Columbia River Project Water Use Plan

Arrow Lakes Reservoir Operations Management Plan

Implementation Year 3

Reference: CLBMON#41

Arrow Reservoir Recreational Demand Study

Study Period: 2011

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August 20, 2012

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CLBMON 41 Arrow Reservoir Recreational Demand Study

Year 3 Progress Report

Study Period: 2011

August 14, 2012

Submitted to:

BC Hydro

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Suggested Citation

Lees+Associates. (2012). *CLBMON-41 Arrow Reservoir Recreational Demand Study. Year 3 Progress Report – 2011.* Vancouver, BC. BC Hydro, Water License Requirements.

Table 1. CLBMON-41 STATUS of OBJECTIVES, MANAGEMENT QUESTIONS and HYPOTHESES after Year 3

Objectives	Management Questions	Management Hypotheses	Year 3 (2011) Status
The main objective of the study is to: 1) Relate volume and type of use by recreational users to Arrow Lakes Reservoir water levels.	The primary management question addressed by the program is whether different reservoir water levels affect the quantity and frequency of participation in water-based and shore-based recreational activities.	H0: Changes in recreational use of Arrow Lake Reservoir, if they occur, are not related to Arrow Lake Reservoir levels.	Based on data collected to date, hypothesis cannot be rejected at this stage. Expecting more data in 2013.
	A secondary management question is whether reservoir levels affect types of recreational activities.	H0A: Frequency of public use of Arrow Lake is not influenced by fluctuating reservoir water levels.	Based on data collected to date, hypothesis cannot be rejected at this stage. Expecting more data in 2013.
		H0B: Volume of public use of Arrow Lake is not influenced by fluctuating reservoir water levels.	Based on data collected to date, hypothesis cannot be rejected at this stage. Expecting more data in 2013.
		H0C: The different types of public use are not affected by fluctuating water levels.	Based on data collected to date, hypothesis cannot be rejected at this stage. Expecting more data in 2013.

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1. EXECUTIVE SUMMARY

The Arrow Lakes Reservoir has many designated and undesignated access points that residents and visitors use throughout the year for recreational purposes including boating, fishing and shoreline use. One of the key factors affecting recreational quality and use is the ability to safely access the water or shoreline during different water levels for both water and shore-based activities.

During the Columbia River Water Use Planning process, the Consultative Committee identified monitoring recreational demand in relation to water levels on the Arrow Reservoir as one of the fundamental objectives of the Water Use Plan (BC Hydro 2007). In 2009, BC Hydro initiated CLBMON 41. The final outcomes of this five year study will assist in developing a model to better predict the recreational use impacts associated with changing water levels of the Arrow Lakes. The results will be used to generate year round use characteristics and determine how recreational use is tied to fluctuations in water level to inform decision making at the next Water Use Plan review.

To address the management questions (Table 1), specific parameters were measured through monitoring (traffic count and observational data collection) and interviews (on-site and on-line surveys). An entry/exit intercept survey method was employed at 13 publicly accessible boat launches and near shore parks. An online survey was also administered to capture a broader set of people in and around the Arrow Lakes.

Year 3 traffic results show a significant amount of boating use occurred on the Arrow Lakes in the past year. Counters recorded approximately 11,400 “boat launches” from October 1, 2010 to September 30, 2011. Overall boating use this year was slightly lower than in 2010, which is likely attributable to the wet weather in June, July and August.

A total of 3,997 visitors were encountered at sample sites on the Arrow Lakes between April 9 and October 19, 2011. Field staff asked 863 visitors to participate in the survey; 631 completed questionnaires were returned, which represents an overall response rate of 83.9%.

Respondents engaged in a total of 24 individual outdoor recreation activities, with swimming identified most frequently (almost 76%). Fishing was identified as the most important activity and was the prime activity engaged in on the day respondents completed their questionnaire. Fishing, camping, swimming, beach activities, and walking/hiking appear to be the main activities.

Of the six management goals that respondents ranked, providing habitat for aquatic species was ranked as most important, followed by providing recreation opportunities.

On average, respondents indicated that they were satisfied with the balance of management tasks that were presented to them. More than nine of ten respondents reported that they would return to the Arrow Lakes for recreation activities based on their experience the day that they completed a questionnaire, thus indicating a reasonable level of satisfaction with recreation opportunities and management practices.

Year 3 of the study was successful in capturing data in all seasons and confirming the reliability of the survey documents and procedures. The full implementation and completion of the five year study will provide much more reliable information, interpretations and conclusions on which to base future management decisions.

2. INTRODUCTION

2.1 Background

The Arrow Lakes Reservoir has many designated and undesignated access points that residents and visitors use throughout the year for recreational purposes. One of the key factors affecting recreational quality and use is the ability to safely access the water or shoreline during different water levels for water-based and shore-based activities. Recreational activities on the Arrow include boating, fishing and shoreline use (swimming, nature walks, etc.). Different recreation activities may have different levels of preferred or optimal water levels.

During the Columbia River Water Use planning process, the Consultative Committee (CC) identified monitoring reservoir recreational demand (land-based, shoreline and boating) in relation to water levels on the Arrow Reservoir as one of the fundamental objectives of the Water Use Plan (BC Hydro 2007). The committee recognized that an increased understanding of recreational use patterns on the Arrow Lakes reservoir would inform operational decision making. These decisions must balance multiple interests including wildlife, recreation, fisheries, culture and heritage, shoreline conditions, and power generation on the reservoir.

The CC recommended a monitoring program to provide long-term measurement of recreation use on and near the waters of the Arrow Lakes from Revelstoke to the Hugh Keenleyside dam at Castlegar. BC Hydro seeks through this study to develop performance measures that link some aspects of recreation by locals/tourists to reservoir levels to inform decision making at next Water Use Plan review. At the end of the five-year study horizon, the intent will be to establish a predictive model of recreational use on the Arrow Lakes Reservoir. “The goal of the study is therefore to establish a functional link between recreational use and water levels on Arrow Lakes Reservoir” (Terms of Reference, BC Hydro 2008, p. 2).

This study is one of a series of monitoring programs that fulfills BC Hydro’s obligation under the Water Use Plan as approved by the Comptroller of Water Rights. This study is conducted in conjunction with CLBMON-14 Boat Ramp Use Study[1] and is scheduled for implementation over five years (2009-2014).

[1] CLBMON 14 is a 10-year study that will track use levels and user satisfaction at boat launch sites on the Arrow and Kinbasket Reservoirs where access improvements have been made. Due to significant similarities and overlaps between the two studies CLBMON 41 and 14 have been combined into one delivery model.

2.2 Management Questions and Objectives.

The monitoring objectives, management questions and hypotheses for CLBMON-41 were stated in the Terms of Reference for the project (BC Hydro 2008) and are restated below.

The main objective of the study is to relate volume and type of use by recreational users[2] to Arrow Lakes Reservoir water levels.

The primary management question addressed by the program is whether different reservoir water levels affect the quantity and frequency of participation in water-based and shore-based recreational activities. A secondary management question is whether reservoir levels affect types of recreational activities.

2.3 Management Hypotheses

Three management hypotheses frame this study:

$H_{0:}$ Changes in recreational use of Arrow Lake Reservoir, if they occur, are not related to Arrow Lake Reservoir levels.

$H_{0A:}$ Frequency of public use of Arrow Lake is not influenced by fluctuating reservoir water levels.

$H_{0B:}$ Volume of public use of Arrow Lake is not influenced by fluctuating reservoir water levels.

$H_{0C:}$ The different types of public use are not affected by fluctuating water levels.

2.3.1 Monitoring Program Rationale

As per the approach recommended in the project's Terms of Reference, this project is an observational study (*i.e.*, site-based inventory) supplemented with questionnaire-elicited data. The general approach is:

> "an observational study of within reservoir levels changes in recreation use at sites selected through a stratified random sampling design. Data will be collected through a combination of survey methods including observed distributions and activities, spot counts, vehicle counters and interviews at the boat access improvement sites on the Arrow Lakes Reservoir" (BC Hydro 2008, p. 6).

The analyses will relate changes in recreation use to water levels that recreational users experienced. Inferences about the causes of changes in types of recreation uses and the likely effects of altered operating regime on recreation volume, frequency and type will be made using statistical models. The

[2] Groups under consideration include boaters, near-shore users and any other group deemed relevant to the study. Two broad classifications are used: resident and tourist.

models will represent users' responses to the operating regime, environmental conditions, and other variables.

2.3.2 Theoretical Foundation for Examining Visitor Demand and Use

When assessing overall recreation use, it is also important to measure variables that inform the *subjective evaluation* element of visitor satisfaction. These variables include socioeconomic characteristics, level of experience, and attitudes and preferences about the context within which visitors are engaging in their recreation activity.

The underlying goal of recreation management is quality: visitors desire high quality recreation experiences, and managers seek to provide high quality recreation opportunities. Within the context of outdoor recreation management, quality has traditionally been measured in terms of visitor satisfaction (Manning, 1999). Satisfaction can be considered to be "a function of the degree of congruence between aspirations and the perceived reality of experience" (Bultena & Klessig, 1969, p. 349). Although there are no standardized measures of satisfaction (experiences are dynamic, evolve over time, and are context-dependent), most measures of satisfaction have been rooted in expectancy theory (Fishbein & Ajzen, 1975), which posits that people engage in outdoor recreation activities with the expectation that this engagement will fulfill particular needs, motivations, or other desires. Satisfaction is both multidimensional and relative (Figure 1): it is multidimensional as overall satisfaction is influenced by biophysical, social, and managerial elements/settings (*i.e.*, situational variables); satisfaction is relative as it is influenced by socioeconomic and cultural characteristics, levels of experience, and attitudes, preferences and norms (*i.e.*, subjective evaluations). Thus, satisfaction is a function of both the recreation setting and the participants.

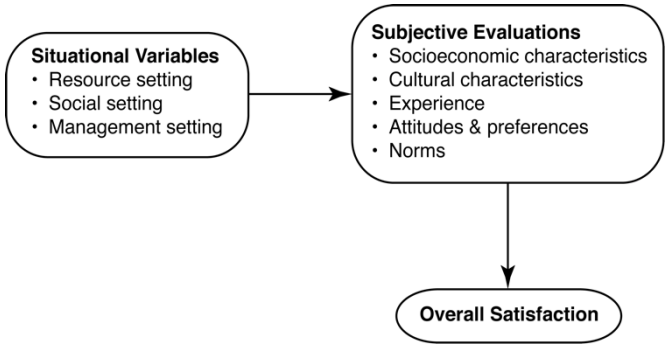


Figure 1. Conceptual model of recreation satisfaction (Manning, 1999).

Visitor satisfaction is a useful and appropriate framework for the present study: if people are not satisfied with their experiences on the Arrow Lakes Reservoir, they may seek alternative opportunities elsewhere. However, understanding visitors' satisfaction with their experiences on the Arrow Lakes Reservoir requires other information in addition to the specific monitoring parameters that have been identified for this project. While reservoir water level is the main variable, it is necessary to consider and control for other variables that may influence visitor use of the Arrow Lakes Reservoir.

In the context of the present study, the resource setting (*i.e.*, biophysical setting) includes water levels, and meteorological data. For example, weather does affect recreation use: if visitor use was measured during a very wet year, one might expect lower visitor turnout; if weather was not accounted for, the predictive models may over- or underestimate the influence of water levels on recreation use. The social setting is concerned with the interactions that visitors have with other visitors; social setting is often measured in terms of social carrying capacity, which can be measured by identifying the degree of user conflicts and crowding that are experienced. For example, if visitor use was measured at a site where there has been a history of conflicts between visitors or where visitors have felt crowded, one might expect low visitor use as people seek alternative opportunities free from conflict and crowding independent of water levels. Lastly, the management setting of the Arrow Lakes Reservoir is multi-jurisdictional (*e.g.*, municipal land, Crown land, BC Parks) as different agencies are responsible for managing access to the Arrow Lakes Reservoir. For example, the frequency and level of maintenance of the facilities, such as the parking lot and boat ramp, may affect visitor satisfaction.

3. METHODS

To address the management questions and supporting hypotheses, specific parameters to be monitored over the five-year period include:

> "types of recreation activity, user classification (resident, tourist), distribution of activities, frequency of activities, reservoir levels and meteorological data (wind, waves, precipitation, air and water temperature). This information is considered necessary to confirm/refute assumptions about the importance of timing, frequency and duration of reservoir levels changes on recreation activities. Vehicle counters will be installed at each of the boat access sites on Arrow Lakes Reservoir to monitor the number of vehicles using the ramp facilities" (Terms of Reference, BC Hydro 2008, p.7).

The sampling is to be conducted in spring, summer, and fall seasons over the five year study horizon. Sampling intensity is higher during the summer due to the proportional increase in volume, the diversity of recreational activities during this period, and the longer season (as spring and fall on-water recreation seasons are limited by snow, cold weather, and hours of daylight). The data will be analyzed to determine the degree to which water levels affect recreation use of the Arrow Lakes Reservoir.

This section is presented under the following headings:

- Sampling Sites
- Traffic Data Collection;
- Observational Data Collection;
- Sampling Design;
- Survey Delivery;
- Survey Design, and
- Sampling Analyses.

The proposed project methodology including sampling sites, collection methods, sampling design, survey delivery and survey design was vetted and approved by the study team in advance of the Year 1 pilot season (Fall 2009). Reviewers included the LEES+Associates team and BC Hydro (Public Use Management, Stakeholder Engagement Group, and the Water License Requirements Program). The Survey Questionnaire was also reviewed by an individual at the *Science Policy and Economics Section, British Columbia Ministry of Environment*, and members of the *Collaborative for Advanced Landscape Planning* at the *University of British Columbia*.

3.1 Sampling sites

Field sampling occurred at 13 access sites representing the three sections of the Arrow Lakes Reservoir (*i.e.,* Upper, Middle, and Lower Arrow Lakes Reservoir; see Table 2, Figure 2). The study area was divided into three geographical units in terms of broad accessibility, *i.e.*, distance to the sites from urban centres. The area outside these three geographical units is isolated and has no established communities.

1. Upper Arrow Lakes from Revelstoke to Galena Bay
2. Middle Arrow Lakes from Shelter Bay to Edgewood
3. Lower Arrow Lakes from Renata to Hugh Keenleyside Dam

Sampling sites were chosen to reflect relatively high use locations that provide access to the water or shoreline for water-based and shore-based activities. The sampling sites include all 11 publicly accessible boat launches on the Arrow Lakes[3] plus two day use areas associated with the boat launches (Table 2). Final site selection was confirmed by the study team and BC Hydro following a reconnaissance visit by the study team to all potential sites, as well as discussions with local forestry officers, park rangers, elected officials, and launch clubs.

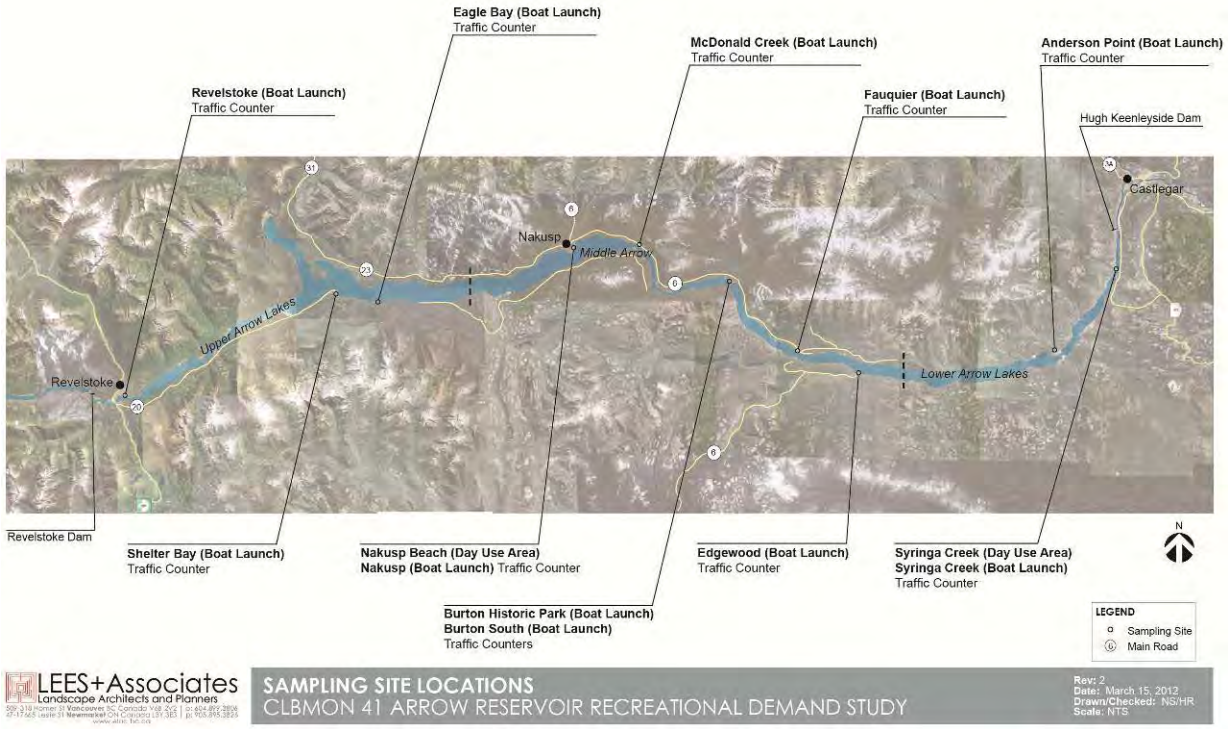
Table 2. Sampling locations.

Upper Arrow Lakes Reservoir	Middle Arrow Lakes Reservoir	Lower Arrow Lakes Reservoir
Revelstoke Boat Launch	Nakusp Beach (Day Use) †	Syringa Creek Park (Day Use) †
Eagle Bay Boat Launch	Nakusp Boat Launch	Syringa Creek Park Boat Launch
Shelter Bay Boat Launch	McDonald Creek Boat Launch	Anderson Point Boat Launch[4]
	Burton Historic Park Boat Launch	
	Burton South Boat Launch[5]	
	Fauquier Park Boat Launch	
	Edgewood Park Boat Launch	

† No ramp access or vehicle counter at these locations

[3] Recreational boat access is also provided by a private facility called Scotties Marina (the only site which charges a user fee), and numerous undesignated launch facilities.
[4] Anderson Point (Boat Launch) was added to the study in April 2010 in conjunction with CLBMON 14 Boat Ramp Use Study.
[5] Burton South (Boat Launch) was added in August 2011. This site has a traffic counter only; no field sampling was undertaken.

Figure 2. Sampling locations map



3.2 Traffic Data Collection

3.2.1 Vehicle counter installation and settings

Vehicle counters were installed year round at all study locations that have boat ramp access (*i.e.,* all monitoring sites except Syringa Creek Day Use and Nakusp Beach Day Use, see Figure 2). TRAFx G3 magnetic field controlled vehicle counters were selected for use, as they are the preferred and recommended traffic counter of BC Parks, Parks Canada, and the U.S. National Parks Service. They have many benefits applicable to the Arrow Reservoir Recreational Demand Study including:

- Ideal for rural, rugged and remote roads (can be installed at roadside, above or below ground);
- Advanced microelectronic design (self-contained, without external wires or tubes);
- Can be used as a permanent or portable counter;
- Small and easy to hide — reduces theft and vandalism risk;
- Low operating, maintenance, and installation costs;
- Long battery life (approximately 1 year);
- Large memory capacity (> 400 million counts);
- Field-proven design (8 year history);
- Well suited to boat launch locations (variable speed and sensitivity to suit ramp situation);

- Quick and effective systems support;
- Can be obtained at a local supplier;
- Less expensive than many competitors, and
- Sophisticated online data analysis and reporting software.

