
Missing	System	1030	99.9		
Total		1031	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Today	354	34.3	76.3	83.6
	Yesterday	57	5.5	12.3	100.0
	Two days ago	19	1.8	4.1	87.7
	Other	34	3.3	7.3	7.3
	Total	464	45.0	100.0	
Missing		567	55.0		
Total		1031	100.0		

8. During your most recent visit to this lake/reservoir, what activities did you participate in?

		Responses		Percent of
		N	Percent	Cases
Lake Activities[a]	Camping	342	17.9%	71.8%
	Windsurfing	5	0.3%	1.1%
	Waterskiing	19	1.0%	4.0%
	Swimming	275	14.4%	57.8%
	Beach activities	204	10.7%	42.9%
	Viewing falls	70	3.7%	14.7%
	Power boating	88	4.6%	18.5%
	Fishing	142	7.4%	29.8%
	Kayaking	124	6.5%	26.1%
	Picnicking	89	4.6%	18.7%
	Dog walking	141	7.4%	29.6%
	Viewing dam	40	2.1%	8.4%
	Canoeing	44	2.3%	9.2%
	Hiking/Walking	209	10.9%	43.9%
	Wildlife Viewing	96	5.0%	20.2%
	Sailing	5	0.3%	1.1%
	Other	21	1.1%	4.4%
Total		1914	100.0%	402.1%

a. Group

Other activities respondents reported participating in:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ATV	5	.5	25.0	25.0
	Biking	5	.5	25.0	50.0
	Paddleboarding	6	.6	30.0	80.0
	Photography	1	.1	5.0	85.0
	Diving	1	.1	5.0	90.0
	Motorbiking	2	.2	10.0	100.0
	Total	20	1.9	100.0	
Missing	System	1011	98.1		
Total		1031	100.0		

9. Based on your most recent activities at the lake/reservoir, how did water levels influence your recreation experience?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Positive	163	15.8	34.4	34.4
	Somewhat Positive	127	12.3	26.8	61.2
	No influence	136	13.2	28.7	89.9
	Somewhat Negative	44	4.3	9.3	99.2
	Very Negative	4	.4	.8	100.0
	Total	474	46.0	100.0	
Missing	System	557	54.0		
Total		1031	100.0		

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?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	446	43.3	94.3	94.3
	Yes	27	2.6	5.7	100.0
	Total	473	45.9	100.0	
Missing	System	558	54.1		
Total		1031	100.0		

Activities identified that respondents were unable to do because of the water level:

		Responses		Percent of Cases
		N	Percent	
Activity Not Able to Do[a]	Beach activities	6	23.1%	24.0%
	Fishing	1	3.8%	4.0%
	Power boating	4	15.4%	16.0%
	Canoeing	1	3.8%	4.0%
	Swimming	10	38.5%	40.0%
	Kayaking	3	11.5%	12.0%
	Waterskiing	1	3.8%	4.0%
Total		26	100.0%	104.0%

a. Dichotomy group tabulated at value 1.

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?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Satisfied	202	19.6	42.5	42.5
	Somewhat Satisfied	166	16.1	34.9	77.5
	Neither Satisfied nor Dissatisfied	70	6.8	14.7	92.2
	Somewhat Dissatisfied	34	3.3	7.2	99.4
	Very Dissatisfied	3	.3	.6	100.0
	Total	475	46.1	100.0	
Missing	System	556	53.9		
Total		1031	100.0		

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?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Safe	261	25.3	55.1	55.1
	Somewhat Safe	140	13.6	29.5	84.6
	Neither Safe nor Unsafe	47	4.6	9.9	94.5
	Somewhat Unsafe	25	2.4	5.3	99.8
	Very Unsafe	1	.1	.2	100.0
	Total	474	46.0	100.0	
Missing	System	557	54.0		
Total		1031	100.0		