Vehicle counters were configured and installed as per the manufacturers specifications (see Appendix A – TRAFx Vehicle Counters) to monitor the number of vehicles using the ramp facilities. Counter sensitivity and delay settings were configured to most accurately record traffic at each site, in order to achieve a level of accuracy that will permit conclusive answers to the hypotheses. The settings are as follows:

Table 3. Traffic counter settings at Arrow Lakes.

Location	Mode	Period	Delay	Threshold	Rate
Revelstoke	VEH_2s	000	120	16	S
Eagle Bay	VEH_2s	000	120	16	S
Shelter Bay	VEH_2s	000	120	16	S
Nakusp	VEH_4d	000	96	16	S
McDonald Creek	VEH_2s	000	120	16	S
Burton	VEH_2s	000	120	16	S
Burton South	VEH_2s	000	120	16	S
Fauquier	VEH_2s	000	120	16	S
Edgewood	VEH_2s	000	120	16	S
Syringa Creek	VEH_4d	000	96	16	S
Anderson Point	VEH_2s	000	120	16	S

Notes: Mode: Veh_2s = single lane traffic; Veh_4d = double lane traffic
Period = 000: means timestamps
Delay: 8 = 1 sec; 96 = 12 sec; 120 = 15 sec
Threshold: Range is 3-16; 16 is least sensitive[6]
Rate: S is slow (<50 km/h)

Settings were monitored and adjusted in 2009–2010. They will be kept at the current settings unless a problem arises. Counters remained in-situ during construction periods for applicable boat ramps; however these periods have been excluded from the data[7].

Annual Traffic Counts are collected and automatically compiled by the TRAFx DataNet system for each full calendar year. This is done to standardize the calculation and application of average daily use to

[6] Counter thresholds were adjusted to the least sensitive setting that would still trip the counter when a vehicle passes through. This also prevented the count of bicycles, and smaller metal objects.

[7] Construction periods for Year 2 included: McDonald Creek (2010-05-16 to 2010-07-01) and Fauquier (2010-05-31 to 2010-09-21). These dates are excluded in the current data but not in the 2010 interim report. Any new reports will exclude appropriate data.

missing data. The system then enables the selection of any time period across years for calculating and reporting daily, weekly and monthly counts, averages and comparisons. Further discussion of annual traffic count calculations and how the counters work can be found in Appendix A: TRAFx Vehicle Counters.

3.3 Observational Data Collection

The surveyors collected observational data about the visitors that they encountered, photographs of site conditions and natural conditions (Table 4). These observations consider information on visitors including number of people seen, gender and age range, recreational activities, and number and origin of cars in the parking lot. They also consider information on natural conditions that can affect the level and nature of recreational usage, such as weather and reservoir conditions including waves, precipitation, wind, percent cloud cover, and air temperature. The observational data were assessed using standardized forms developed for this purpose (Appendix E). Definitions used to record observed weather, waves, wind, cloud cover, air and water temperatures are also included in Appendix E.

Table 4. Observational data: variables collected each field day.

Observation	Description
Number of people seen	• This information provides an overall sense of the level of activity that day, and recording the number of people approached provides a basis for calculating a response rate for the on-site survey. • Party size was also recorded where possible to compare with established Park stats[8].
Gender and age range	• Total male or female • Age range (1-10, 11-15, 16-20, 21-30, 31-40, 41-50, 51-60, 61-70, 71+)
Activities	• Type of recreational activity observed
Number of cars in parking lot (and origin)	• The number and origin of license plates was recorded through continuous observation to provide information about the number of parties using the facilities, visitors' place of residence and rough travel distance.
Site photography	• Photographic records of sample sites to capture site conditions.
Weather*	• General descriptions to supplement individual measurements
Presence of waves*	• Wave height and formation.
Wind*	• Wind direction and an estimate of speed (Beaufort Scale).
Percent cloud cover*	• An assessment of the amount of sky/sun obscured by clouds.
Air temperature*	• Recorded in Celsius.
Water temperature*	• Recorded in Celsius.

* Note: environmental data collected each field day at 13h00.

[8] BC Parks party size data are determined by number of people in group divided by the number of groups. Averages have been developed over years of surveys.

3.4 Sampling Design

This section outlines the sampling design including details about the methods of data collection for the on-site survey, online survey and observational data collection.

Thirteen sampling sites were chosen to represent the three sections of the Arrow Lakes Reservoir (*i.e.,* Upper, Middle, and Lower Arrow Lakes Reservoir; Table 2). Eleven of the thirteen sites have boat launches. Intensive surveying occurred at all sites in order to provide a comprehensive assessment of Arrow Lakes Reservoir recreational use, user preferences for conditions, and user attitudes about management.

The sampling periods were designed to maximize the response to the user survey and to capture a broad selection of outdoor recreation participants. The sampling strategy adopted in this project provides a random sample that is stratified by four factors: (1) section of the Arrow Lakes Reservoir; (2) season (the number of sample days in each season is proportional to the number of days in that season); (3) type of day (*i.e.*, weekends, week days, holidays); and (4) the time of day that sampling occurs (*i.e.*, morning or afternoon). Over the course of the five-year sampling horizon, this approach will provide a representative sample of visitors to the Arrow Lakes Reservoir.

During Year 3, three sites were sampled during each survey day – one sample site from each section of the Arrow Lakes Reservoir. Survey days at sample sites were randomly selected (Gregoire & Buhyoff, 1999). Data collection for Year 3 commenced Saturday, April 9, 2011 and finished Wednesday, October 19, 2011 (Tables 5 to 7). As a further step to ensure the representation of a wide range of outdoor recreation activities and respondents, surveyors were on-site during randomly selected six-hour periods (8:30 am to 2:30 pm or 10:30 am to 4:30 pm[9]).

Table 5. Spring 2011 sampling locations and dates.

Date	Upper Arrow Lakes Reservoir	Middle Arrow Lakes Reservoir	Lower Arrow Lakes Reservoir
Saturday April 9	Shelter Bay	MacDonald Creek Park	Anderson Point
Monday April 11	Revelstoke Boat Launch	Burton Historic Park	Syringa Boat Launch
Saturday April 16	Eagle Bay	Edgewood Park	Anderson Point
Tuesday April 19	Revelstoke Boat Launch	Nakusp Beach	Anderson Point
Friday April 22	Shelter Bay	Nakusp Boat Launch	Syringa Boat Launch
Wednesday May 4	Eagle Bay	Edgewood Park	Anderson Point
Tuesday May 10	Revelstoke Boat Launch	Fauquier Boat Launch	Anderson Point

Spring sampling hours: AM: 8:30 am to 2:30 pm PM: 10:30 am to 4:30 pm

[9] The six hour sampling period is based on successful application in previous recreational studies undertaken by the study team. An overlap of morning and afternoon periods ensures surveyors capture the higher use time over lunch hour.

Table 6. Summer 2011 sampling locations and dates.

Date	Upper Arrow Lakes Reservoir	Middle Arrow Lakes Reservoir	Lower Arrow Lakes Reservoir
Saturday June 4	Revelstoke Boat Launch	Nakusp Boat Launch	Syringa Creek Day Use
Sunday June 12	Shelter Bay	Fauquier Boat Launch	Syringa Boat Launch
Tuesday June 14	Eagle Bay	Nakusp Boat Launch	Syringa Boat Launch
Friday July 1	Revelstoke Boat Launch	Edgewood Park	Anderson Point
Thursday July 7	Shelter Bay	Edgewood Park	Syringa Boat Launch
Saturday July 9	Eagle Bay	Nakusp Beach	Syringa Creek Day Use
Saturday July 23	Revelstoke Boat Launch	Edgewood Park	Syringa Boat Launch
Friday July 29	Shelter Bay	MacDonald Creek Park	Anderson Point
Tuesday August 2	Revelstoke Boat Launch	Fauquier Boat Launch	Syringa Creek Day Use
Friday August 5	Shelter Bay	Nakusp Boat Launch	Syringa Boat Launch
Monday August 8	Eagle Bay	Burton Historic Park	Syringa Creek Day Use
Monday August 15	Revelstoke Boat Launch	MacDonald Creek Park	Syringa Boat Launch
Saturday August 27	Eagle Bay	Nakusp Beach	Anderson Point
Sunday September 4	Shelter Bay	Fauquier Boat Launch	Syringa Creek Day Use
Monday September 5	Eagle Bay	Burton Historic Park	Anderson Point
Sunday September 11	Revelstoke Boat Launch	MacDonald Creek Park	Anderson Point
Thurs September 22	Eagle Bay	Burton Historic Park	Syringa Creek Day Use
Sunday September 25	Shelter Bay	Nakusp Beach	Anderson Point

Summer sampling hours: AM: 8:00 am to 2:00 pm PM: 1:00 pm to 7:00 pm

Table 7. Fall 2011 sampling locations and dates.

Date	Upper Arrow Lakes Reservoir	Middle Arrow Lakes Reservoir	Lower Arrow Lakes Reservoir
Sunday October 9	Revelstoke Boat Launch	Nakusp Boat Launch	Anderson Point
Monday October 10	Shelter Bay	Fauquier Boat Launch	Syringa Boat Launch
Wednesday October 12	Shelter Bay	Edgewood Park	Syringa Boat Launch
Saturday October 15	Eagle Bay	MacDonald Creek Park	Anderson Point
Wednesday October 19	Eagle Bay	Burton Historic Park	Syringa Creek Day Use

Fall sampling hours: AM: 8:30 am to 2:30 pm PM: 10:30 am to 4:30 pm

Recreational users were surveyed at publicly accessible boat launches and near shore parks. An entry/exit intercept survey method was selected over a mail-out survey as comprehensive lists of people who visit the Arrow Lakes Reservoir are not available (*viz*. Dillman *et al.*, 2002) and the participation of a

broad selection (*i.e.*, water and shoreline recreationists) of visitors to the Arrow Lakes Reservoir is desired. A limitation of this sample approach is that respondents are self-selected based on their choice of recreation location and their decision to participate in the survey; people who have ceased visiting the Arrow Lakes Reservoir (for any reason) are excluded from the sample. Information about the use (or non-use) of the Arrow Lakes Reservoir (and reasons for non-use) needed to be gathered from a broader sample of regional residents. To address this limitation, an online survey was administered in order to capture the attitudes, behaviours, and preferences of a broader set of people in and around the Arrow Lakes Reservoir. This convenience sample was invited to participate in the online survey through a press release and announcement sent to local newspapers by BC Hydro in March 2011. A copy of published news articles can be found in Appendix H. In 2011, 26 people responded using the online survey.

3.5 Survey Delivery

The visitor survey is designed to be delivered in two formats over the course of this project: (1) an on-site survey, administered to visitors to sample sites; and (2) an online survey, administered to regional residents to capture a broader range of attitudes and opinions about recreational use (or non-use) of the Arrow Lakes Reservoir.

3.5.1 On-site Survey

All parties at a sample site were approached for inclusion in this study. People were approached after completing an outdoor recreation activity, so that their responses would be based on the activity they did that day. A representative from each party was asked to participate in the survey; however, if other members of the party wished to participate they were welcomed to do so. Respondents completed the questionnaires on-site. The number of people approached for inclusion in the study was recorded to permit the calculation of response rate. Number of parties and total number of people on-site was also recorded. On sampling days with high attendance (such as long weekends, or Canada Day), the total number of visitors was estimated. People who refused to participate were thanked for their time and were not engaged further. A standard introduction statement was made to all prospective participants that summarized the cover letter that accompanied the questionnaire. If asked what the surveys would be used for, people were told that the information would be used to inform the development of strategies to guide the management of water flows in the Arrow Lakes Reservoir. Contact information for the project team was provided in the event that anyone had questions or concerns about the project.

3.5.2 Online Survey

An online version of the survey was developed for a sample of regional residents to capture a broader range of attitudes and opinions about recreational use (or non-use) of the Arrow Lakes Reservoir. As mentioned above, this survey is also available for on-site visitors that preferred to provide their

information online. The online survey is identical to the on-site survey and is available at www.arrow-kinbasket-recreation-survey.ca.

3.6 Survey Design

The Visitor Survey questionnaire employed in this study was developed using the principles of the *Tailored Design Method*. This method identifies procedures to maximize survey return rates and minimize survey error (Salant & Dillman, 1994; Dillman, 2000), including questionnaire layout considerations. The questionnaire was designed to ensure a logical flow of the questions, and that the wording of the questions and instructions to the respondents be clear and as brief as possible. A key requirement of the questionnaire was that it be suitable for repeated delivery at multiple locations in order that a better understanding of recreation use trends and of visitors' attitudes about the management of the Arrow Lakes Reservoir be identified.

After an initial scoping exercise (which produced three drafts of potential questions) the Arrow Lakes Visitor Survey questionnaire underwent seven drafts before being finalized. Three initial drafts (*i.e.*, scoping documents) provided a comprehensive set of questions (and different wordings of questions). The objective of these early drafts was to (1) demonstrate different approaches that could be taken in a survey of visitors to the Arrow Lakes, (2) ensure that the questionnaire would be consistent with BC Hydro goals and objectives, (3) ensure that the questionnaire met the data requirements of the project, and (4) ensure that the questionnaire was amenable to potential respondents (*i.e.*, interesting, easy to follow, and phrased and laid out in a manner that could be answered consistently). Subsequent drafts of the questionnaire were circulated in order to promote discussion around suggested changes in question ordering, question wording, answer options, and/or question instructions. Reviewers included the LEES+Associates team, BC Hydro (Public Use Management, Stakeholder Engagement Group, and the Water License Requirements Program), an individual at the *Science Policy and Economics Section, British Columbia Ministry of Environment*, and members of the *Collaborative for Advanced Landscape Planning* at the *University of British Columbia*.

In spring 2010, Section 6 of the visitor questionnaire was amended to include four questions pertaining specifically to boat ramp usage to address the management hypotheses for CLBMON 14 Boat Ramp Use Study[10]. The other sections remained the same. The questionnaire has also retained the same format - a four-page booklet (two 8.5" by 11" sheets printed on both sides, stapled in the top left corner) that comprehensively measures people's use of, and attitudes about, recreation on the Arrow Lakes.

[10] As per the Terms of Reference for CLBMON 14 Boat Ramp Use Study.

The questions permit the isolation of variables to characterize outdoor recreation use and water level preferences in the Arrow Lakes Reservoir. Recreationists are not a homogeneous group (Bryan, 1977; Manning, 1999; Salz *et al.*, 2001; Rollins & Robinson, 2002), as participants differ in their values, the activities that they pursue, preferred settings, desired experiences, and motivations for participating (Choi *et al.*, 1994); however, the variation among preferences, attitudes, and behaviours can be explained by the recreation specialization framework (Bryan, 1977; McFarlane *et al.*, 1998). Understanding the desires and needs of recreationists is important for the management of outdoor recreation (McFarlane, 1994). As the recreation specialization framework can provide a basis for the differentiation of recreationists holding various goals, preferences, and behaviors (McFarlane, 2001), it was used to frame the collection of recreation data, as it provides a coherent and comprehensive approach, and addresses the issue of engagement in multiple activities, which can violate statistical assumptions about independent samples (Jackson, 1986). These measurement protocols follow standard practices and are appropriate for a project of this type. The questionnaire is composed of seven sections:

Section 1: Arrow Lakes Outdoor Recreation Activities.

Section 2: Important Outdoor Recreation Activities.

Section 3: Arrow Lake Outdoor Recreation Experiences.

Section 4: Use and Familiarity of Arrow Lakes.

Section 5: Arrow Lakes Outdoor Recreation Management.

Section 6: Arrow Lakes Outdoor Recreation Experiences.

Section 7: Demographics.

Table 8. Relation of questionnaire subsections to management hypotheses.

Management hypothesis	Related Questionnaire Subsection
H_{0A} – frequency of public use of Arrow Lake is not influenced by fluctuating reservoir water levels	Section 1: Arrow Lakes Outdoor Recreation Activities Section 5: Arrow Lakes Outdoor Recreation Management Section 6: Outdoor Recreation Experiences
H_{0B} – volume of public use of Arrow Lake is not influenced by fluctuating reservoir water levels	Section 3: Outdoor Recreation Experiences Section 4: Use and Familiarity
H_{0C} – the different types of public use are not affected by fluctuating water levels.	Section 1: Arrow Lakes Outdoor Recreation Activities Section 2: Important Outdoor Recreation Activities Section 5: Arrow Lakes Outdoor Recreation Management Section 7: Demographics

Given that visitor satisfaction is multidimensional, data collection in this study takes advantage of the different elements of this study (*i.e.*, observational data and questionnaire-elicited data). Table 9 illustrates the links between the specific monitoring parameters identified in the project's *Terms of Reference* (BC Hydro 2008) and the mode of measurement.

Table 9. Links between monitoring parameters and mode of measurement.

Specific Monitoring Parameters	Mode of Measurement	Unit of Measurement
1. Types of recreation activity	• *Detailed Daily Sample Summary* form. • Questionnaire: Question 1.	Descriptions
2. Volume of recreation use	• Field Crew: vehicle counters and *Detailed Daily Sample Summary* form.	# of vehicles # of people in group
3. User classification (*i.e.*, resident, tourist)	• Questionnaire: Question 7. • Field Crew: *Site and Survey Log*	Age range who travelled > 80km
4. Distribution of activities	• Measured by stratifying observed recreation activities by sample sites.	
5. Frequency of activities	• Questionnaire: Question 1; Question 2.	
6. Reservoir levels	• Data supplied by BC Hydro; to be matched up with sampling times.	Meters
7. Meteorological data (*i.e.*, weather, waves, wind, sky conditions, air and water temperature). Collected by survey crews at 13h00 each day on-site.	• Field Crew: *Site and Survey Log*	
	Weather	General descriptions
	Presence of waves	Wave height & frequency
	Wind	Beaufort scale
	Percent cloud cover	Assessment of sky/sun obscured by clouds
	Air temperature	Recorded in Celsius
	Water temperature	Recorded in Celsius

To address H_{0A} (frequency of public use of Arrow Lake is not influenced by fluctuating reservoir water levels), data are required about how often people come to the Arrow Lakes Reservoir and whether or not people will return based on the water levels that they experienced.

To address H_{0B} (volume of public use of Arrow Lake is not influenced by fluctuating reservoir water levels), data are required about numbers of people visiting the Arrow Lakes Reservoir.

To address H_{0C} (different types of public use are not affected by fluctuating water levels), data are required about the different activities that occur on and near the Arrow Lakes Reservoir, as well as an assessment of influence of water levels by activity.

For each hypothesis, we need to control for the influence of other variables (*e.g.*, management setting[11] or meteorological data). The following sections demonstrate how the data captured by the questionnaire will address the study's management questions, and how the questions address the theoretical framework of the study.

3.6.1 Section 1: Arrow Lakes Outdoor Recreation Activities

The questions in this section (Figure 3) ask about the recreation activities done on the water or onshore of the Arrow Lakes. The questions provide an assessment of the different activities that each respondent engages in. This can help to inform the likelihood of visitors substituting activities *vs*. opportunities (*i.e.*, location) if satisfaction is not achieved. These questions address H_{0A} by measuring the frequency of use by season. As information is also collected about the types of activities that take place on the water or onshore of the Arrow Lakes Reservoir, the frequency of use can be stratified by activity. These questions also inform H_{0C} by measuring the different types of recreation activity that take place on the water or onshore of the Arrow Lakes Reservoir.

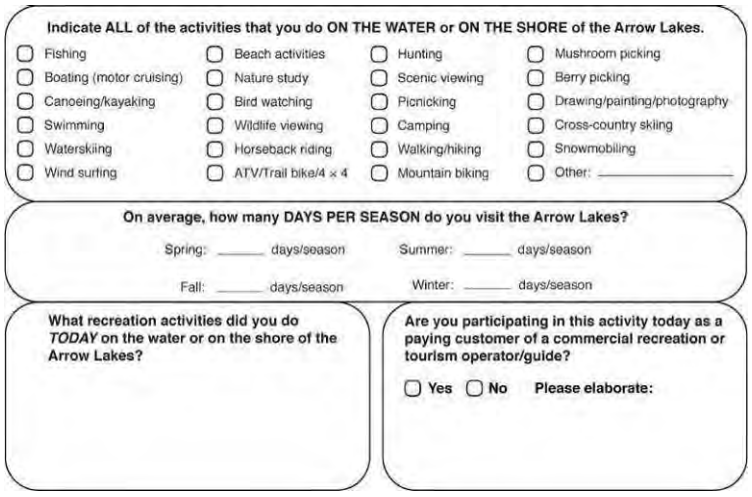


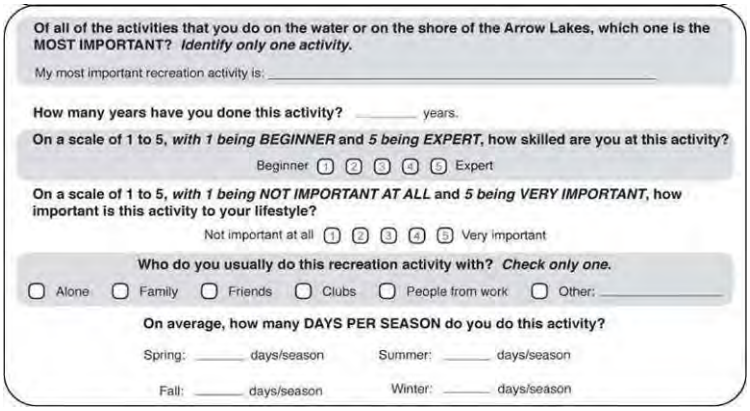
Figure 3. Section 1 questions.

3.6.2 Section 2: Important Outdoor Recreation Activities

Section 2 asks about respondents' most important outdoor recreation activities. These questions inform H_{0C} by providing information about the type of user in terms of intra-activity characteristics. Recreationist may partake in a range of activities. This question provides an assessment of individual's degree of

[11] *e.g.*, municipal land, Crown land, BC Parks, as different agencies are responsible for managing access to the Arrow Lakes Reservoir.

recreation specialization, which accounts for intra-activity variation (Bryan, 1977; McFarlane, 2001; Scott & Shafer, 2001).



Of all of the activities that you do on the water or on the shore of the Arrow Lakes, which one is the MOST IMPORTANT? ***Identify only one activity.***

My most important recreation activity is: _____

How many years have you done this activity? _____ years.

On a scale of 1 to 5, *with 1 being BEGINNER* and *5 being EXPERT*, how skilled are you at this activity?

Beginner (1) (2) (3) (4) (5) Expert

On a scale of 1 to 5, *with 1 being NOT IMPORTANT AT ALL* and *5 being VERY IMPORTANT*, how important is this activity to your lifestyle?

Not important at all (1) (2) (3) (4) (5) Very important

Who do you usually do this recreation activity with? ***Check only one.***

☐ Alone ☐ Family ☐ Friends ☐ Clubs ☐ People from work ☐ Other: _____

On average, how many DAYS PER SEASON do you do this activity?

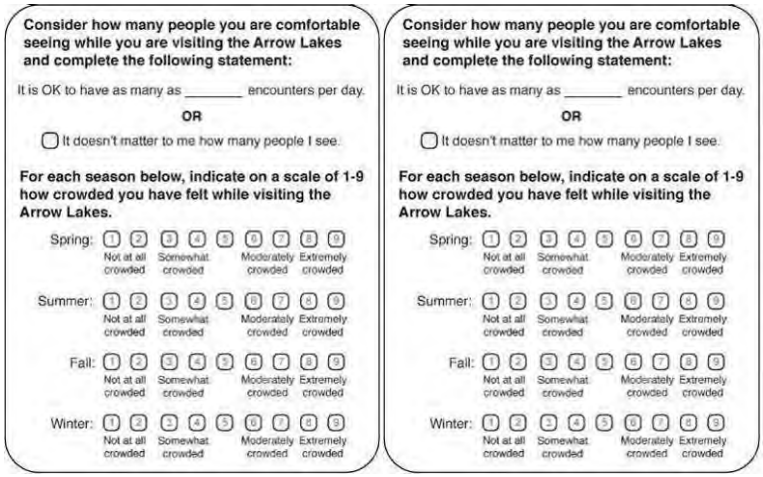
Spring: _____ days/season Summer: _____ days/season

Fall: _____ days/season Winter: _____ days/season

Figure 4. Section 2 questions.

3.6.3 Section 3: Arrow Lakes Outdoor Recreation Experiences.

This section has two parts. The first part (Figure 5) asks about some of the experiences that respondents may have had while visiting the Arrow Lakes for recreation activities. These two questions provide information about social settings by eliciting individual's encounter norms to provide an assessment of crowding (Manning, 1999; Vaske & Donnelly, 2002).



Consider how many people you are comfortable seeing while you are visiting the Arrow Lakes and complete the following statement:

It is OK to have as many as _____ encounters per day.

OR

☐ It doesn't matter to me how many people I see.

For each season below, indicate on a scale of 1-9 how crowded you have felt while visiting the Arrow Lakes.

Spring: (1) (2) (3) (4) (5) (6) (7) (8) (9)
Not at all crowded Somewhat crowded Moderately crowded Extremely crowded

Summer: (1) (2) (3) (4) (5) (6) (7) (8) (9)
Not at all crowded Somewhat crowded Moderately crowded Extremely crowded

Fall: (1) (2) (3) (4) (5) (6) (7) (8) (9)
Not at all crowded Somewhat crowded Moderately crowded Extremely crowded

Winter: (1) (2) (3) (4) (5) (6) (7) (8) (9)
Not at all crowded Somewhat crowded Moderately crowded Extremely crowded

Consider how many people you are comfortable seeing while you are visiting the Arrow Lakes and complete the following statement:

It is OK to have as many as _____ encounters per day.

OR

☐ It doesn't matter to me how many people I see.

For each season below, indicate on a scale of 1-9 how crowded you have felt while visiting the Arrow Lakes.

Spring: (1) (2) (3) (4) (5) (6) (7) (8) (9)
Not at all crowded Somewhat crowded Moderately crowded Extremely crowded

Summer: (1) (2) (3) (4) (5) (6) (7) (8) (9)
Not at all crowded Somewhat crowded Moderately crowded Extremely crowded

Fall: (1) (2) (3) (4) (5) (6) (7) (8) (9)
Not at all crowded Somewhat crowded Moderately crowded Extremely crowded

Winter: (1) (2) (3) (4) (5) (6) (7) (8) (9)
Not at all crowded Somewhat crowded Moderately crowded Extremely crowded

Figure 5. Section 3 questions, part 1.

The second part addresses recreation conflicts (Figure 6). Recreation conflict occurs when the presence, behaviour, or values of an individual or group interferes with another individual or group (Vaske, *et al.*,

2007). This question provides information about the social setting by asking whether individuals have encountered any conflicts with other recreation visitors.

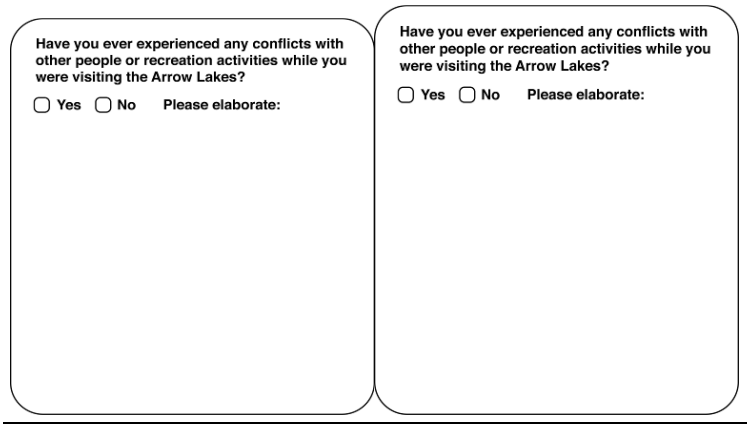


Figure 6. Section 3 questions, part 2.

3.6.4 Section 4: Use and Familiarity of Arrow Lakes.

This section includes two questions. The first question (Figure 7) asks about respondents' use of, and familiarity with, the Arrow Lakes. People can have multiple motivations for engaging in recreation activities, which may include enjoyment from the activity itself, socialization, as well as other benefits (Driver *et al.*, 1991). An understanding of people's motivations for pursuing recreation activities in the Arrow Lakes Reservoir helps to inform the attitudes and preferences element of the *subjective evaluation* component of the satisfaction model.

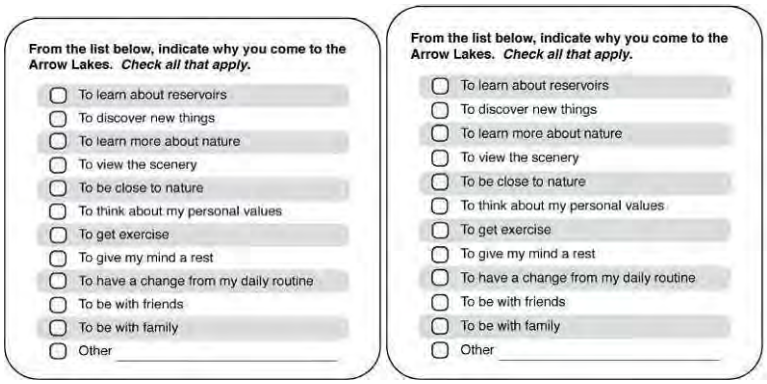


Figure 7. Section 4 questions, part 1.

The second question (Figure 8) addresses respondents' knowledge about the management goals of the Arrow Reservoir. People engage in outdoor recreation activities with the expectation that this engagement will fulfill particular needs, motivations, or other desires (Fishbein & Ajzen, 1975; Manning, 1999). Understanding individual's expectations informs their recreation satisfaction. If people are not aware of

the management goals for the Arrow Lakes Reservoir, their expectations may not be realistic, and their satisfaction affected.

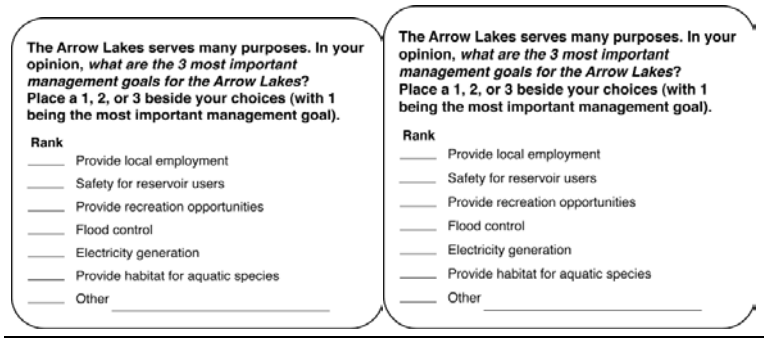


Figure 8. Section 4 questions, part 2.

3.6.5 Section 5: Arrow Lakes Outdoor Recreation Management.

This section has two parts. The first part of this section (Figure 9) asks about how respondents feel about the management of recreation on the Arrow Lakes. Although there are not any standardized measures of visitor satisfaction, a common approach is to gauge overall satisfaction through the use of multiple-item measures of satisfaction that are context specific (Manning, 1999). This question provides an overall assessment of visitor satisfaction, which will be used to test the relationship of water levels to visitor use.

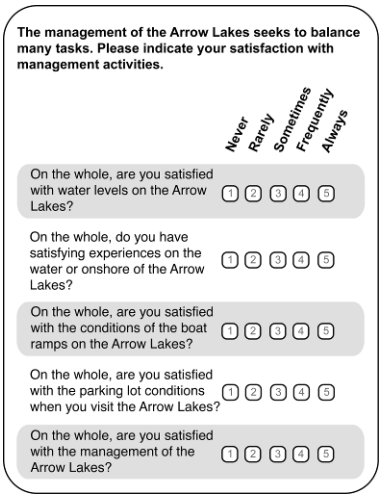


Figure 9. Section 5 questions, part 1.

The second part of this section (Figure 10) directly addresses H_{0A} as it explicitly asks whether respondents will return based on the water levels that they have experienced. This question also addresses H_{0C} as the stated relationship between water levels and likelihood of returning to the Arrow Lakes Reservoir can be stratified by activity. This question informs the conceptual model of satisfaction by examining the link between Resource Setting and likelihood of returning (*i.e.*, achieved satisfaction).

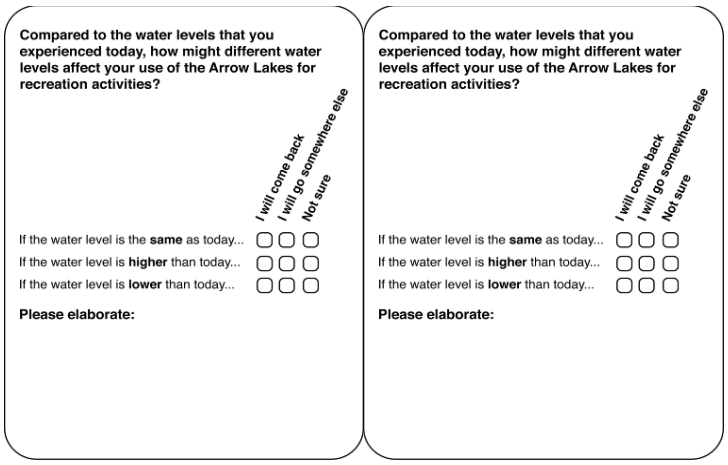


Figure 10. Section 5 questions, part 2.

3.6.6 Section 6: Arrow Lakes Outdoor Recreation Experiences.

This section has two parts (Figure 11) which ask about respondents' recreation experiences on the Arrow Lakes. The first part of this section establishes respondents' familiarity with the Arrow Lakes Reservoir by asking about the length of time that they have used the area for outdoor recreation. The degree of familiarity influences visitors' expectations, which has an effect on their degree of satisfaction. Respondents are also asked where they first heard about recreation opportunities near and on the Arrow Lakes.

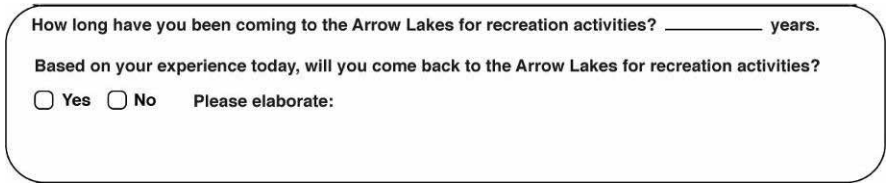


Figure 11. Section 6 questions, part 1.

The second part includes 4 questions related to respondents' experience while using boat ramp facilities (Figure 12). These questions address H_{0C} by asking about people's motivations, and their degree of satisfaction.

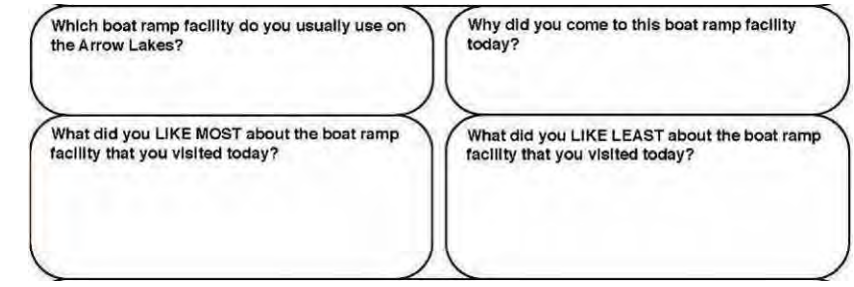
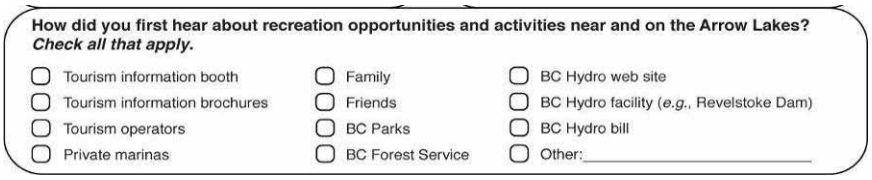


Figure 12. Section 6, part 2, questions pertaining to boat ramp use.

Respondents are also asked where they first heard about recreation opportunities near and on the reservoir (Figure 13).

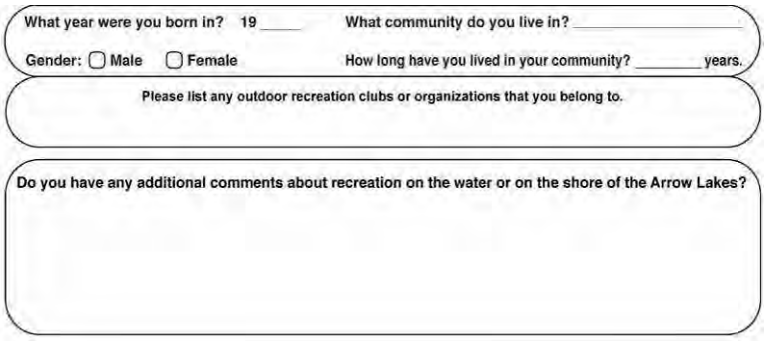

How did you first hear about recreation opportunities and activities near and on the Arrow Lakes? *Check all that apply.*

- ☐ Tourism information booth
- ☐ Tourism information brochures
- ☐ Tourism operators
- ☐ Private marinas
- ☐ Family
- ☐ Friends
- ☐ BC Parks
- ☐ BC Forest Service
- ☐ BC Hydro web site
- ☐ BC Hydro facility (*e.g.*, Revelstoke Dam)
- ☐ BC Hydro bill
- ☐ Other:_____

Figure 13. Section 6 questions, part 3.

3.6.7 Section 7: Demographics.

Section 7 collects basic information about respondents' demographic characteristics. These questions provide explicit information about individuals' place of residence, which informs the user classification as either resident or tourist (*i.e.,* travelled more than 80km (Murphy, 1991)). They also provide information about user socioeconomic characteristics, which addresses H_{0C}. This question provides data about socioeconomic characteristics, which addresses the *subjective evaluation* component of the conceptual model of satisfaction.


What year were you born in? 19____ What community do you live in? _____

Gender: ☐ Male ☐ Female How long have you lived in your community? _____ years.

Please list any outdoor recreation clubs or organizations that you belong to.

Do you have any additional comments about recreation on the water or on the shore of the Arrow Lakes?

Figure 14. Section 7 questions.

3.7 Survey Analyses

Descriptive statistics were tabulated for each question. For those questions that ask respondents to indicate their level of agreement, satisfaction, or importance, the proportion of responses was calculated for each interval. The mean response, standard deviation, and standard error were calculated for questions that use an interval scale. General comments made by respondents on the questionnaires are presented in Appendix C.

3.7.1 Data Entry QA/QC

The data from all completed questionnaires were entered (twice) into two SPSS databases to facilitate the verification of data for keying errors, and accuracy and consistency in data coding (Salant & Dillman, 1994). Each completed questionnaire was compared among the two datasets such that each cell (each answer to a question) was verified using the Identify Duplicate Cases function is SPSS (if two cases are identified as being duplicates, then it is assumed that they have been entered correctly). When discrepancies were identified, the appropriate questionnaire was consulted and the necessary correction was made. The resultant dataset can be considered to be free of errors from data entry. The data were checked for "protest votes" (*i.e.,* outliers or obvious patterns such as multiple responses from the same IP address); when these were identified they were checked against the corresponding questionnaire. No obvious "protest votes" were identified.