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

		Responses		Percent of
		N	Percent	Cases
Lake Safety Concerns[a]	Floating Debris	23	4.1%	5.0%
	Visible Stumps	92	16.4%	19.9%
	Hidden Stumps	128	22.9%	27.7%
	Boat Launch Conditions	10	1.8%	2.2%
	Other	18	3.2%	3.9%
	No Safety Concerns	289	51.6%	62.6%
Total		560	100.0%	121.2%

a. Group

Other safety concerns mentioned for lakes/reservoirs:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aquatic vegetation	2	.2	8.7	8.7
	Broken glass/garbage	4	.4	17.4	26.1
	Dogs	1	.1	4.3	30.4
	Hazard tree	1	.1	4.3	34.8
	Other visitors	1	.1	4.3	39.1
	Slippery conditions	4	.4	17.4	56.5
	Swimmers itch	3	.3	13.0	69.6
	Unsafe boating/jet ski	2	.2	8.7	78.3
	Wildlife	3	.3	13.0	91.3
	Winds	1	.1	4.3	95.7
	Wood debris on beach	1	.1	4.3	100.0
	Total	23	2.2	100.0	
Missing	System	1008	97.8		
Total		1031	100.0		

14. Given the water levels at the time, how satisfied were you during your most recent activities at the reservoir with access to…:

a) the beach?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Satisfied	210	20.4	45.5	45.5
	Somewhat Satisfied	132	12.8	28.6	74.0
	Neither Satisfied nor Dissatisfied	43	4.2	9.3	83.3
	Somewhat Dissatisfied	28	2.7	6.1	89.4
	Very Dissatisfied	12	1.2	2.6	92.0
	Not Applicable	37	3.6	8.0	100.0
	Total	462	44.8	100.0	
Missing	System	569	55.2		
Total		1031	100.0		

b) the water via a boat launch?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Satisfied	115	11.2	28.0	28.0
	Somewhat Satisfied	76	7.4	18.5	46.6
	Neither Satisfied nor Dissatisfied	65	6.3	15.9	62.4
	Somewhat Dissatisfied	15	1.5	3.7	66.1
	Very Dissatisfied	6	.6	1.5	67.6
	Not Applicable	133	12.9	32.4	100.0
	Total	410	39.8	100.0	
Missing	System	621	60.2		
Total		1031	100.0		

c) the water via the shoreline?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Satisfied	182	17.7	41.2	41.2
	Somewhat Satisfied	125	12.1	28.3	69.5
	Neither Satisfied nor Dissatisfied	55	5.3	12.4	81.9
	Somewhat Dissatisfied	31	3.0	7.0	88.9
	Very Dissatisfied	8	.8	1.8	90.7
	Not Applicable	41	4.0	9.3	100.0
	Total	442	42.9	100.0	
Missing	System	589	57.1		
Total		1031	100.0		

15. NOTE: Questions 15-20 in the survey are associated with the Discrete Choice Experiment and are summarized in the body of the report.

21. Have you visited Elk Falls during this trip?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	576	55.9	63.7	63.7
	Yes	328	31.8	36.3	100.0
	Total	904	87.7	100.0	
Missing	System	127	12.3		
Total		1031	100.0		

22. When was your most recent visit to Elk Falls?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Today	261	25.3	80.8	84.5
	Yesterday	33	3.2	10.2	100.0
	Two days ago	17	1.6	5.3	89.8
	Other	12	1.2	3.7	3.7
	Total	323	31.3	100.0	
Missing	System	708	68.7		
Total		1031	100.0		

23. Just based on water flows you observed at the falls on your most recent visit, how impressive would you rate Elk Falls?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Impressive	208	20.2	61.0	61.0
	Somewhat Impressive	117	11.3	34.3	95.3
	Neither Impressive or Unimpressive	9	.9	2.6	97.9
	Somewhat Unimpressive	5	.5	1.5	99.4
	Very Unimpressive	2	.2	.6	100.0
	Total	341	33.1	100.0	
Missing	System	690	66.9		
Total		1031	100.0		