4. RESULTS

4.1 Traffic Count Results

A significant amount of boating use occurred on the Arrow Lakes in the past year as counters recorded approximately 11,400 "boat launches[12]" from October 1, 2010 to September 30, 2011 (Table 10). Syringa Creek and Nakusp were the most active boat launch locations and constituted 62% of the recorded boat launch traffic. Overall boating use this year was slightly lower than in 2010, as shown in the revised[13] 2010 counts (Table 11). The greatest percentage increase was noted at Anderson Point (first full year of counting). The greatest percentage decreases were noted at Eagle Bay, Edgewood, Fauquier and McDonald Creek. These reductions are likely attributable in large part to the very wet and cold weather in May, June and July. The average temperature and total precipitation for May, June and July are summarized in Table 12.

[12] Total vehicle counts are divided by four as a boating experience would normally generate one count for each time a vehicle passed the counter – thus, twice when a boat is put in the water and twice when taken out of the water.

[13] The reported 2010 use figures have been recalculated (multiplied by a factor of 0.5) as the numbers had originally only accounted for two traffic counts per boat launch rather than four.

Table 10. Arrow Lakes Traffic Summary – October 1, 2010 to September 30, 2011

Site	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	%
Anderson Pt	83	44	34	29	31	34	50	82	120	203	172	124	**1,006**	8.8%
Burton	19	9	2	0	9	2	11	32	72	121	144	56	**476**	4.2%
Burton South[14]	0	0	0	0	0	0	0	0	0	0	35	22	**57**	0.5%
Eagle Bay	2	0	0	0	0	0	0	9	3	23	13	11	**62**	0.5%
Edgewood	34	21	15	12	10	42	51	66	68	140	123	53	**636**	5.6%
Fauquier	0	0	0	2	0	0	4	2	3	3	2	3	**19**	0.2%
McDonald Cr	37	12	2	0	0	0	36	33	55	101	148	52	**477**	4.2%
Nakusp	185	90	150	183	114	125	198	202	318	643	724	266	**3,198**	28.1%
Revelstoke	68	17	0	0	0	0	25	44	60	119	129	91	**553**	4.9%
Shelter Bay	179	31	0	0	0	22	102	171	119	116	174	174	**1,088**	9.5%
Syringa Cr	174	64	32	44	77	97	147	241	495	1,066	1,004	381	**3,821**	33.5%
Total	**782**	**288**	**235**	**270**	**241**	**322**	**624**	**882**	**1,313**	**2,535**	**2,668**	**1,233**	**11,393**	**100%**

Table 11. Arrow Lakes Traffic Summary: 2010 (October 1, 2009 to September 30, 2010) and 2011(October 1, 2010 to Sept 30, 2011)

Site	Total Boat Launches 2010	Total Boat Launches 2011	Percent increase/decrease
Anderson Point	856	1,006	14.9%
Burton	399	476	16.2%
Burton South	N/A	57	N/A
Eagle Bay	112	62	-80.6%
Edgewood	984	636	-54.7%
Fauquier	161	19	-747.4%
McDonald Creek	935	477	-96.0%
Nakusp	3,162	3,198	1.1%
Revelstoke	652	553	-17.9%
Shelter Bay	1,118	1,088	-2.8%
Syringa Creek	3,649	3,821	4.5%
Total	**12,028**	**11,393**	**-5.6%**

Table 12. Average Temperature and Total Precipitation in June, July and August (Source: Environment Canada)

Site	2010	2011
Average Temperature (ºC)	15.8	14.9
Total Precipitation (mm)	137.0	208.5

The following table (Table 13) shows complete traffic counts from September 2009 to September 30, 2011 at the boat ramps surveyed on the Arrow Lakes. Annual Traffic Counts are collected and automatically compiled by the TRAFx DataNet system for each full calendar year. This is done to

[14] Burton South was a partial year only (August 26 to September 30, 2010); numbers would be higher for a full year.

standardize the calculation and application of average daily use to missing data. The system then enables the selection of any time period across years for calculating and reporting daily, weekly and monthly counts, averages and comparisons. Further discussion of annual traffic count calculations, including adjustments and filtering can be found in Appendix A: TRAFx Vehicle Counters.

Table 13. Annual Traffic Summary – Arrow Lakes

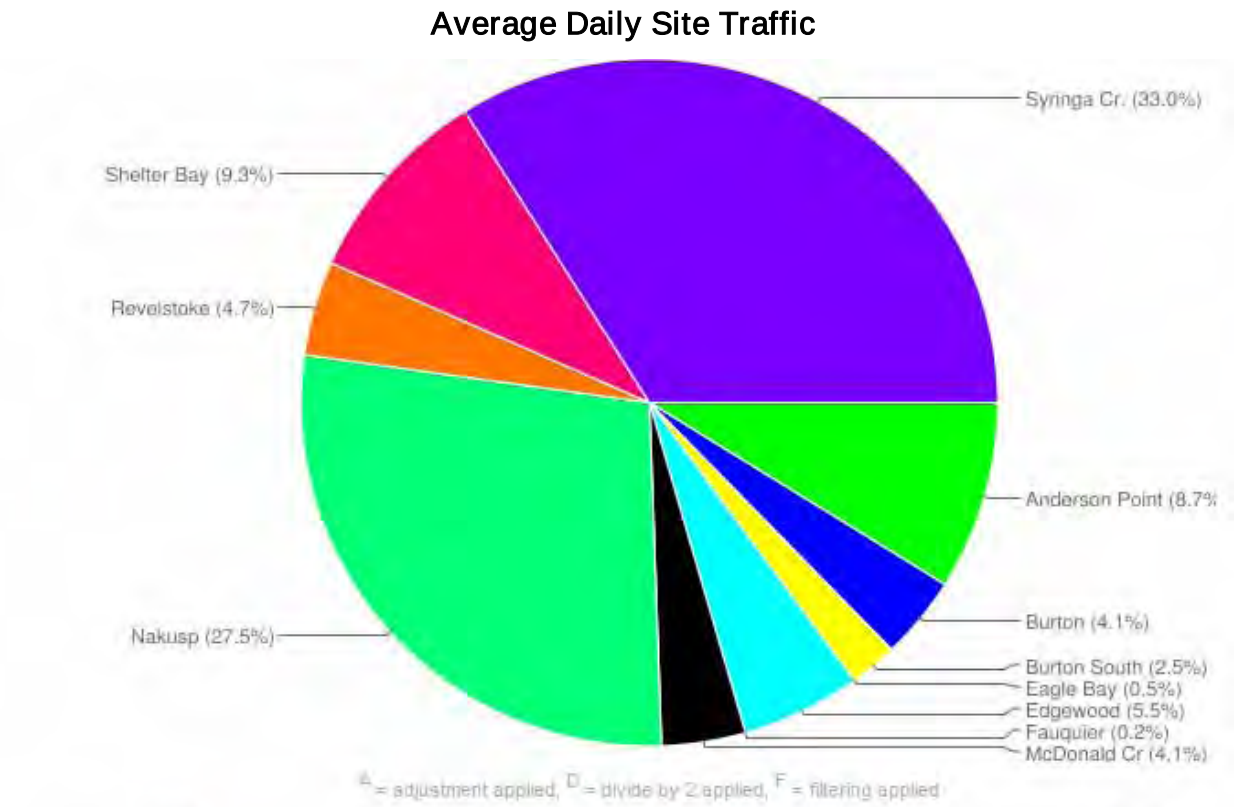
Year	Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AADT†	Days with data	Totals
2009	Burton ADF									*62**	*19**	8	0	0.604	106	*220***
	Eagle Bay ADF									*25**	*3**	*0**	0	0.188	96	*68***
	Edgewood ADF									*84**	51	48	37	1.726	113	*630***
	Fauquier ADF									*33**	*7**	6	3	0.351	111	*128***
	McDonald Cr ADF									*71**	26	15	7	0.867	113	*317***
	Nakusp ADF									*245**	178	144	149	5.661	112	*2,066***
	Revelstoke ADF									*114**	*81**	32	0	1.655	110	*604***
	Shelter Bay ADF									*211**	142	79	9	3.377	114	*1,233***
	Syringa Cr. ADF									*465**	*152**	*78**	55	5.402	102	*1,972***
2010	Anderson Point DF				66	100	196	197	190	107	83	44	34	3.698	275	*1,350***
	Burton ADF	0	3	*2**	*8**	*32**	83	106	123	15	19	9	2	1.134	351	*414***
	Eagle Bay ADF	0	0	*1**	*1**	22	*2**	41	25	17	*2**	0	0	0.316	351	*115***
	Edgewood ADF	96	100	*136**	64	61	88	174	103	26	*34**	21	15	2.524	361	*921***
	Fauquier ADF	3	17	*18**	12	*35**				*3**	*0**	0	0	0.340	244	*124***
	McDonald Cr ADF	4	19	*16**	*32**	*124**		*300**	215	87	*37**	12	2	2.530	328	*924***
	Nakusp ADF	152	162	*170**	192	247	330	748	*529**	161	185	90	150	8.530	362	*3,114***
	Revelstoke ADF	2	16	*33**	24	42	*90**	159	87	86	*68**	17	0	1.706	361	*623***
	Shelter Bay ADF	0	41	*100**	89	165	*85**	142	148	118	*179**	31	0	2.992	359	*1,092***
	Syringa Cr. ADF	106	130	181	164	307	565	997	738	175	*174**	64	32	9.964	364	*3,637***
2011	Anderson Point DF	29	31	34	*50**	82	120	203	172	124	*113**			3.139	288	*1,146***
	Burton ADF	0	9	2	*11**	32	72	121	*144**	56	*8**			1.556	286	*568***
	Burton South ADF								*35**	22	*2**			0.564	55	*206***
	Eagle Bay ADF	0	0	0	0	9	3	*23**	13	11	*9**			0.215	284	*78***
	Edgewood ADF	12	10	42	*51**	66	68	140	123	53	*24**			1.997	288	*729***
	Fauquier ADF	2	0	0	*4**	2	3	*3**	2	3	*0**			0.066	274	*24***
	McDonald Cr ADF	0	0	0	*36**	33	55	101	148	52	*4**			1.476	288	*539***
	Nakusp ADF	183	114	125	*198**	202	318	643	724	266	*172**			9.883	290	*3,607***
	Revelstoke ADF	0	0	0	*25**	44	60	*119**	129	91	*57**			1.711	287	*624***
	Shelter Bay ADF	0	0	22	102	171	119	116	174	174	*171**			3.357	291	*1,225***
	Syringa Cr. ADF	44	77	97	*147**	241	495	1,066	1,004	381	*124**			12.535	288	*4,575***

† AADT = Annual Average Daily Traffic, the total whole day counts for the given year, divided by the number of whole days with data in that year.

* Some monthly totals are estimated when there is only partial data for the month. The values shown are calculated based on the daily average for the available data, multiplied by the number of days in that month.

** Totals in years where data is incomplete are calculated by multiplying the AADT by the number of days in that year.

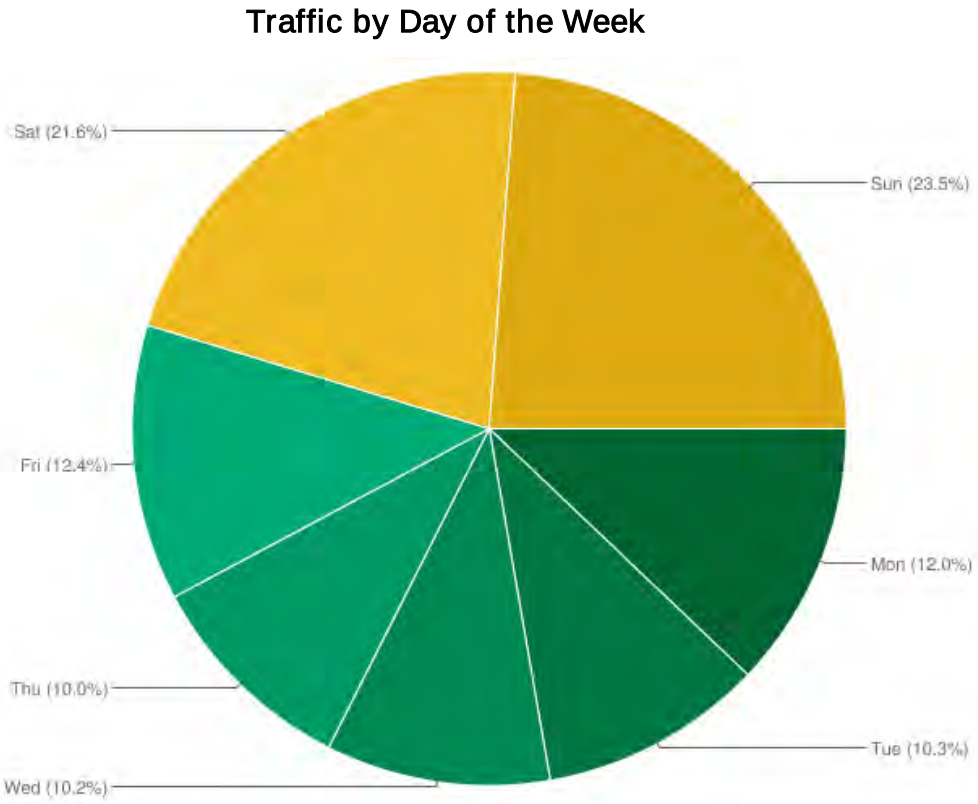
A = adjustment applied, D = divide by 2 applied, F = filtering applied



Site name	Daily average
Anderson Point[DF]	2.8 (8.7%)
Burton[ADF]	1.3 (4.1%)
Burton South[ADF]	0.8 (2.5%)
Eagle Bay[ADF]	0.2 (0.5%)
Edgewood[ADF]	1.7 (5.5%)
Fauquier[ADF]	0.1 (0.2%)
McDonald Cr[ADF]	1.3 (4.1%)
Nakusp[ADF]	8.8 (27.5%)
Revelstoke[ADF]	1.5 (4.7%)
Shelter Bay[ADF]	3.0 (9.3%)
Syringa Cr.[ADF]	10.5 (33.0%)

Figure 15. Average Daily Site Traffic

Syringa Creek and Nakusp were the most consistently active on a daily basis as they constituted 60.5% of the average daily boat launch traffic on the Arrow Lakes. A new boat launch was constructed at Burton South over the summer but construction activities did not restrict visitor access to the Burton Historic Park site. Burton South received a higher percentage of use based on average daily counts rather than the actual traffic counts as the total count is for only a partial year.

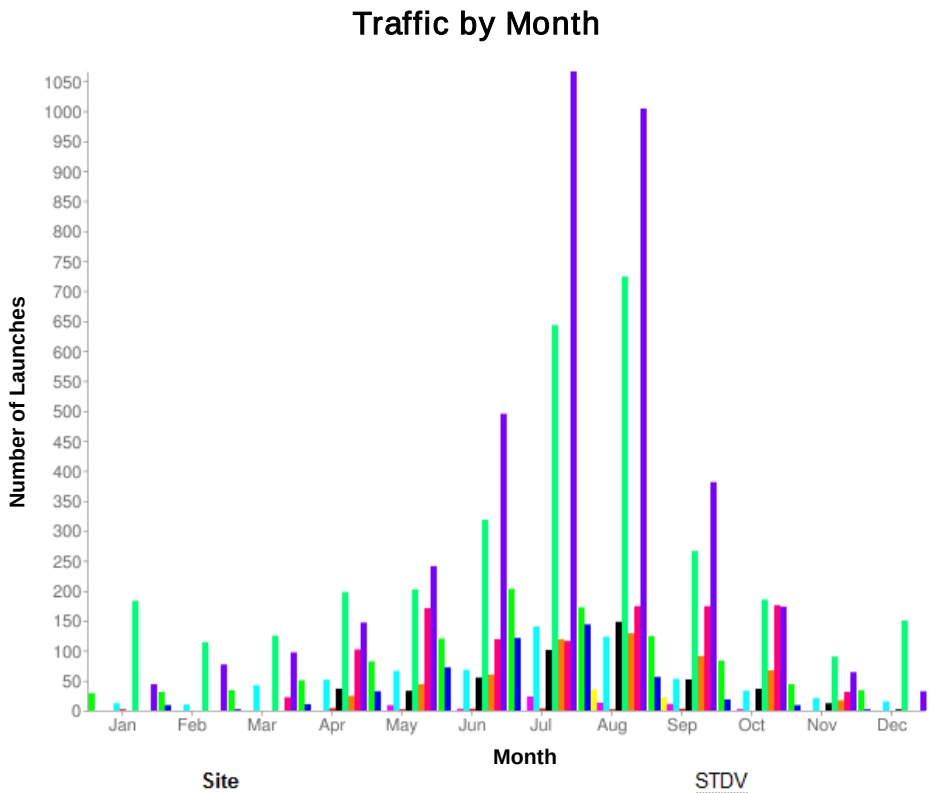


site name	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Anderson Point[DF]	2.5	2.2	2.0	2.5	3.3	3.0	3.8
Burton[ADF]	1.3	1.2	1.0	1.2	1.3	1.4	1.7
Burton South[ADF]	1.2	1.4	0.6	0.5	0.0	1.0	1.2
Eagle Bay[ADF]	0.2	0.0	0.1	0.1	0.1	0.2	0.4
Edgewood[ADF]	1.6	1.5	1.4	1.5	1.7	2.2	2.4
Fauquier[ADF]	0.0	0.1	0.0	0.0	0.1	0.1	0.1
McDonald Cr[ADF]	1.0	0.8	1.1	1.2	1.2	2.0	1.7
Nakusp[ADF]	7.5	6.2	6.5	6.7	8.5	12.5	13.5
Revelstoke[ADF]	1.8	1.4	1.6	1.2	1.1	1.7	1.8
Shelter Bay[ADF]	1.8	1.5	1.6	2.0	2.6	6.1	5.1
Syringa Cr.[ADF]	8.0	6.5	6.8	5.5	7.7	18.0	20.8
daily averages	2.4	2.1	2.1	2.0	2.5	4.4	4.8

[A] = adjustment applied, [D] = divide by 2 applied, [F] = filtering applied

Figure 16. Traffic by Day of the Week

As expected, each day of a weekend received about 1.5 – 2 times the number of recorded counts as each week day. Weekends accounted for approximately 45% of the weekly use. Friday and Monday counts were generally higher when compared to Tues-Thurs for most sites, due to long weekends. Anderson Point had higher Friday counts likely due to commuter traffic.



Site Name	Average	Median	STDV (σpop)	Min	Max
Anderson Point[DF]	83.9	66.2	56.5	29.0	203.0
Burton[ADF]	39.6	14.6	46.9	2.0	143.6
Burton South[ADF]	19.1	22.0	14.6	22.0	35.4
Eagle Bay[ADF]	5.1	1.1	7.1	2.3	23.3
Edgewood[ADF]	52.9	46.7	40.2	10.0	140.0
Fauquier[ADF]	1.6	2.0	1.4	2.0	3.8
McDonald Cr[ADF]	39.6	34.6	43.6	2.0	148.0
Nakusp[ADF]	266.5	191.3	196.7	90.0	724.0
Revelstoke[ADF]	46.0	34.3	45.3	17.0	129.0
Shelter Bay[ADF]	90.4	109.0	71.9	22.0	175.7
Syringa Cr.[ADF]	318.4	159.9	347.6	32.0	1,066.0

[A] = adjustment applied, [D] = divide by 2 applied, [F] = filtering applied

Figure 17. Traffic by Month

As expected, June, July and August recorded the highest traffic counts with greatest use peaking in the month of July. Syringa Creek had over 1,000 launches in July and August while Nakusp recorded about 650 and 700 respectively in the same months. Nakusp maintained the highest counts through the six off-season months (October through April); this may be due to the fact that the boat launch access is in good condition, right in town, is plowed regularly and can be used at lower water levels.

Estimations of boating and recreation use of the Arrow Lakes need to consider local conditions and influences that might impact or modify usage numbers or at least help in understanding some of the anomalies at each site. Some of those considerations are included in the following table (Table 14). Figure 18 shows sampling site locations.

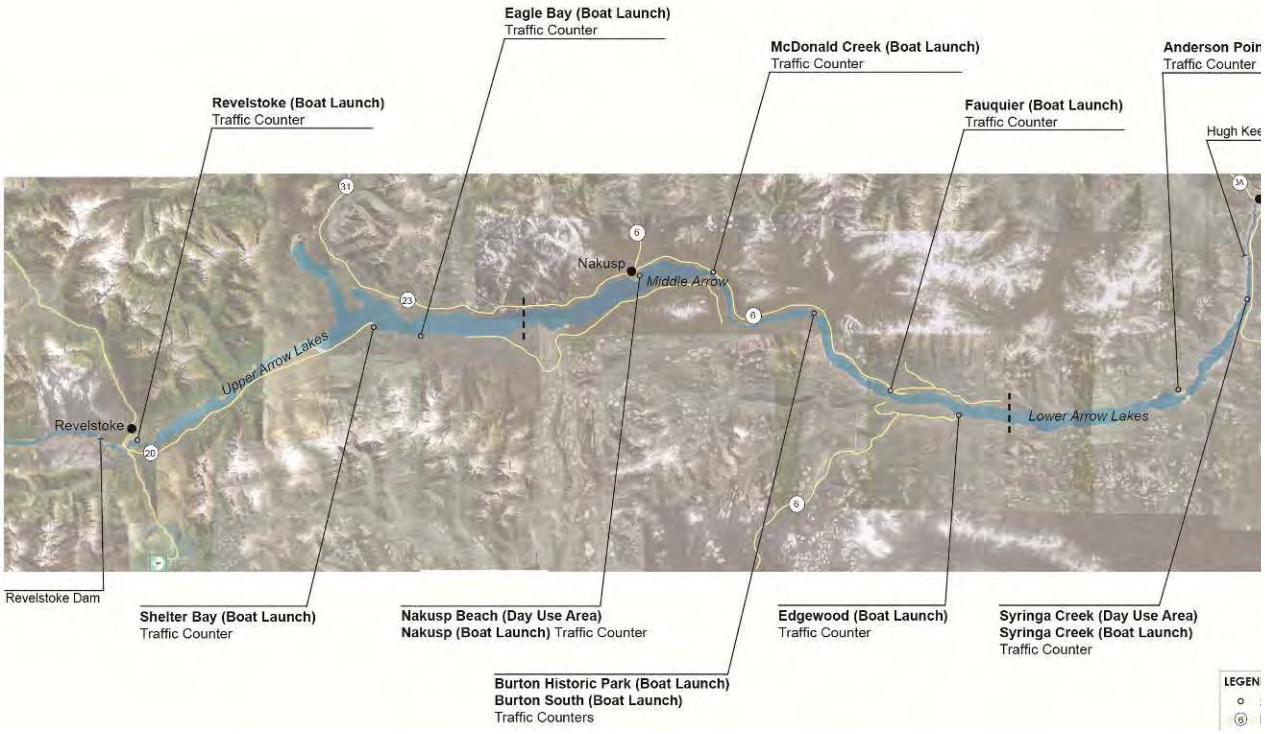


Figure 18. Sampling locations map

Table 14. Local conditions affecting recreational traffic counts.

Sampling location	Description of local conditions affecting usage
Anderson Point	
	Anderson Point is currently very roughly developed and primarily serves Renata's permanent and summer residents as a commuter access point. The traffic count numbers at this site have been reported only using two counts per launch as most people using the boat launch walk to and from their parked vehicle where the parking lot sits above the traffic counter. The majority of users are only counted when they bring a loaded vehicle down to their boat to transfer supplies.
Burton Historic Park	
	As there is significant camping activity in the campground associated with the Historic Park boat launch, it will continue to service the community and campers during the summer higher water periods. Construction of the new boat launch south of town did not affect recreational access to the Historic Park launch. However, people will likely use the new ramp south of town use when water levels are low.

Table 14 (cont'd). Local conditions affecting recreational traffic counts.

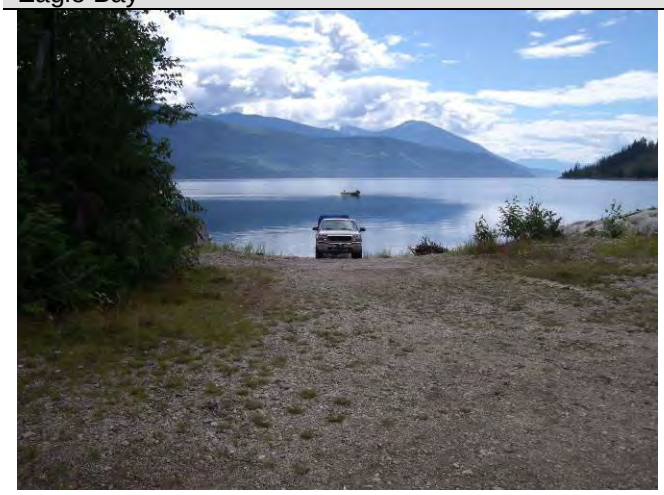
Sampling location	Description of local conditions affecting usage
Burton South	
	In August 2011, BC Hydro substantially finished construction of a new boat launch and facilities about 4 km south of the community that will ensure boater access at both higher and lower water levels. It still needs to have the launch extended at low water in spring 2012.
Eagle Bay	
	Eagle Bay is the only traffic counter in this study located at a boat ramp in a Ministry of Tourism campground (formerly a Forest Service campground). The Eagle Bay site is located 13 km along a logging road from Shelter Bay and 65 km from Revelstoke. Due to the remote location, all boat ramp use here is associated with campers or picknickers at the campground. Most people would not travel there to just put their boat in the water.

Table 14 (cont'd). Local conditions affecting recreational traffic counts.

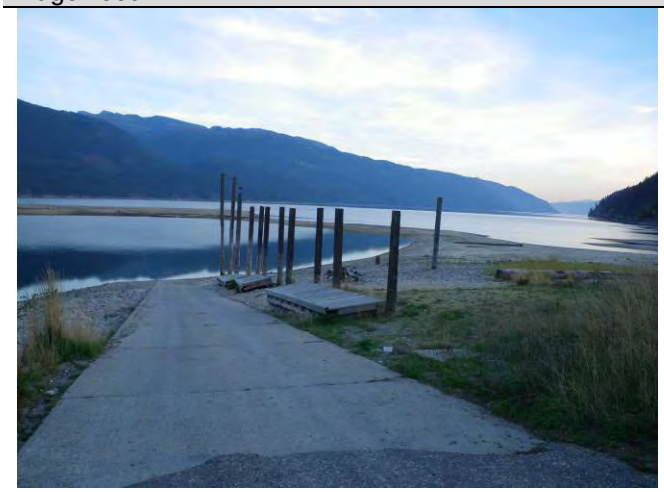
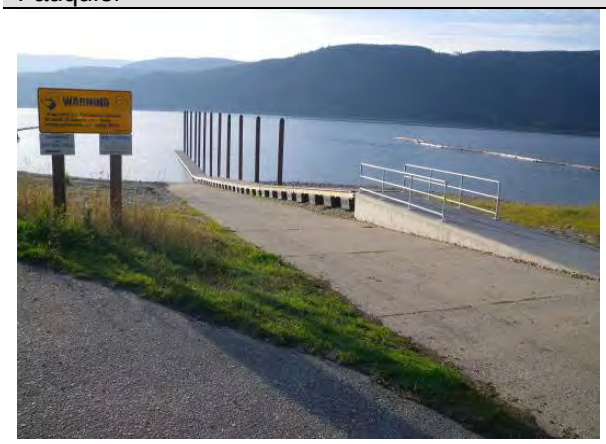
Sampling location	Description of local conditions affecting usage
Edgewood	
	When the water is low residents use the sandbar as a launch, thus traffic counts are not recorded, because access to the sand bar is not captured by the traffic counter.
Fauquier	
	Fauquier boat launch had the least recorded use this season of any boat launch being studied on the Arrow Lakes. It had a marked decrease in recorded use from last year, which may be attibutable to the very cold, wet summer months this year. The months of June, July and August, 2011 were 1ºC cooler and 71mm wetter than the previous year (Environment Canada 2012). Due to the low vehicles counts, the Fauquier counter was checked and tested to ensure that it was operating properly and all was found in good order. The site will be monitored closely in future years to better determine the cause (or causes) for the drop in usage.

Table 14 (cont'd). Local conditions affecting recreational traffic counts.

Sampling location	Description of local conditions affecting usage
McDonald Creek	
	McDonald Creek boat launch was operational this year, after major construction upgrades during June and July last year which restricted the public's ability to use the launch. Park activity in general may have been down this year due to the the very cold, wet summer months.
Nakusp	
	Nakusp was the second-most-often used launch on the Arrow Lakes. There is a marina attached to the launch so many repeat boat users do not use the launch each time they go out on the lake. However, the marina lacks a refueling facility at the waters edge so many boats are taken out of the water to refuel. This would offset some of the lost counts due to the 'passive' boat use at the marina. Nakusp boat launch consistently receives the greatest use during the six off season months (October to April).

Table 14 (cont'd). Local conditions affecting recreational traffic counts.

Sampling location	Description of local conditions affecting usage
Revelstoke	
	Revelstoke boat launch is located in town and provides a year-round natural area access away from the hustle and bustle of downtown. The launch is limited in its designed use to relatively high water levels but additional recreational activities occur no matter what the water level, such as workers or students parking on the ramp to eat their lunch or 'take a break' from school, and people fishing from their vehicle on the ramp). Thus many of the traffic counts recorded are not for launching boats.
Shelter Bay	
	Shelter Bay is located in a park campground next to the ferry terminal so the park receives significant pass through activity by sightseers, dog walkers and passengers waiting for ferries. According to field staff observations while conducting surveys, this boat ramp is the main access point used by Revelstoke residents when the water begins to drop.
Syringa Creek	
	Syringa Creek is the closest public boat launch to the resident population of Castlegar, the community that most survey respondents (14%) reported living in (Question 7). Thus it is the most highly used boat ramp on the lake. There are also two private marinas just south of this ramp, one with its own launch, so a significant amount of additional boating activities would take place but not be accounted for with this study.

Other – there are numerous other 'intermittent' private or unmanaged launch areas that are used in various locations and at different water levels around the Arrow Lakes that also add to the total boating use on the lake.

Many of the boat launches in this study are located in or next to parks, day use areas or campgrounds, thus there are significant shore-based recreation activities on the lake that are not accounted for in the traffic counts of this study. These activities are captured in the observational data collected by field staff, and in the responses to the public survey portion of study.

4.2 Survey Results

A total of 3,997 visitors were encountered at sample sites on the Arrow Lakes between April 9 and October 19, 2011. Field staff asked 836 visitors to participate in the survey; 631 completed questionnaires were returned, which represents an overall response rate of 83.9% (Table 15). The frequencies of completed questionnaires by season are illustrated in Appendix D – Completed Questionnaires by Sample Date. The frequencies of completed returns by sample site are illustrated in Figure 19. Visitors completed 26 web-based surveys.

Table 15. Arrow Lakes visitor encounters and survey response rates.

Season	# Visitors Encountered	# Visitors Asked to Participate	# Previously Completed†	# Completed Questionnaires‡	Response Rate
Spring	404	116	5	98	88.3%
Summer	3360	649	64	486	83.1%
Fall	233	71	15	47	83.9%
TOTAL	**3997**	**836**	**84**	**631**	**83.9%**

† People who have previously completed the survey in this sampling year.
‡ A total of 638 questionnaires were returned; however, only 631 were completed.

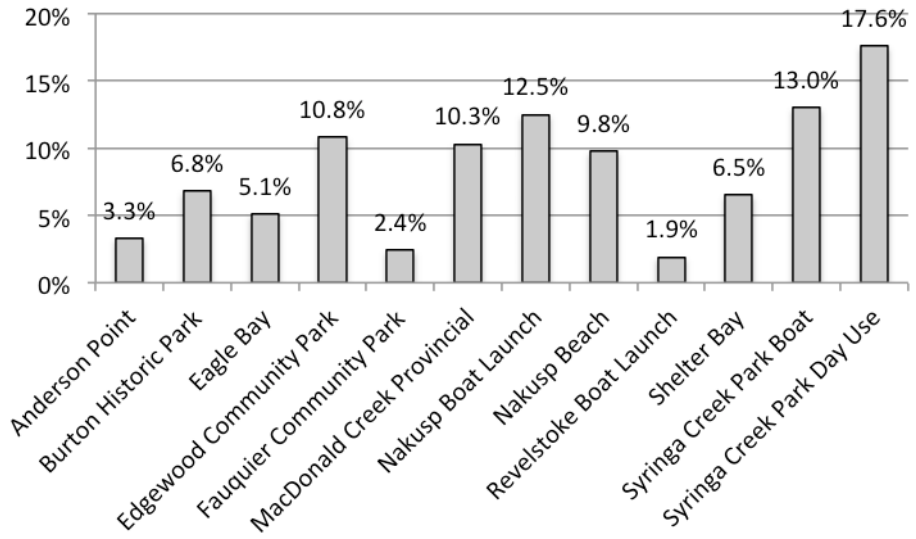


Figure 19. Completed questionnaires by sample location (n = 631).

4.3 Question 1: Arrow Lakes Outdoor Recreation Activities

Respondents participated in a total of 24 individual outdoor recreation activities (Table 16; Table 17); respondents could identify more than one activity. The five most frequently identified activities by on-site respondents (n = 631) were: swimming (78.4%), camping (73.1%), beach activities (71.6%), walking/hiking (71.3%) and fishing (67.4%). The five most frequently identified activities by web respondents (n = 26) were: swimming (80.8%), fishing (76.9%), walking/hiking (76.9%), beach activities (65.4%), and boating (motor cruising) (57.7%). Other activities identified by respondents are identified in Tables 18 and 19. Space was provided for people to elaborate on activities done on the water or onshore of the Arrow Lakes; 280 additional comments describing respondents' recreation experiences (elaborations presented in Appendix C – Table 49).

Table 16. On-site responses: Indicate all of the activities that you do on the water or onshore of the Arrow Lakes.

Activities	Frequency	%
Swimming	495	78.4%
Camping	461	73.1%
Beach activities	452	71.6%
Walking/hiking	450	71.3%
Fishing	425	67.4%
Scenic viewing	404	64.0%
Picnicking	360	57.1%
Boating (motor cruising)	341	54.0%
Wildlife viewing	277	43.9%
Bird watching	210	33.3%
Canoeing/kayaking	180	28.5%
Nature study	148	23.5%
Berry picking	145	23.0%
ATV/Trail bike/4 x 4	130	20.6%
Drawing/painting/photography	119	18.9%
Mountain biking	118	18.7%
Waterskiing	104	16.5%
Mushroom picking	98	15.5%
Hunting	66	10.5%
Snowmobiling	49	7.8%
Other	46	7.3%
Cross-country skiing	43	6.8%
Horseback riding	17	2.7%
Wind surfing	7	1.1%

Table 17. Web responses: Indicate all of the activities that you do on the water or onshore of the Arrow Lakes.

Activities	Frequency	%
Swimming	21	80.8%
Fishing	20	76.9%
Walking/hiking	20	76.9%
Beach activities	17	65.4%
Boating (motor cruising)	15	57.7%
Scenic viewing	15	57.7%
Picnicking	15	57.7%
Bird watching	14	53.8%
Camping	14	53.8%
Wildlife viewing	13	50.0%
Nature study	11	42.3%
Mountain biking	11	42.3%
Canoeing/kayaking	10	38.5%
Drawing/painting/photography	9	34.6%
Berry picking	8	30.8%
Mushroom picking	6	23.1%
ATV/Trail bike/4 x 4	6	23.1%
Waterskiing	4	15.4%
Hunting	3	11.5%
Cross-country skiing	3	11.5%
Other	3	11.5%
Snowmobiling	2	7.7%
Wind surfing	1	3.8%

Table 18. On-site responses: Other activities identified by respondents.

Other Activity	Frequency	%
Golf	3	7.9%
Relax	3	7.9%
Snow shoeing	3	7.9%
Hot springs	2	5.3%
Rock throwing with kids, stick for dog	2	5.3%
Sailing	2	5.3%
Tubing	2	5.3%
Biking	1	2.6%
Clean up garbage	1	2.6%
Climbing	1	2.6%
Collect firewood	1	2.6%
Dog swimming	1	2.6%
Dog walk	1	2.6%
Green relaxation for health	1	2.6%
Growing	1	2.6%
Just to read	1	2.6%
Log rodeo	1	2.6%
Loving the lake	1	2.6%
Motorcycle ride on roads	1	2.6%
Photography	1	2.6%
Rock collecting	1	2.6%
Skiing	1	2.6%
Snowboarding	1	2.6%
Socializing	1	2.6%
Star gazing/astronomy	1	2.6%
Using the quiet	1	2.6%
Wakeboarding	1	2.6%
Weight lifting	1	2.6%

Table 19. Web responses: Other activities identified by respondents.

Other Activity	Frequency	%
Dog walking	1	20.0%
Live on the lake	1	20.0%
Rain bathing	1	20.0%
Sailing	1	20.0%
Snow shoeing	1	20.0%

Respondents reported visiting the Arrow lakes in all four seasons (Table 20). Annual visits by on-site respondents averaged 124.0 ±9.8 days (mean ± 95% CI) per year; annual visits by web respondents averaged 206.77 ±39.55 days per year. The mean number of annual visits reported by web respondents appears to be large due to the low number of overall web respondents (26).

Table 20. On average, how many days per month do you visit the Arrow Lakes in each season? (Web responses shaded)

Season	n	Minimum	Maximum	Mean	95% CI	SD
Spring	631	0	30	9.4	± 0.9	11.378
	26	2	30	17.0	± 3.8	9.833
Summer	631	0	30	15.8	± 0.9	11.149
	26	4	30	23.5	± 2.9	7.453
Fall	631	0	30	9.3	± 0.9	11.281
	26	2	30	18.3	± 4.0	10.314
Winter	631	0	30	6.8	± 0.9	11.399
	26	0	30	10.2	± 4.3	11.059
Annual	631	0	360	124.0	± 9.8	125.182
	26	30	360	206.8	± 39.5	102.889

Respondents participated in a total of 20 different types of outdoor recreation activities on the day that they completed their questionnaire (Tables 21 and 22). Fishing was the most frequently identified activity by on-site respondents (27.9%); walking/hiking was the most frequently identified activity of web respondents (36.7%).

Table 21. What recreation activities did you do today on the water or onshore of the Arrow Lakes? (n = 631[†]).

Today's Recreation Activities	Frequency	%
Fishing	176	27.9%
Swimming	147	23.3%
Walking/hiking	140	22.2%
Boating (motor cruising)	112	17.7%
Beach activities	104	16.5%
Camping	94	14.9%
Scenic viewing	81	12.8%
Picnicking	74	11.7%
Other	27	4.3%
Canoeing/kayaking	24	3.8%
Drawing/painting/photography	20	3.2%
Mountain biking	20	3.2%
Bird watching	19	3.0%
Wildlife watching	18	2.9%
Nature study	13	2.1%
ATV/Trail bike/ 4 x 4	11	1.7%
Waterskiing	10	1.6%
Berry picking	4	0.6%
Dog walking	4	0.6%
Mushroom picking	2	0.3%

[†] Respondents typically identified more than one activity.