24. How satisfied were you with your viewing experience of Elk Falls?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Satisfied	275	26.7	80.9	80.9
	Somewhat Satisfied	56	5.4	16.5	97.4
	Neither Satisfied nor Dissatisfied	6	.6	1.8	99.1
	Somewhat Dissatisfied	1	.1	.3	99.4
	Very Dissatisfied	2	.2	.6	100.0
	Total	340	33.0	100.0	
Missing	System	691	67.0		
Total		1031	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	721	69.9	81.1	81.1
	Yes	168	16.3	18.9	100.0
	Total	889	86.2	100.0	
Missing	System	142	13.8		
Total		1031	100.0		

26. Which river did you recreate at most recently on this trip?

		Responses		Percent of Cases
		N	Percent	
Rivers Visited[a]	Quinsam River	133	72.3%	76.0%
	Campbell River	42	22.8%	24.0%
	Salmon River	3	1.6%	1.7%
	Other	6	3.3%	3.4%
Total		184	100.0%	105.1%

a. Group

Other rivers:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Elk River	2	.2	33.3	33.3
	Myra Creek	1	.1	16.7	50.0
	Oyster River	1	.1	16.7	66.7
	Ralph River	2	.2	33.3	100.0
	Total	6	.6	100.0	
Missing	System	1025	99.4		
Total		1031	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Today	134	13.0	80.2	86.8
	Yesterday	13	1.3	7.8	100.0
	Two days ago	9	.9	5.4	92.2
	Other	11	1.1	6.6	6.6
	Total	167	16.2	100.0	
Missing	System	864	83.8		
Total		1031	100.0		

28. During your most recent visit to this river, what activities did you participate in?

		Responses		
		N	Percent	Percent of Cases
River Activities	Camping	121	16.7%	33.8%
	Fishing	89	12.3%	24.9%
	Swimming	24	3.3%	6.7%
	Beach activities	26	3.6%	7.3%
	Boating	5	0.7%	1.4%
	Hiking/Walking	155	21.4%	43.3%
	Picnicking	31	4.3%	8.7%
	Dog walking	90	12.4%	25.1%
	Canoeing	6	0.8%	1.7%
	Kayaking	5	0.7%	1.4%
	Wildlife Viewing	73	10.1%	20.4%
	Sightseeing	86	11.9%	24.0%
	Other	13	1.8%	3.6%
Total		724	100.0%	202.2%

Other activities respondents reported participating in:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Work	1	.1	100.0	100.0
Missing	System	1030	99.9		
Total		1031	100.0		

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?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	164	15.9	98.2	98.2
	Yes	3	.3	1.8	100.0
	Total	167	16.2	100.0	
Missing	System	864	83.8		
Total		1031	100.0		

Activities identified that respondents were unable to do because of the river flow conditions:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Canoeing	1	.1	33.3	33.3
	Low water	1	.1	33.3	66.7
	Swimming	1	.1	33.3	100.0
	Total	3	.3	100.0	
Missing	System	1028	99.7		
Total		1031	100.0		

30. Based on your most recent activities at the river, how did water flows influence your recreation experience?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Positive	66	6.4	36.9	36.9
	Somewhat Positive	68	6.6	38.0	74.9
	No influence	39	3.8	21.8	96.6
	Somewhat Negative	6	.6	3.4	100.0
	Total	179	17.4	100.0	
Missing	System	852	82.6		
Total		1031	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Satisfied	84	8.1	46.9	46.9
	Somewhat Satisfied	60	5.8	33.5	80.4
	Neither Satisfied nor Dissatisfied	28	2.7	15.6	96.1
	Somewhat Dissatisfied	7	.7	3.9	100.0
	Total	179	17.4	100.0	
Missing	System	852	82.6		
Total		1031	100.0		

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?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Safe	88	8.5	49.7	49.7
	Somewhat Safe	47	4.6	26.6	76.3
	Neither Safe nor Unsafe	37	3.6	20.9	97.2
	Somewhat Unsafe	4	.4	2.3	99.4
	Very Unsafe	1	.1	.6	100.0
	Total	177	17.2	100.0	
Missing	System	854	82.8		
Total		1031	100.0		

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

		Responses		Percent of Cases
		N	Percent	
Safety Concerns at River[a]	High flows	6	3.4%	3.5%
	Floating debris	10	5.7%	5.8%
	Poor access conditions	4	2.3%	2.3%
	Exposed hazards	8	4.6%	4.6%
	Other	5	2.9%	2.9%
	None	142	81.1%	82.1%
Total		175	100.0%	101.2%

a. Group

Other safety concerns mentioned for rivers:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low flows	1	.1	20.0	20.0
	Swimming	1	.1	20.0	40.0
	Traffic	1	.1	20.0	60.0
	Turbid water	1	.1	20.0	80.0
	Woody debris	1	.1	20.0	100.0
	Total	5	.5	100.0	
Missing	System	1026	99.5		
Total		1031	100.0		

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

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	522	50.6	57.8	57.8
	Yes	381	37.0	42.2	100.0
	Total	903	87.6	100.0	
Missing	System	128	12.4		
Total		1031	100.0		

35. On average, how many days per season do you typically visit the Campbell River system?

a) Spring

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4 days plus	237	23.0	53.9	70.7
	2-3 days	74	7.2	16.8	16.8
	Once	58	5.6	13.2	100.0
	Less than once	12	1.2	2.7	73.4
	Never	59	5.7	13.4	86.8
	Total	440	42.7	100.0	
Missing	System	591	57.3		
Total		1031	100.0		

b) Summer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4 days plus	373	36.2	76.7	90.7
	2-3 days	68	6.6	14.0	14.0
	Once	33	3.2	6.8	100.0
	Less than once	3	.3	.6	91.4
	Never	9	.9	1.9	93.2
	Total	486	47.1	100.0	
Missing	System	545	52.9		
Total		1031	100.0		

c) Winter

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4 days plus	123	11.9	30.5	37.2
	2-3 days	27	2.6	6.7	6.7
	Once	47	4.6	11.7	100.0
	Less than once	25	2.4	6.2	43.4
	Never	181	17.6	44.9	88.3
	Total	403	39.1	100.0	
Missing	System	628	60.9		
Total		1031	100.0		

d) Fall

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4 days plus	162	15.7	38.6	52.1
	2-3 days	57	5.5	13.6	13.6
	Once	53	5.1	12.6	100.0
	Less than once	14	1.4	3.3	55.5
	Never	134	13.0	31.9	87.4
	Total	420	40.7	100.0	
Missing	System	611	59.3		
Total		1031	100.0		

36. What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	416	40.3	45.9	45.9
	Male	490	47.5	54.1	100.0
	Total	906	87.9	100.0	
Missing	System	125	12.1		
Total		1031	100.0		

37. What is your current age?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 25	91	8.8	10.1	100.0
	25-34	107	10.4	11.9	11.9
	35-44	194	18.8	21.5	33.4
	45-54	164	15.9	18.2	51.6
	55-64	183	17.7	20.3	71.8
	64 plus	163	15.8	18.1	89.9
	Total	902	87.5	100.0	
Missing	System	129	12.5		
Total		1031	100.0		

38. How many people are in your party today?

Party Size

N	Valid	849
	Missing	182
Mean		3.79
Median		3.00
Mode		2
Std. Deviation		3.224
Minimum		1
Maximum		48

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

a) City

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	100 Mile House	1	.1	.1	.1
	Airdrie	1	.1	.1	.2
	Alert Bay	2	.2	.2	.5
	Arnhem	2	.2	.2	.7
	Austin	1	.1	.1	.8
	Barendrecht	1	.1	.1	.9
	Barry	1	.1	.1	1.1
	Basel	1	.1	.1	1.2
	Beaver Dam	1	.1	.1	1.3
	Bedford	1	.1	.1	1.4
	Bern	1	.1	.1	1.5
	Billercay	1	.1	.1	1.6
	Black Creek	7	.7	.8	2.5
	Breda	1	.1	.1	2.6
	Brier	1	.1	.1	2.7
	Burnaby	1	.1	.1	2.8
	Calgary	13	1.3	1.5	4.3
	Campbell River	327	31.7	38.3	42.7
	Canmore	1	.1	.1	42.8
	Cheticamp	1	.1	.1	42.9
	Claresholm	1	.1	.1	43.0
	Comox	37	3.6	4.3	47.4
	Conception Bay	1	.1	.1	47.5
	Coombs	1	.1	.1	47.6
	Coquitlam	1	.1	.1	47.7
	Cortez Island	2	.2	.2	47.9
	Courtenay	36	3.5	4.2	52.2
	Cowichan Valley	1	.1	.1	52.3
	Cumberland	8	.8	.9	53.2
	Delta	2	.2	.2	53.5
	Den Bosch	1	.1	.1	53.6
	Deverta	1	.1	.1	53.7