Table 22. What recreation activities did you do today on the water or onshore of the Arrow Lakes? (n = 17[†])

Today's Recreation Activities	Frequency	%
Walking/hiking	11	36.7%
Scenic viewing	4	13.3%
Fishing	3	10.0%
Beach activities	2	6.7%
Mountain biking	2	6.7%
Wildlife watching	2	6.7%
Bird watching	1	3.3%
Boating (motor cruising)	1	3.3%
Camping	1	3.3%
Drawing/painting/photography	1	3.3%
Other	1	3.3%
Swimming	1	3.3%

[†] Respondents typically identified more than one activity.

The majority of on-site respondents reported that they were not paying customers of a commercial recreation or tourism operator/guide (Figure 20); web-based respondents did not answer this question.

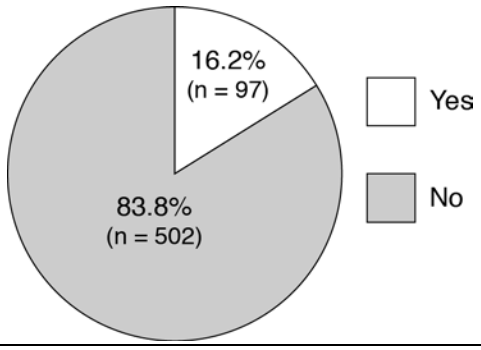


Figure 20. Are you participating in this activity today as a paying customer of a commercial recreation or tourism operator/guide? (On-site respondents only; n = 599)

Most on-site respondents indicated that instead of being paying customers of a commercial recreation or tourism operator/guide, they were camping or local residents (Table 23).

Table 23. Elaboration: Are you participating in this activity today as a paying customer of a commercial recreation or tourism operator/guide? (On-site respondents only; n = 112)

Comment	Frequency	%
Other†	42	37.5%
Camping	41	36.6%
Local resident	19	17.0%
Paying customer	8	7.1%
No fees paid	2	1.8%
Working	0	0.0%

† Denotes comments that do not address the question.

4.4 Question 2: Important Outdoor Recreation Activities

Respondents identified a total of 23 outdoor recreation activities that they considered to be most important (Tables 24 and 25). Of the 627 on-site respondents that provided responses, fishing was identified most frequently (27.2%), followed by camping (16.9%) and swimming (14.5%). Of the 26 web respondents that provide responses, fishing was identified most frequently (34.5%), followed by boating (24.1%) and camping (10.3%).

Table 24. On-site responses: Of all of the activities that you do on the water or onshore of the Arrow Lakes, which one is the most important[†]? (n = 631).

Activity	Frequency	%
Fishing	187	29.6%
Camping	121	19.2%
Swimming	105	16.6%
Boating (motor cruising)	92	14.6%
Walking/hiking	50	7.9%
Beach activities	36	5.7%
Canoeing/kayaking	33	5.2%
Other	22	3.5%
Scenic viewing	15	2.4%
Picnicking	7	1.1%
ATV/Trail bike/ 4 x 4	6	1.0%
Drawing/painting/photography	4	0.6%
Mountain biking	4	0.6%
Bird watching	3	0.5%
Hunting	3	0.5%
Wildlife watching	3	0.5%
Cross-country skiing	2	0.3%
Dog walking	2	0.3%
Waterskiing	2	0.3%
Nature study	2	0.3%
Snowmobiling	2	0.3%
Horseback riding	1	0.2%
Mushroom picking	1	0.2%
Wildlife watching	1	0.2%

[†] Some respondents identified more than one activity.

Table 25. Web responses: Of all of the activities that you do on the water or onshore of the Arrow Lakes, which one is the most important[†]? (n = 26)

Activity	Frequency	%
Fishing	10	34.5%
Boating (motor cruising)	7	24.1%
Camping	3	10.3%
Walking/hiking	3	10.3%
Scenic viewing	2	6.9%
Swimming	2	6.9%
Nature study	1	3.4%
Wildlife watching	1	3.4%

[†] Some respondents identified more than one activity.

On-site respondents reported that they had participated in their most important activity for an average of 20.3 ±1.3 years; web respondents reported that they had participated in their most important activity for an average of 28.3 ±5.6 years (Table 26).

Table 26. How many years have you done this activity? (Web responses shaded)

n	Minimum	Maximum	Mean	95% CI	SD
584	0	70	22.5	± 1.3	16.219
26	4	50	28.3	± 5.6	14.504

Respondents indicated that they were generally skilled at the activity that was most important to them (Table 27).

Table 27. On a scale of 1 to 5, with 1 being beginner and 5 being expert, how skilled are you at this activity? (Web responses shaded)

n	Minimum	Maximum	Mean	95% CI	SD
584	1	5	3.91	± 0.08	0.966
26	3	5	4.19	± 0.22	0.567

Respondents indicated that the activity that was most important to them was also important to their lifestyle (Table 28).

Table 28. On a scale of 1 to 5, with 1 being not important at all and 5 being very important, how important is this activity to your lifestyle? (Web responses shaded)

n	Minimum	Maximum	Mean	95% CI	SD
652	1	5	4.31	± 0.07	0.897
26	3	5	4.65	± 0.24	0.629

Family and friends were the most frequently identified people that both on-site and web respondents participated in their most important outdoor recreation activity with (Table 29). The 141 on-site respondents that selected indicated different combinations of people (or different companions) (Table 30); the combination of “friends & family” was identified most frequently.

Table 29. Who do you usually do this recreation activity with? (Web responses shaded)

Response	Frequency	%
Alone	25	4.1%
	1	3.8%
Family	314	51.3%
	15	57.7%
Friends	130	21.2%
	9	34.6%
Clubs	2	0.3%
	1	3.8%
People from Work	–	–
	–	–
Other	141	23.0%
	–	–

Table 30. Onsite: Who do you usually do this recreation activity with (other)?[†]

Activity	Frequency	%
Family & friends	127	90.1%
Family, friends & dogs	2	1.4%
Spouse	2	1.4%
All of the above	2	1.1%
Dog	2	1.1%
Anyone	1	0.7%
Family & dog	1	0.7%
Family, friends & clubs	1	0.7%
Friends & colleagues	1	0.7%
Girlfriend	1	0.7%
Partner	1	0.7%

[†] Web respondents did not indicate an "other" response.

Respondents reported participating in their most important outdoor recreation activity in all four seasons (Table 31).

Table 31. On average, how many days per month do you visit the Arrow Lakes in each season? (Web responses shaded)

Season	n	Minimum	Maximum	Mean	95% CI	SD
Spring	631	0	30	9.69	± 0.86	11.003
	26	0	30	14.73	± 4.71	12.256
Summer[†]	631	0	30	18.19	± 0.82	10.459
	26	4	30	21.00	± 3.43	8.931
Fall	631	0	30	9.51	± 0.86	11.015
	26	0	30	14.48	± 4.69	12.200
Winter	631	0	30	6.45	± 0.87	11.204
	26	0	30	7.42	± 4.23	10.995
Annual	631	0	360	124.00	± 9.77	125.182
	26	30	360	206.77	± 39.55	102.889

4.5 Question 3: Arrow Lake Outdoor Recreation Experiences

On-site respondents indicated that an average of 4.46 ±0.95 encounters with other people was acceptable while visiting the Arrow Lakes, while web respondents indicated that their encounter threshold was 3.04 ±2.15 (Table 32). In terms of respondents who indicated no crowding threshold, 382 on-site respondents (60.5%) reported that it did not matter how many people that they saw while visiting the Arrow Lakes; 16 (61.5%) web respondents reported that it did not matter how many people that they saw while visiting the Arrow Lakes.

Table 32. Consider how many people you are comfortable seeing while you are visiting the Arrow Lakes and complete the following statement: "It is OK to have as many as _____ encounters per day". (Web responses shaded)

n	Minimum	Maximum	Mean	95% CI	SD
628	0	100	4.46	± 0.95	12.141
26	0	20	3.04	± 2.15	5.589

Respondents indicated that they generally felt somewhat crowded while visiting the Arrow Lakes (Table 33). Crowding was experienced most frequently in the summer months and least frequently in the winter months.

Table 33. For each season below, indicate on a scale of 1 - 9 how crowded you have felt while visiting the Arrow Lakes. (Web responses shaded)

Season	n	Minimum	Maximum	Mean	95% CI	SD
Spring	492	1	9	1.95	± 0.12	1.312
	26	1	9	2.26	± 0.81	2.159
Summer	569	1	9	3.75	± 0.19	2.262
	26	1	9	3.56	± 0.83	2.190
Fall	474	1	9	2.08	± 0.12	1.351
	26	1	6	2.04	± 0.52	1.372
Winter	400	1	9	1.43	± 0.10	0.999
	26	1	2	1.11	± 0.12	0.320

Fewer than one of five on-site respondents (13.6%; n = 604) reported that they had experienced conflicts with other people or recreation activities while they were visiting the Arrow Lakes. Web respondents reported more conflicts (42.3%; n = 26) with other people or recreation activities while they were visiting the Arrow Lakes. Space was provided for people to elaborate on whether or not they had experienced conflicts while visiting the Arrow Lakes; 145 respondents elaborated on the conflicts that they had experienced, which generally dealt with issues of respect (Appendix C – Table 50). Grouping of responses will be done at end of data collection (Year 5) as relevant categories could change over the years.

4.6 Question 4: Use and Familiarity of Arrow Lakes

Of the twelve motivation items presented to respondents for visiting the Arrow Lakes, viewing scenery was identified most often by both on-site and web respondents (Table 34).

Table 34. From the list below, indicate why you come to the Arrow Lakes. (Web responses shaded)

Motivation	n	%
To view scenery.	631	74.6%
	26	84.6%
To be with family.	631	69.1%
	26	84.6%
To give my mind a rest.	631	65.5%
	26	80.8%
To be close to nature.	631	64.5%
	26	76.6%
To be with friends.	631	57.2%
	26	69.2%
To have a change from my daily routine.	631	56.7%
	26	57.7%
To get exercise.	631	51.8%
	26	65.4%
To discover new things.	631	36.9%
	26	42.3%
To learn about nature.	631	29.0%
	26	53.8%

Table 34 (cont'd). From the list below, indicate why you come to the Arrow Lakes. (Web responses shaded)

To think about my personal values.	631	28.2%
	26	50.0%
Other.	631	17.1%
	26	15.4%
To learn about reservoirs.	631	5.4%
	26	3.8%

Of the six management goals that respondents ranked in terms of importance (Table 35) among on-site respondents, providing habitat for aquatic species received the most first rankings (44.3%), followed by providing recreation opportunities (42.2%), safety for reservoir users (34.6%), flood control (31.5%), providing local employment (29.3%), and electricity generation (27.6%). Among Web respondents, providing recreation opportunities (45.5%) received the most first rankings, followed by providing habitat for aquatic species (36.8%), safety for reservoir users (30.0%), electricity generation (29.4%), and flood control (23.1%); no web respondents selected providing local employment as a first rank.

Table 35. The Arrow Lakes serve many purposes. In your opinion, what are the 3 most important management goals for the Arrow Lakes? (Web responses shaded)

Management Goal	Rank[†]		
	1	2	3
Provide local employment	29.3%	34.1%	28.8%
	–	12.5%	50.0%
Safety for reservoir users	34.6%	30.3%	28.4%
	30.0%	40.0%	10.0%
Provide recreation opportunities	42.2%	29.0%	27.2%
	45.5%	22.7%	27.3%
Flood control	31.5%	34.9%	29.0%
	23.1%	38.5%	38.5%
Electricity generation	27.6%	33.9%	33.9%
	29.4%	41.2%	23.5%
Provide habitat for aquatic species	44.3%	27.0%	26.8%
	36.8%	36.8%	21.1%
Other	63.6%	18.2%	18.2%
	100.0%	–	–

[†] Ranks may not add up to 100% as some respondents indicated ranks greater than three.

4.7 Question 5: Arrow Lakes Outdoor Recreation Management

On average, respondents indicated that they were satisfied with the management of the five management tasks that were presented to them (Table 36). Respondents were most satisfied with their experiences on the water or onshore of the Arrow Lakes, and least satisfied with the management of the Arrow Lakes.

Table 36. The management of the Arrow Lakes seeks to balance many tasks. Please indicate your satisfaction with management activities. (Web responses shaded)

Management Activity	n	Minimum	Maximum	Mean	95% CI	SD
On the whole, are you satisfied with water levels on the Arrow Lakes?[†]	599	1	9	4.25	± 0.16	2.057
	26	2	5	3.19	± 0.29	0.749
On the whole, do you have satisfying experiences on the water or onshore of the Arrow Lakes?	598	1	9	4.49	± 0.07	0.931
	26	3	5	4.27	± 0.21	0.533
On the whole, are you satisfied with the conditions of the boat ramps on the Arrow Lakes?	587	1	9	4.95	± 0.22	2.739
	26	1	9	3.31	± 0.94	2.446
On the whole, are you satisfied with the parking lot conditions when you visit the Arrow Lakes?	598	1	9	4.39	± 0.12	1.514
	26	1	9	3.42	± 0.63	1.629
On the whole, are you satisfied with the management of the Arrow Lakes?[‡]	595	1	9	4.49	± 0.16	2.022
	26	1	9	2.92	± 0.56	1.468

The majority of on-site and web respondents indicated that they would continue to return to the Arrow Lakes if water levels were the same or higher than those that they experienced on the day that they completed their questionnaire (Table 37). Two hundred nineteen on-site respondents and 14 web respondents elaborated on their answers regarding water levels (Appendix C, Table 51),

Table 37. Compared to the water levels that you experienced today, how might different water levels affect your use of the Arrow Lakes for recreation activities? (Web responses shaded)

	n	I will come back	I will go somewhere else	Not sure
If the water level is the same as today...	632	87.8%	3.2%	9.0%
	27	59.3%	11.1%	29.6%
If the water level is higher than today...	620	75.0%	12.7%	12.3%
	27	66.7%	11.1%	22.2%
If the Water level is lower than today...	622	72.8%	11.6%	15.6%
	27	59.3%	18.5%	22.2%

Question 6: Arrow Lakes Outdoor Recreation Experiences.

On average, on-site respondents indicated that they had pursued their outdoor recreation activities on the Arrow Lakes for more than 17 years; web respondents indicated that they had pursued their outdoor recreation activities on the Arrow Lakes for more than 26 years (Table 39; elaborations presented in Appendix C, Table 52).

Table 38. How long have you been coming to the Arrow Lakes for recreation activities (years)? (Web responses shaded)

n	Minimum	Maximum	Mean	95% CI	SD
585	0	79	17.6	± 1.2	14.877
26	5	56	26.6	± 5.7	14.808

More than nine of ten on-site and web respondents reported that they would return to the Arrow Lakes for recreation activities based on their experience the day that they completed a questionnaire (Figure 21).

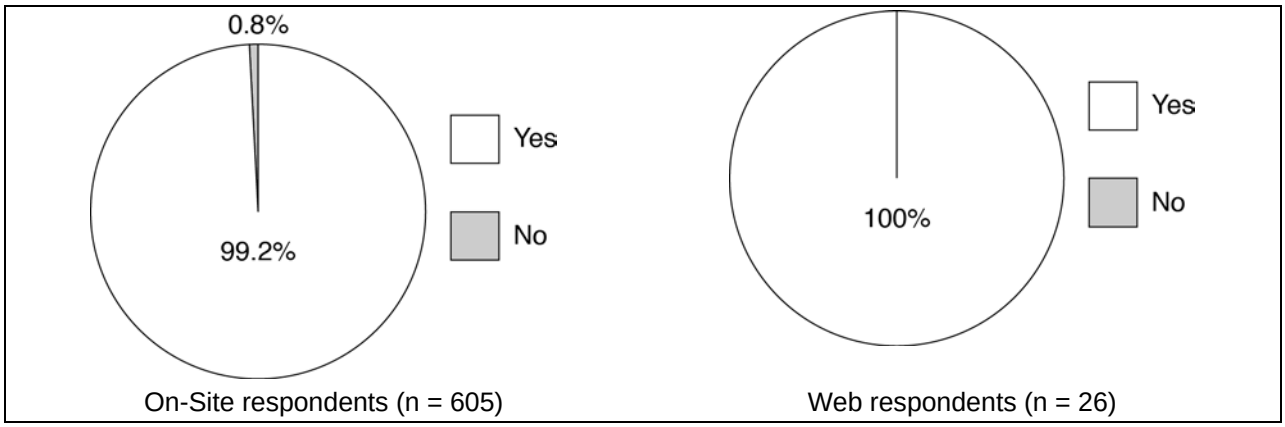


Figure 21. Based on your experience today, will you come back to the Arrow Lakes for recreation activities?

Respondents indicated that they usually use all of the available boat ramps on the Arrow Lakes (Table 40). Shelter Bay and Nakusp Boat Launches received the highest reported use.

Table 39. Which boat ramp facility do you usually use on the Arrow Lakes? (Web responses shaded; On-site n = 488; Web n = 23)

Boat Launch	Frequency	%
Anderson Point	11	2.3%
	1	4.3%
Burton Historic Park	16	3.3%
	–	–
Eagle Bay	11	2.3%
	–	–
Edgewood Community Park	43	8.8%
	1	4.3%
Fauquier Community Park Boat Launch	10	2.0%
	1	4.3%
Galena Bay	–	–
	1	4.3%
MacDonald Creek Provincial Park	16	3.3%
	–	–
Nakusp Boat Launch	61	12.5%
	2	8.7%
Revelstoke Boat Launch	2	0.4%
	2	8.7%
Shelter Bay	88	18.0%
	6	26.1%
Syringa Creek Park Boat Launch	15	3.1%
	–	–
Above Revelstoke Dam	2	0.4%
	–	–
Arrow Park Ferry	2	0.4%
	–	–
Centennial Park	3	0.6%
	–	–
Renata	2	0.4%
	–	–
Scotties Marina	4	0.8%
	–	–
Don’t use boat ramps	22	4.5%
	1	4.3%
Multiple sites	180	36.9%
	8	34.8%

Respondents indicated 34 different motivations for using the boat ramp facility that they did on the day that they were surveyed (Table 41). Proximity and convenience to other recreation facilities was the most common motivation indicated.

Table 40. Why did you come to this boat ramp facility today? (Web responses shaded; On-site n = 373; Web n = 22)

Reason	Frequency	%
Previous enjoyable experience	5	1.3%
	–	–
Convenient	23	6.2%
	2	9.1%
Close to home (local)	27	7.2%
	3	13.6%
Cost (free)/Public launch	3	0.8%
	–	–
Not crowded	5	1.3%
	–	–
Preferred one	6	1.6%
	–	–
Best one	3	0.8%
	–	–
Only one	18	4.8%
	1	4.5%
Close to camping	45	12.1%
	–	–
Keep boat here	3	0.8%
	–	–
Closest to where I want to go	2	0.5%
	–	–
Only one with appropriate facilities	6	1.6%
	–	–
Scenery	12	3.2%
	1	4.5%
Close to swimming	3	0.8%
	–	–
Close to beach	3	0.8%
	–	–
To launch boat/take boat out of water	23	6.2%
	–	–

Table 41 (cont'd). Why did you come to this boat ramp facility today? (Web responses shaded; On-site n = 373; Web n = 22)

Water levels	4	1.1%
	–	–
Access to Renata	8	2.1%
	1	4.5%
Closest to other recreation activities	49	13.1%
	–	–
Didn't use ramp today	12	3.2%
	6	27.3%
To fish	38	10.2%
	4	18.2%
Other	66	17.7%
	3	13.6%
Multiple	9	2.4%
	1	4.5%

Respondents indicated 22 elements that they liked most about the boat ramp facility that they visited on the day that they were surveyed (Table 42). Not crowded was the most frequently identified element.