	Dewsbury	1	.1	.1	53.8
	Dresden	1	.1	.1	53.9
	Dronten	1	.1	.1	54.0
	Duncan	14	1.4	1.6	55.7
	Edihborn	1	.1	.1	55.8
	Edmonton	8	.8	.9	56.7
	Eindhaven	1	.1	.1	56.9
	Enter	1	.1	.1	57.0
	Eymet	1	.1	.1	57.1
	Fanny Bay	1	.1	.1	57.2
	Fort Worth	2	.2	.2	57.4
	Franaker	1	.1	.1	57.6
	Frankfurt	5	.5	.6	58.1
	Gabriola Island	1	.1	.1	58.3
	Gold River	12	1.2	1.4	59.7
	Gouda	1	.1	.1	59.8
	Grande Prairie	1	.1	.1	59.9
	Green Bay	1	.1	.1	60.0
	Guelph	1	.1	.1	60.1
	Hagen	1	.1	.1	60.3
	Hamilton	1	.1	.1	60.4
	Hanley	1	.1	.1	60.5
	Hayling Island	1	.1	.1	60.6
	Herentals	1	.1	.1	60.7
	Hong Kong	1	.1	.1	60.8
	Houston	1	.1	.1	61.0
	Hubbards	1	.1	.1	61.1
	Kamloops	5	.5	.6	61.7
	Kelowna	4	.4	.5	62.1
	Kingston	1	.1	.1	62.3
	Kolin	1	.1	.1	62.4
	La-Crete	1	.1	.1	62.5
	Lacombe	1	.1	.1	62.6
	Ladysmith	4	.4	.5	63.1
	Langley	4	.4	.5	63.5
	Lenexa	1	.1	.1	63.7
	Lethbridge	1	.1	.1	63.8

	London	4	.4	.5	64.2
	Loveland	1	.1	.1	64.4
	Mackay	1	.1	.1	64.5
	Massena	1	.1	.1	64.6
	Merville	1	.1	.1	64.7
	Michigan	1	.1	.1	64.8
	Mill Bay	4	.4	.5	65.3
	Mississippi	1	.1	.1	65.4
	Monterey	1	.1	.1	65.5
	Moscow	1	.1	.1	65.7
	Mt. Curry	1	.1	.1	65.8
	Mt. Vernon	1	.1	.1	65.9
	Munich	2	.2	.2	66.1
	N.Augusta	1	.1	.1	66.2
	Nanaimo	40	3.9	4.7	70.9
	Nanoose Bay	3	.3	.4	71.3
	New York	2	.2	.2	71.5
	Nieuwebreg	1	.1	.1	71.6
	North Vancouver	2	.2	.2	71.9
	Nymengen	1	.1	.1	72.0
	Nyrerdal	1	.1	.1	72.1
	Othmarsingen	1	.1	.1	72.2
	Ottawa	2	.2	.2	72.5
	Parksville	16	1.6	1.9	74.3
	Pine Lake	1	.1	.1	74.4
	Plano	1	.1	.1	74.6
	Port Alberni	10	1.0	1.2	75.7
	Port Coquitlam	2	.2	.2	76.0
	Port Hardy	5	.5	.6	76.6
	Port McNeill	3	.3	.3	76.9
	Portland	1	.1	.1	77.0
	Pouch River	1	.1	.1	77.1
	Powell River	3	.3	.4	77.5
	Poznan	1	.1	.1	77.6
	Prince George	1	.1	.1	77.7
	Prince Rupert	1	.1	.1	77.8
	Quadra Island	3	.3	.4	78.2