Table 41. What did you like most about the boat ramp facility that you visited today? (Web responses shaded; On-site n = 326; Web n = 22)

Most Liked Element	Frequency	%
Access	26	8.0%
	1	4.5%
Close to home	8	2.5%
	2	9.1%
Concrete ramp/dock	14	4.3%
	1	4.5%
Amenities (toilets, garbage containers, *etc*.)	2	0.6%
	–	–
Didn't use today	6	1.8%
	1	4.5%
Clean/well maintained	17	5.2%
	–	–
Paved parking lot	4	1.2%
	1	4.5%
Convenient	9	2.8%
	–	–

Table 42 (cont'd). What did you like most about the boat ramp facility that you visited today? (Web responses shaded; On-site n = 326; Web n = 22)

Close to campsite	3	0.9%
	–	–
Not crowded	28	8.6%
	3	13.6%
Close to Renata	1	0.3%
	–	–
Water levels	12	3.7%
	–	–
Dock	8	2.5%
	–	–
Wide ramp	2	0.6%
	–	–
Easy to use	11	3.4%
	–	–
Lots of space	1	0.3%
	–	–
Upgrade/well constructed	21	6.4%
	1	4.5%
Cost (free)	1	0.3%
	–	–
No problems/General positive comment	29	8.9%
	5	22.7%
Do not like/negative comment	28	8.6%
	1	4.5%
Other	69	21.2%
	6	27.3%
Multiple	26	8.0%
	–	–

Respondents identified 26 elements that they liked least about the boat ramp facility that they visited on the day that they were surveyed (Table 43). Problems with dock/dock ramp was identified most frequently.

Table 42. What did you like least about the boat ramp facility that you visited today? (Web responses shaded; On-site n = 236; Web n = 22)

Least Liked Element	Frequency	%
Problems with dock/dock ramp	17	7.2%
	3	13.6%
Problems with breakwater	7	3.0%
	1	4.5%
Rough road	1	0.4%
	–	–
Washrooms needed	3	1.3%
	–	–
Too narrow/not wide enough	4	1.7%
	–	–
Not safe	5	2.1%
	1	4.5%
Ramp angle too steep	3	1.3%
	1	4.5%
Problems with parking lot	1	0.4%
	1	4.5%
Too crowded	17	7.2%
	–	–
Rough launch	1	0.4%
	–	–
Improvements needed for all components	16	6.8%
	3	13.6%
Ramp not long enough	8	3.4%
	–	–
Water levels	15	6.4%
	–	–
More parking needed	5	2.1%
	1	4.5%
Not enough room to turn around/load/unload	3	1.3%
	–	–
Debris	6	2.5%
	–	–
Docks too far from shore	1	0.4%
	–	–
Not well maintained/not clean	15	6.4%
	4	18.2%

Table 43 (cont'd). What did you like least about the boat ramp facility that you visited today? (Web responses shaded; On-site n = 236; Web n = 22)

No boat tie-ups	2	0.8%
	–	–
No problems/positive comment	40	16.9%
	1	4.5%
Did not use today	5	2.1%
	1	4.5%
Too sandy/muddy	–	–
	1	4.5%
Other	39	16.5%
	2	9.1%
Multiple	22	9.3%
	2	9.1%

Of the eleven possibilities presented to respondents about information sources they heard first for recreation opportunities near and on the Arrow Lakes, *friends* and *family* were identified most frequently (Table 44).

Table 43. How did you first hear about recreation opportunities near and on the Arrow Lakes? (Web responses shaded; On-site n = 631, Web n = 26)

Response	Frequency	%
Tourism information booth	21	3.3%
	1	3.8%
Family	256	40.6%
	10	38.5%
BC Hydro web site	2	0.3%
	–	–
Tourism information brochures	38	6.0%
	2	7.7%
Friends	331	52.2%
	11	42.3%
BC Hydro facility (*e.g.*, Revelstoke Dam)	3	0.5%
	–	–
Tourism operators	6	1.0%
	–	–

Table 44 (cont'd). How did you first hear about recreation opportunities near and on the Arrow Lakes? (Web responses shaded; On-site n = 631, Web n = 26)

BC Parks	96	15.2%
	4	15.4%
BC Hydro bill	–	–
	–	–
Private marinas	10	1.6%
	2	7.7%
BC Forest Service	30	4.8%
	2	7.7%
Other	155	24.6%
	4	15.3%

One-hundred sixty respondents indicated other ways that they first found information about recreation opportunities near and on the Arrow Lakes (Table 45). Most respondents cited that they know about the Arrow Lakes because they live nearby.

Table 44. How did you first hear about recreation opportunities near and on the Arrow Lakes: Other?

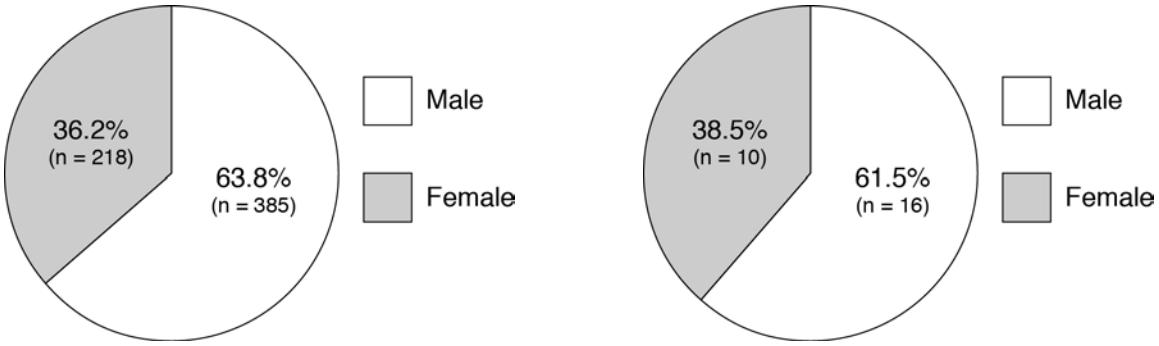
On-site Responses (n = 155)
A map.
Accidental discovery.
Accommodation hosts.
Always known.
Back road map books. [4 responses]
BC Hydro employee.
BC map book.
BC sites & trails website.
Been going all my life.
Been here previously.
Books on history of the area.
Born here. [4 responses]
Came to town one day!
Came with kids when small.
Canoe map.
Discovered it.
Driving by. [7 responses]
Explore. [3 responses]
Found it by accident.

Table 45 (cont'd). How did you first hear about recreation opportunities near and on the Arrow Lakes: Other?

On-site Responses (n = 155)
German travel book.
Grew up here. [8 responses]
Happened upon it touring.
Highway sign.
Horizon is unlimited.
Husband grew up here.
I come here a lot.
Internet. [8 responses]
Just stop.
Just traveling.
Just walking by. [2 responses]
Staff from Wood Fire Pizza.
Resident/live near by. [61 responses]
Local info posters.
Local map.
M/c rallies.
Maps.
Moved to area.
Nakusp Hot Springs.
Old.
Our own travels.
Parents lived in Revelstoke since 1959.
Relator. [2 responses]
Roadmap.
Survey rep.
Tourist guide.
Travelling through. [4 responses]
Used the overflow to [illegible].
Viewed from aircraft.
Visited the town.
We own property here.
Wondered through one day.
Word of mouth. [3 responses]
Work brought me to the area. [2 responses]
Web Responses (n = 5)
By accident just touring.
I live there. [2 responses]
The reservoir was built a [illegible].
Word of mouth.

Question 7: Demographics

On-site respondents ranged in age from 12 to 84; the average age of on-site questionnaire respondents was 53.4 ±1.5 years (n = 602; SD = 19.239) based on responses to Question 7 of the questionnaire. Web respondents ranged in age from 27 to 75; the average age of web respondents was 51.0 ±4.5 years (n = 26; SD = 11.803). Almost two-thirds of on-site respondents were male; while just more than 3 out of five web respondents were male (Figure 22).



On-site respondents (n = 604) Web respondents (n = 26)

Figure 22. What is your gender?

Respondents reported living in 135 different communities. The majority of respondents were local residents (57%) and BC Tourists (28%) (Table 46). Both on-site and web respondents had lived in their communities for an average of more than 20 years (Table 47).

Table 45. What community do you live in?

Community	Frequency	%
On-site (n = 599) BC Communities		
Local Resident (travelled < 80 km)	342	57%
BC Tourist (travelled > 80 km)	162	28%
Other Canadian Respondents	74	12%
International Respondents	16	3%
Web (n = 22) BC Communities		
Local Resident (travelled < 80 km)	18	82%
BC Tourist (travelled > 80 km)	4	18%

Table 46. How long have you lived in your community (years)? (Web responses shaded)

n	Minimum	Maximum	Mean	95% CI	SD
594	0	77	23.6	± 1.4	16.795
26	1	60	26.6	± 6.5	16.990

More than one-quarter of on-site respondents reported being members of outdoor recreation clubs or organizations; more than four web respondents out of five reported being members of outdoor recreation clubs or organizations (Figure 23).

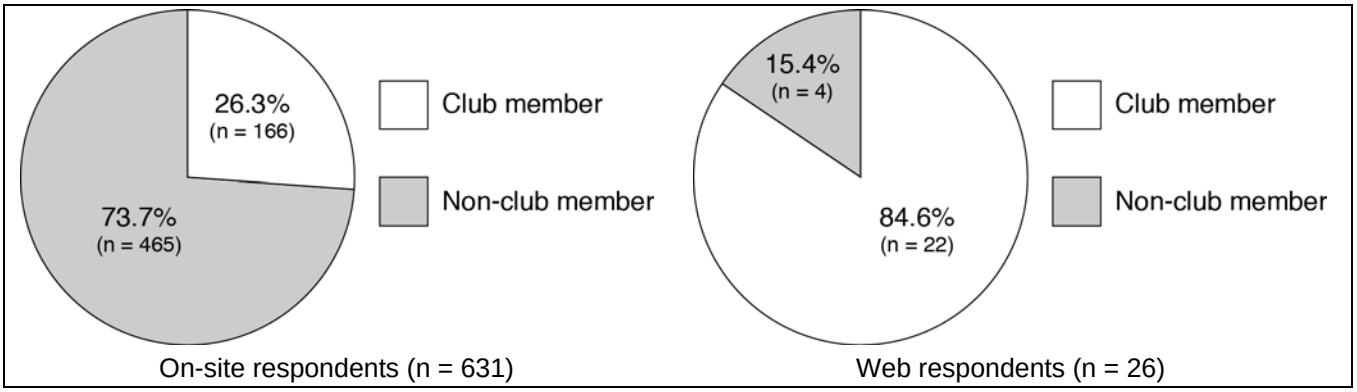


Figure 23. Based on your experience today, will you come back to the Arrow Lakes for recreation activities?

Respondents identified 60 outdoor recreation clubs or organizations that they belonged to (Table 48).

Table 47. Please list any outdoor recreation clubs or organizations that you belong to.

Response
On-site Respondents
1st Robson Beavers/Cubs/Scouts
ADAC
Alpine Club of Canada
Arrow Lakes Conservation Club
Arrow Lakes Yacht Club
ATV BC
BC Conservation Association
Backcountry Horseman
BC Wildlife Federation

Table 48 (cont'd). Please list any outdoor recreation clubs or organizations that you belong to.

Response
On-site Respondents
BMSA
Boundary Snowmobile Club
Bow Valley Kayaking Club
Boy Scouts
Burrard Yacht Club
CSA
Canadian Ski Instructor Association
Castlegar & Dist. Wildlife Association
Castlegar Fly Club
Castlegar Golf Club
Castlegar Nordic Ski Club
Castlegar Snowmobile Association
Castlegar Wildlife Assoc.
CFPTS
Dogwood Canoe Club
Ducks Unlimited
Edgewood Conservation Club
Fauquier Golf Course
Good Sam Club
Hog
Ininoaklin Recreation Commission
Kelowna ATV
Kelowna Canoe & Kayak Club
Kootenay Columbia Trail Society
Kootenay Lake Sailing Association
Launch Club
Lower Arrow Lakes Conservation Association
Nakusp Boat Launch
Nakusp Paddling Club
Nakusp Rod & Gun
Nakusp Trails
National Firearms Association
Nelson Cycling Club
Nelson Rod & Gun
Okanagan Kayak Club
Osprey Lake Snow Wheelers Snowmobile Club
Revelstoke Snowmobile Society
Revelstoke Archery Club
Revelstoke ATV

Table 48 (cont'd). Please list any outdoor recreation clubs or organizations that you belong to.

Response On-site Respondents
Revelstoke Rod & Gun Club
RLOP
RTGC
Selkirk Saddle Club
Slocan Valley Snowmobile Club
Trail Wildlife
Trails Marksmen
West Kootenay Archers
West Kootenay ATV
West Kootenay Big Game Assoc.
West Kootenay Sno-Goers
Wild BC

Response Web Respondents
ATV Club
BC Lake Stewardship Society
Fly Fishers, Rod @ Gun Club
NCES IGS Friends of MRG
Revelstoke ATV Club Revelstoke Fly Fishing Club
Revelstoke Nordic Ski Club
Revelstoke Rod & Gun Club Elks Loggers Sports
Rod and Gun Club
Search and Rescue, local kayak club

4.8 Independent observations

As enjoined in the Methods section, the surveyors collected observational data about the visitors that they encountered, and natural conditions. These observations consider information on natural conditions that can affect the level and nature of boat ramp usage, such as weather and reservoir conditions including waves, precipitation, wind, percent cloud cover, and air temperature. The observational data were assessed using standardized forms developed for this purpose (Appendix E). The data are summarized in Appendix F (Observational Data Summaries).

4.9 Reservoir levels

Average daily reservoir levels peaked in the summer months, with lowest water levels in the spring (Figure 24).

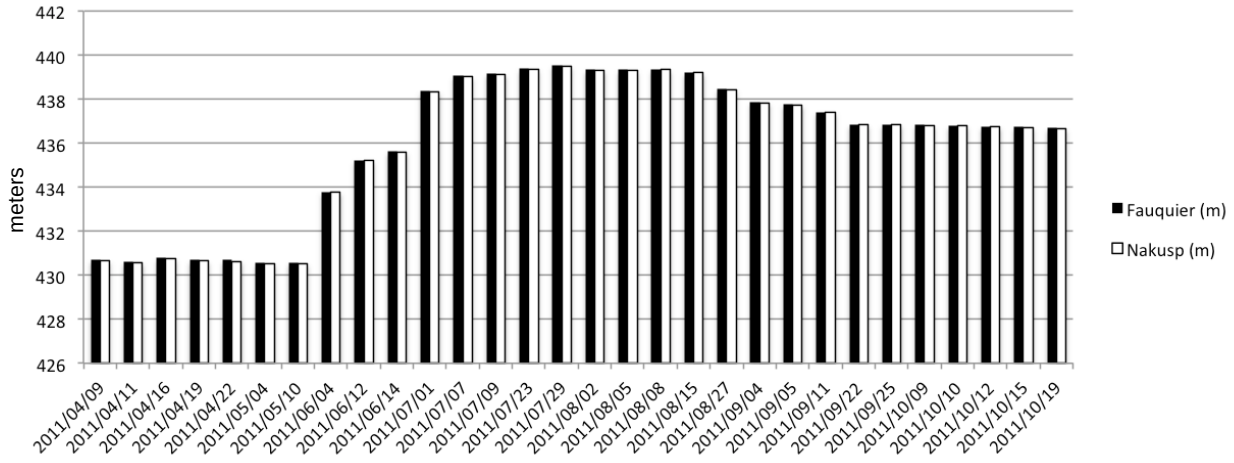


Figure 24. Arrow Reservoir daily average water levels (in meters) by sample date. Source: BC Hydro

5. DISCUSSION

Year 3 of this study has provided useful insights into the people, activities, experiences, attitudes and satisfaction of recreationists on the Arrow Lakes. Year 3 results provide a better understanding of the most important recreational activities on the Lake, the amount of 'tourist' use and the significant socio-economic impacts to be considered.

A total of 24 outdoor recreation activities were identified by respondents. On-site respondents participated in the following recreation activities, in descending order of participation: swimming (78%), camping (73%), beach activities (72%), walking/hiking (71%), and fishing (67%). Web respondents reported participating in: swimming (81%), fishing (77%), walking/hiking (77%), beach activities (65%), and boating (motor cruising) (58%). Thirty percent of respondents identified fishing as their most important activity while 19% felt camping was number one. On the day they were interviewed, 176 visitors said they had gone fishing while the next highest response was swimming at 147. Among the many activities available in and near the Arrow Lakes, consideration of the above activities would appear to be the main drivers in developing a mutually beneficial operational management plan.

Based on the frequency of visits, respondents seemed to be familiar with the Arrow Lakes as the mean annual visits to the Lake was 124, or roughly once every 3 days. Visits to the Arrow Lakes were highest in summer (approximately four visits per week) and lowest in the winter (approximately one visit per week).

Respondents had longstanding involvement with the activity that they identified as most important to them, which was also identified as playing an important role to their lifestyles. Respondents indicated that they were generally familiar with the Arrow Lakes as they had been visiting the Lake for an average of 17 years. More than nine out of ten respondents reported that they would return to the Arrow Lakes for recreation activities based on their experience the day that they completed a questionnaire.

The provision of habitat for aquatic species was identified as the most important management goal most frequently, followed by providing recreation opportunities, safety for reservoir users. Respondents indicated that they visit the Arrow Lakes most often with their families and friends (which was also identified as a motivation for the majority of respondents), which may indicate an important social function of the reservoir.

The popularity of the Arrow Lakes does, in some instances, lead to issues of crowding. On-site recreationists indicated an average of four encounters with other people was acceptable, while web respondents indicated that their encounter threshold was three other recreationists per visit. Despite these instances of crowding, reports of conflicts with other people or recreation activities while visiting the Arrow Lakes was low (and generally dealt with issues of respect). Viewing scenery was the most frequently identified motivation for visiting the Arrow Lakes, which is likely related to the majority of respondents reporting that being close to nature was also a motivation.

A fair number of tourists used the boat launches and associated campsites as forty-four percent of respondents reported living in a community that is more than 80 km from an Arrow Lake community.

Year 3 of the study was successful in capturing data in all seasons and confirming the reliability of the survey documents and procedures. The final outcomes of this five year study will assist in developing a model that will better predict the recreational use impacts associated with changing water levels of the Arrow Lakes. The comprehensive results of this study will be used to generate year round use characteristics and determine how recreational use is tied to fluctuations in water level. The results from this progress report provide an indication of what is important to the recreational users of the reservoir and what might be important to consider in developing management strategies.

6. CONCLUSIONS

As in past years, swimming was the most frequently identified activity, while fishing appeared to be the most important activity and the prime recreation activity of choice on the Arrow Lakes. Camping also received high levels of participation from recreationists. In 2011, a fair number of tourists (44%) used the boat launches and associated campsites.

Almost all respondents (over 99%) would return for another visit, thus indicating a reasonable level of satisfaction with recreation opportunities and management practices.

The Year 3 results do not provide sufficient data to predict whether improvements in facilities and water level management of the Arrow Lakes would significantly affect the use and satisfaction of recreationists.

The first three years have been a successful and productive start to an informative and progressive initiative. The full implementation and completion of the five year study will provide much more reliable information, interpretations and conclusions on which to base future management decisions.

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APPENDIX A – TRAFx VEHICLE COUNTERS

How were traffic counters used in this study?