	Qualicum	2	.2	.2	78.4
	Qualicum Beach	6	.6	.7	79.1
	Reno	1	.1	.1	79.2
	Richmond	2	.2	.2	79.5
	Rocky Mountain House	3	.3	.4	79.8
	Romo	1	.1	.1	80.0
	Rotorua	1	.1	.1	80.1
	Royston	1	.1	.1	80.2
	Saanich	2	.2	.2	80.4
	Saffron	1	.1	.1	80.5
	Salt Spring	1	.1	.1	80.7
	SanRafael	1	.1	.1	80.8
	Saskatoon	5	.5	.6	81.4
	Sayward	2	.2	.2	81.6
	Seaton	1	.1	.1	81.7
	Seattle	11	1.1	1.3	83.0
	Shawnigan	2	.2	.2	83.2
	Sheabogenbosch	1	.1	.1	83.4
	Sherwood Park	1	.1	.1	83.5
	Sidney	2	.2	.2	83.7
	Sooke	1	.1	.1	83.8
	Squamish	1	.1	.1	83.9
	St. Albert	1	.1	.1	84.1
	St.Helens	1	.1	.1	84.2
	Stevenage	1	.1	.1	84.3
	Stoney Plain	1	.1	.1	84.4
	Stratford	1	.1	.1	84.5
	Sudbury	1	.1	.1	84.6
	Surrey	5	.5	.6	85.2
	Sydney	1	.1	.1	85.3
	Tahsis	2	.2	.2	85.6
	Tangstedt	1	.1	.1	85.7
	Tewksbury	1	.1	.1	85.8
	Tianjin	1	.1	.1	85.9
	Tofino	4	.4	.5	86.4
	Toronto	7	.7	.8	87.2
	Truro	1	.1	.1	87.3

	Tulalip	2	.2	.2	87.6
	Ucluelet	1	.1	.1	87.7
	University Place	1	.1	.1	87.8
	Utrecht	2	.2	.2	88.0
	Vancouver	19	1.8	2.2	90.3
	Vernon	5	.5	.6	90.9
	Victoria	67	6.5	7.9	98.7
	Villingen	1	.1	.1	98.8
	Voorburg	1	.1	.1	98.9
	Wagga Wagga	1	.1	.1	99.1
	Warburg	1	.1	.1	99.2
	Wellington	1	.1	.1	99.3
	Wetaskiwin	1	.1	.1	99.4
	White Rock	1	.1	.1	99.5
	Winnipeg	2	.2	.2	99.8
	Worchester	1	.1	.1	99.9
	Zeballos	1	.1	.1	100.0
	Total	853	82.7	100.0	
Missing	System	178	17.3		
Total		1031	100.0		

b) Province/State

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AB	33	3.2	4.1	4.1
	BC	697	67.6	87.5	91.6
	CA	3	.3	.4	92.0
	CO	1	.1	.1	92.1
	KS	1	.1	.1	92.2
	MA	1	.1	.1	92.3
	MB	2	.2	.3	92.6
	MI	1	.1	.1	92.7
	MS	1	.1	.1	92.8
	NL	1	.1	.1	93.0
	NS	4	.4	.5	93.5
	NV	1	.1	.1	93.6
	NY	3	.3	.4	94.0

	ON	18	1.7	2.3	96.2
	OR	1	.1	.1	96.4
	SA	1	.1	.1	96.5
	SC	1	.1	.1	96.6
	SK	5	.5	.6	97.2
	TX	4	.4	.5	97.7
	WA	16	1.6	2.0	99.7
	WI	2	.2	.3	100.0
	Total	797	77.3	100.0	
Missing	System	234	22.7		
Total		1031	100.0		

c) Country

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Australia	4	.4	.5	.5
	Belgium	1	.1	.1	.6
	Canada	762	73.9	88.2	88.8
	China	2	.2	.2	89.0
	England	8	.8	.9	89.9
	France	1	.1	.1	90.0
	Germany	14	1.4	1.6	91.7
	Holland	6	.6	.7	92.4
	Italy	1	.1	.1	92.5
	Japan	1	.1	.1	92.6
	Netherlands	13	1.3	1.5	94.1
	New Zealand	2	.2	.2	94.3
	Poland	1	.1	.1	94.4
	Russia	1	.1	.1	94.5
	Switzerland	4	.4	.5	95.0
	Texas	1	.1	.1	95.1
	UK	4	.4	.5	95.6
	USA	38	3.7	4.4	100.0
	Total	864	83.8	100.0	
Missing	System	167	16.2		
Total		1031	100.0		

APPENDIX B. CAMPBELL RESERVOIRS PUBLIC USE AND PERCEPTIONS SURVEY

Campbell Reservoirs Public Use and Perceptions Study – 2016/2017

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!

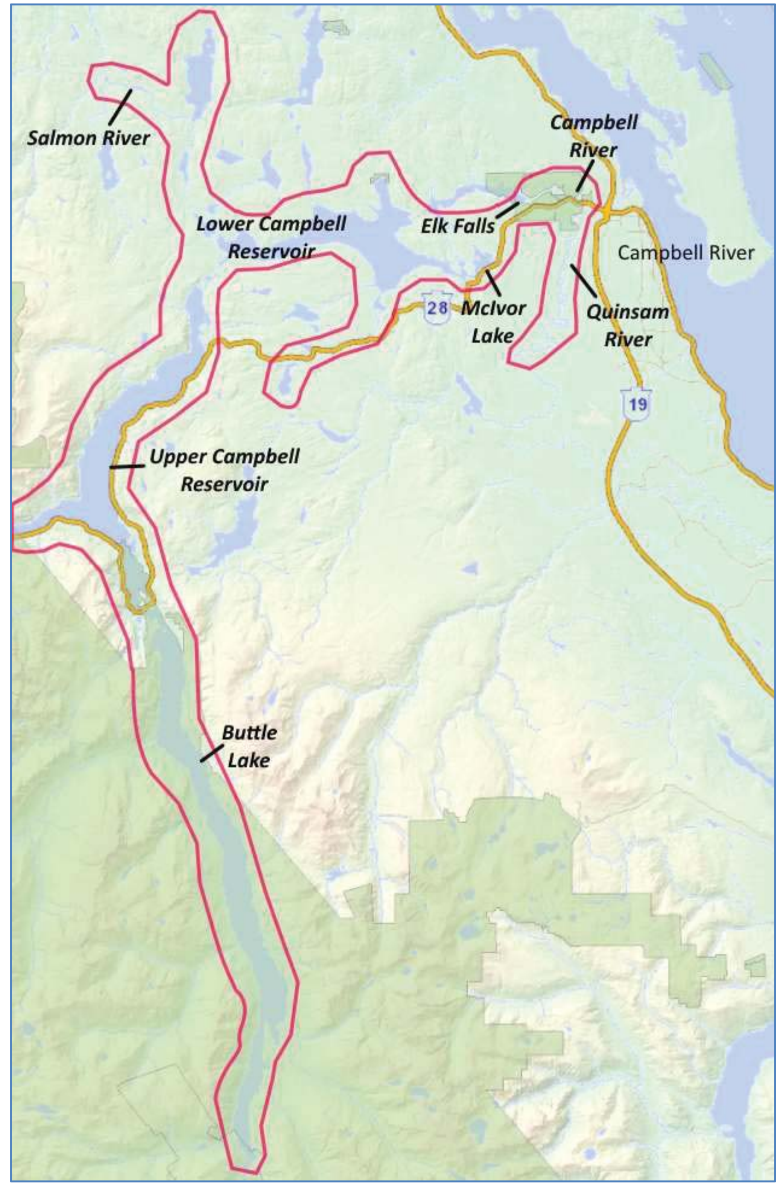
Laich-Kwil Tach Environmental Assessment Ltd. Partnership

EDI ENVIRONMENTAL DYNAMICS INC.

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 **one 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 **one 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.*)

____
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Thank you again for your participation