Traffic counters were configured and installed at 11 boat launch facilities on the Arrow Lakes Reservoir. This includes Syringa Creek, Shelter Bay, Nakusp, Eagle Bay, McDonald Creek, Burton Historic Park, Revelstoke, Edgewood, Fauquier, and Anderson Point. In 2011, an additional traffic counter was installed at the Burton South boat launch. The TRAFx G3 magnetic field controlled vehicle counters were selected for use in this study as they are the preferred and recommended traffic counter of BC Parks, Parks Canada and the US National Parks Service.

How does the traffic counter work?

Ferrous metal (i.e., metals with iron content) objects distort the earth's magnetic field as they move through it. Pure aluminum (non-alloy aluminum) will not be detected. Moving the counter (i.e., pointing it in different compass directions, tilting it, jiggling or jolting it) will also cause counts to occur. This is because the earth's magnetic field has different strengths for different directions and tilts, and the counter senses this.

As vehicles move, they disturb the earth’s magnetic field. The TRAFx vehicle counter digitizes and analyzes these disturbances using highly sophisticated hardware and software. Thus, as a vehicle passes within the detection zone it changes the earth’s magnetic field in that area which triggers a count. Different modes are used to meet the particular needs and traffic pattern of a given site. That is why the modes and sensitivity settings were selected at each site to best reflect the local conditions.

Can the vehicle counter be buried? Does it perform differently when buried?

Yes, it can be buried. Because it responds to changes in the earth’s magnetic field, the TRAFx Vehicle Counter functions the same whether the counter is buried or installed above ground.

Will the counter still function if a vehicle parks over or near the counter?

Yes. Unlike most other types of vehicle counters, the TRAFx vehicle counter will automatically adjust to the presence of a vehicle parked over top or nearby, and continue to function properly. Likewise, if the counter is placed near a metal pole (e.g., signpost) or similar static metal object (e.g., guard rail, cattleguard, bridge beam etc.) it will automatically adjust to its presence.

How were annual traffic counts calculated?

TRAFx DataNet traffic count estimates follow the most widely accepted vehicle traffic calculation methods used in North America. This system is used by the US Army Corps of Engineers, US Bureau of Land

Management, US Fish and Wildlife, US Forest Service, US National Parks Service, Parks Canada, most Canadian provicincial and territorial governments, and numerous countries in Europe and the South Pacific.

Annual Traffic Counts are collected and automatically compiled by the TRAFx DataNet system for each full calendar year. This is done to standardize the calculation and application of average daily use to missing data. The system then enables the selection of any time period across years for calculating and reporting daily, weekly and monthly counts, averages and comparisons.

The Annual Traffic Summary shows estimated total yearly counts by recording the total daily counts and calculating the average daily count for that month, then applying that average daily count to missing data periods (such as partial months due to mid-month start date or interruptions due to data downloads, dead batteries or missing data). Thus, if a given counter has at least one day of counts in a month but is also missing at least one day of counts that month, the TRAFx Datanet will apply the monthly average daily count to only those days where data has been interrupted or is missing. If the counter had been operating without interruption during a day or month and there was absolutely no traffic recorded, the TRAFx DataNet calculates a '0' traffic count for that day or month. For years with complete months of missing data (not zero counts, but actually missing data) an annual average daily traffic count (AADT) is applied to all days within a missing month. The total estimate for the year is generated by adding the recorded and calculated counts.

How were boat launch counts calculated?

To get an accurate count at a boat launch it is necessary to apply additional factors, including:

- Filter — a 12-17 second delay is applied (12 seconds on double lane ramps and 17 seconds on single lane ramps) to remove any multiple counts within those intervals to reduce the possibility of multiple counts for a single launch.
- Divide by two — as a vehicle must pass the counter twice to launch a boat (going into the water loaded and coming out empty) the count is divided by two.
- Adjustment Factor of '0.5' — as a vehicle must make two trips per boating experience (one to launch the boat and another to load the boat) the count is again multiplied by 0.5 (or in other words again divided by two).

(TRAFx, 2010)

APPENDIX B – ARROW LAKES VISITOR SURVEY

LEES + Associates
RESEARCH & PLANNING

604 899 3806 | www.elac.bc.ca

Arrow Lakes Recreation Survey

- The purpose of this survey is to obtain information about recreation use of the Arrow Lakes.
- Participation in this study is completely voluntary: you may refuse to participate at any time.
- You may skip any question that you do not feel comfortable answering, although we encourage you to complete all questions if possible.
- The survey will take about 5 to 10 minutes to complete.

All information resulting from this study will be kept strictly confidential. Please do not write your name anywhere on this questionnaire. Individual responses will not be made available to anyone outside of the *Arrow Lakes Recreation Survey Research Team (LEES + Associates)*.

If you have any questions about this research,or would like further information, please do not hesitate to contact *LEES + Associates at (604) 899-3806*.

Q1

The questions in this section ask about the recreation activities that you do ON THE WATER or ON THE SHORE of the Arrow Lakes.

Indicate ALL of the activities that you do ON THE WATER or ON THE SHORE of the Arrow Lakes.

☐ Fishing	☐ Beach activities	☐ Hunting	☐ Mushroom picking
☐ Boating (motor cruising)	☐ Nature study	☐ Scenic viewing	☐ Berry picking
☐ Canoeing/kayaking	☐ Bird watching	☐ Picnicking	☐ Drawing/painting/photography
☐ Swimming	☐ Wildlife viewing	☐ Camping	☐ Cross-country skiing
☐ Waterskiing	☐ Horseback riding	☐ Walking/hiking	☐ Snowmobiling
☐ Wind surfing	☐ ATV/Trail bike/4 × 4	☐ Mountain biking	☐ Other: _____

On average, how many DAYS PER SEASON do you visit the Arrow Lakes?

Spring: _____ days/season Summer: _____ days/season

Fall: _____ days/season Winter: _____ days/season

What recreation activities did you do *TODAY* on the water or on the shore of the Arrow Lakes?

Are you participating in this activity today as a paying customer of a commercial recreation or tourism operator/guide?

☐ **Yes** ☐ **No** **Please elaborate:**

OFFICE USE ONLY	Tracking #	Sample Date (yyyy-mm-dd)	Sample Location	Surveyor Initials

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Q2 **The following questions ask about the *ONE* outdoor recreation activity that is MOST IMPORTANT to you. Refer to this activity when answering all of the questions in this section.**

Of all of the activities that you do on the water or on the shore of the Arrow Lakes, which one is the MOST IMPORTANT? *Identify only one activity.*

My most important recreation activity is: _____

How many years have you done this activity? _____ years.

On a scale of 1 to 5, *with 1 being BEGINNER* and *5 being EXPERT*, how skilled are you at this activity?

Beginner (1) (2) (3) (4) (5) Expert

On a scale of 1 to 5, *with 1 being NOT IMPORTANT AT ALL* and *5 being VERY IMPORTANT*, how important is this activity to your lifestyle?

Not important at all (1) (2) (3) (4) (5) Very important

Who do you usually do this recreation activity with? *Check only one.*

☐ Alone ☐ Family ☐ Friends ☐ Clubs ☐ People from work ☐ Other: _____

On average, how many DAYS PER SEASON do you do this activity?

Spring: _____ days/season Summer: _____ days/season

Fall: _____ days/season Winter: _____ days/season

Q3 **The following questions ask about some of the EXPERIENCES that you may have had while visiting the Arrow Lakes for recreation activities.**

Consider how many people you are comfortable seeing while you are visiting the Arrow Lakes and complete the following statement:

It is OK to have as many as _____ encounters per day.

OR

☐ It doesn't matter to me how many people I see.

For each season below, indicate on a scale of 1-9 how crowded you have felt while visiting the Arrow Lakes.

Spring:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Not at all crowded		Somewhat crowded			Moderately crowded		Extremely crowded	
Summer:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Not at all crowded		Somewhat crowded			Moderately crowded		Extremely crowded	
Fall:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Not at all crowded		Somewhat crowded			Moderately crowded		Extremely crowded	
Winter:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Not at all crowded		Somewhat crowded			Moderately crowded		Extremely crowded	

Have you ever experienced any conflicts with other people or recreation activities while you were visiting the Arrow Lakes?

☐ **Yes** ☐ **No** **Please elaborate:**

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Q4 The questions below ask about your USE and FAMILIARITY with the Arrow Lakes.

From the list below, indicate why you come to the Arrow Lakes. *Check all that apply.*

- ☐ To learn about reservoirs
- ☐ To discover new things
- ☐ To learn more about nature
- ☐ To view the scenery
- ☐ To be close to nature
- ☐ To think about my personal values
- ☐ To get exercise
- ☐ To give my mind a rest
- ☐ To have a change from my daily routine
- ☐ To be with friends
- ☐ To be with family
- ☐ Other _____

The Arrow Lakes serves many purposes. In your opinion, *what are the 3 most important management goals for the Arrow Lakes*? Place a 1, 2, or 3 beside your choices (with 1 being the most important management goal).

Rank

- _____ Provide local employment
- _____ Safety for reservoir users
- _____ Provide recreation opportunities
- _____ Flood control
- _____ Electricity generation
- _____ Provide habitat for aquatic species
- _____ Other _____

Q5 The questions below ask about HOW YOU FEEL about the management of recreation on the Arrow Lakes.

The management of the Arrow Lakes seeks to balance many tasks. Please indicate your satisfaction with management activities.

	Never	Rarely	Sometimes	Frequently	Always	Don't know
On the whole, are you satisfied with water levels on the Arrow Lakes?	1	2	3	4	5	☐
On the whole, do you have satisfying experiences on the water or on the shore of the Arrow Lakes?	1	2	3	4	5	☐
On the whole, are you satisfied with the condition of the boat ramp facilities at this site?	1	2	3	4	5	☐
On the whole, are you satisfied with the parking lot conditions at this site?	1	2	3	4	5	☐
On the whole, are you satisfied with the management of the Arrow Lakes?	1	2	3	4	5	☐

Compared to the water levels that you experienced today, how might different water levels affect your use of the Arrow Lakes for recreation activities?

	I will come back	I will go somewhere else	Not sure
If the water level is the **same** as today...	☐	☐	☐
If the water level is **higher** than today...	☐	☐	☐
If the water level is **lower** than today...	☐	☐	☐

Please elaborate:

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Q6 The following questions ask about YOUR RECREATION EXPERIENCES on the Arrow Lakes.

How long have you been coming to the Arrow Lakes for recreation activities? _____ years.

Based on your experience today, will you come back to the Arrow Lakes for recreation activities?

☐ Yes ☐ No Please elaborate:

Which boat ramp facility do you usually use on the Arrow Lakes?

Why did you come to this boat ramp facility today?

What did you LIKE MOST about the boat ramp facility that you visited today?

What did you LIKE LEAST about the boat ramp facility that you visited today?

How did you first hear about recreation opportunities and activities near and on the Arrow Lakes? *Check all that apply.*

☐ Tourism information booth	☐ Family	☐ BC Hydro web site
☐ Tourism information brochures	☐ Friends	☐ BC Hydro facility (*e.g.*, Revelstoke Dam)
☐ Tourism operators	☐ BC Parks	☐ BC Hydro bill
☐ Private marinas	☐ BC Forest Service	☐ Other:_____

Q7 These questions below ask about you. We use this information only to assist us in compiling the survey results.

What year were you born in? 19____ What community do you live in? _____

Gender: ☐ Male ☐ Female How long have you lived in your community? _____ years.

Please list any outdoor recreation clubs or organizations that you belong to.

Do you have any additional comments about recreation on the water or on the shore of the Arrow Lakes?

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APPENDIX C – RESPONDENT GENERAL COMMENTS

Q1 – Additional comments

Table 48. Q1. Additional comments about recreation on the water or on the shore of the Arrow Lakes.

1. Huge fluctuation in water level is detrimental to the shore and wildlife. 2. Very high reservoir levels is eroding/eliminating beaches. 3. If reservoir is always kept high, the flood control is negated.
Yes! A distinct lack of fire pits!
1. Nice and quiet 2. Commercialized.
A better boat launch site closer to town would be nice for using the river.
A disparate amount of money is being spent on fluctuating reservoirs in other communities and we are getting a pittance for the Arrow Reservoir. There is not one efficient, safe boat ramp in the vicinity of Revelstoke except that of Martha Creek (and it requires maintenance) Shelter Bay is in dire need of reconstruction. I understand that an unfortunate waste of money is planned for Centennial Park. This boat launch is rarely used outside of July/August when the rainbow are running and anyone can launch a boat there safely because the water is higher. Spend the cash at Shelter Bay where the launch is need. Also the boat launch at Eagle Bay is pathetic. A new ramp for small boats only is needed there, as boats/trucks of all kinds keep getting stuck due to the grade/sandy natural launch that exists. Also the cement does not go far enough down which is ridiculous when the water us low - which is frequent.
A great place to fish and lounge around.
A steady shoreline would be better, more fish!
Absolutely beautiful scenery and the water level is the best I have seen it. When it is lower the submerged town sites are almost visible and one worries about safety clearance.
Add shower to the campsite.
Amount of debris in water.
Arrow Lakes is clean with many good sand beaches when the water levels are 2-3 feet lower.
As an occasional visitor I feel unable to answer many questions knowledgeably. However, we do love the area and would like to spend more time here.
Beautiful ramp
Beautiful, unspoiled.
Beautiful, very friendly attendants.
Beautiful! [3 responses]
Believe that Hydro should spend more on physical facilities (rather than studies) to enhance recreation (self powered) & wildlife environment.
Bigger boat launch and parking lot.
Boat ramp in too be replaced.
Boat ramp: wharf needs upgrade.
Boats should be monitored for cleaner engines, there is an oil film visible on water.
Campgrounds - hard to get info. Campgrounds are over priced for little services.
Camping costs for tenting w/ no facilities are too high.
Camping spots are becoming harder to find. More accessible forest service sites, keep water level high.
Campsites are well kept, clean & private. Beautiful views and peaceful surroundings have us looking forward to returning here.
Can't seem to recall the year but the water level was the lowest we'd seen making water activities difficult.
Clean & beautiful. Beautiful, beautiful, beautiful!!!! And maybe a boat dock off the camping beach.

Table 49 (cont'd). Additional comments about recreation on the water or on the shore of the Arrow Lakes.

Clear the debris off the lake, especially July & August.
Continue to preserve public areas and limit building/development on the arrow lakes. No industry beyond the current. Too much already. Paper and metal mills limit enjoyment and overall quality of natural environment.
Control tourism. Control jet skis.
Create more camping i.e., BC Hydro sites.
Create more parks or camp grounds on the Arrow Lakes.
Debris was outrageous till beginning of August, that's unacceptable!!
Dock needs to be increased in length for low water use.
Dogs not being allowed in day use area or on beach is stupid. We always travel with our dogs so we don't use those beaches ever. We are considering paying for launch access at new condos as the launch and docks are protected from bad weather and Syringa is not, and our boat has been slammed a few times at the dock.
Don't commercialize it.
Don't have the water come much higher than it is today (Aug 15/11).
Don't over commercialize like Shaswap or Okanagan- keep it pristine!
Driftwood is my main concern.
Eagle Bay forest rec site - picnic tables in poor condition. Boat ramp too short so can only be used in high water levels.
Eagle Bay needs a clean up, garbage all over, damaged picnic tables, fire pits not in the proper places.
Edgewood needs a dock and wind break.
Enjoy the beaches sandy.
Erosion is an issue from Eagle Creek.
Everything seems to be great.
Excited about new docks & lake access.
Extend the campground.
Favourite lake to visit. Clean, refreshing, great fishing and lots of nature hikes to explore.
Feel very sad for young families when there is limited beaches for children to enjoy.
Fish needs to improve.
Fishing is not as good as it once was.
Fishing - very poor. Fish hatchery closed. No real evidence of fish enhancement (only spin).
Fix our boat ramp facility. Stabilize the lake level more.
Fix the boat ramp to the specifications of your on judgment. Put the new boat ramp at Kilarney (old log dump) across from Edgewood on south side across eagle creek.
Fix the concrete ramp.
Follow and enforce your own DDZMP.
Get more people to come here.
Get rid of the planting of cottonwoods.
Good facilities, trash, rest areas clean. Roads are good.
Good fishing.
Good fishing yesterday.
Great beach at Nakusp – it's a real attraction!
Great lake and facilities. Only change I would suggest is 1-2 more provincial campsites.

Table 49 (cont'd). Additional comments about recreation on the water or on the shore of the Arrow Lakes.

Great lake with great facilities
Great place to live!
Great place, never crowded.
Great place, try to keep water levels more stable. Build a bigger boat launch in the same location.
Great recreational experience except there are too many loose logs floating on the lake and cluttering the shoreline.
Great, the best!
Have a great day.
Hire someone to continuously work on cleaning debris out of the lake and on the shore, open up more land for lakeside cabins.
Hope we can keep coming here for the next 20 years.
I believe that there needs to be more fish enhancement programs. A majority of the people who boat on the Arrow lake do so to fish. The fish numbers have dwindled to a very low level over the last 15 years or so. I believe this lake can support a large fish population. Many people fish in the Columbia river as well in the summer and fall. There is no usable boat launch in this area and most people launch off the shoreline at various locations. This can be dangerous when the water level is low. I have been stuck often when I have launched and then returned later in the day to find the water level has dropped drastically and I can no longer get the boat on the trailer at that location. Twice I have damaged my trailer. Once I had to make arrangements to get the trailer to another location to load the boat. I have also damaged propellers trying to get into shallow locations to load.
I believe the Arrow lakes needs to market itself towards the future and the natural opportunities places like Nakusp can offer, rather than focusing on mature, declining industries such as logging.
I do not mind the fact that the lake is a reservoir, it keeps recreational power boats and vacationers to a minimum.
I have canoed the lake from Galena Bay to Syringa Creek at high water - excellent!!
I hope this lake does not get over developed.
I like it when the reservoir is at or near full capacity in the summer.
I like that this lake is usually not busy and its warmer than Kootenay lake. We enjoy boating activities and this is a great lake for it. More campgrounds please! Forestry campsites would be great (with docks for boats).
I love it here, so calming for the soul!
I love it!
I now love bringing my own kids here, the facilities have always been well maintained and we look forward to many more years of camping, boating, beaching. Keep up the good work. Showers and soap in the campground bathrooms would be wonderful!
I realize the issues with docks and changing water levels but those of us with bigger boats have VERY LIMITED places to tie up like only Nakusp or Edgewood more facilities would be greatly appreciated by all.
I trust BC hydro will make the right decision to upgrade the Edgewood campground boat launch to be on par with those in such places as burton and Fauquier.
I would like to see more campgrounds similar to McDonald creek park (beautiful place!)
I'm hoping and looking forward to any up grades to the Shelter Bay boat launch. Many tourists and "lots" of locals from Revelstoke use that facility during the spring, summer and winter, but we are having to use the actual ferry terminal ramp to launch boats during the winter months. Is this an issue we can resolve?
I'm not local and haven't frequented much but recreation possibilities have always seemed available here i.e., fishing, swimming, camping. I grew up windsurfing and have in the back of my mind thought about checking spots around here.

Table 49 (cont'd). Additional comments about recreation on the water or on the shore of the Arrow Lakes.

Improve docking, swimming area for kids.
In addition to a boat launch at Beaton we also need some form of cell phone service for safety reasons.
In some places there is littering.
International jewel, preserve! Valuable as a recreational resource is unimaginable!
It is a very valuable resource, well worth preserving. The boat ramp is not protected from the west which makes removal of boat from lake difficult in choppy conditions - needs a breakwater.
It is one of the most beautiful areas to be.
It should remain as it is today! Quick level changes should go slower, less than 6" /day.
It would be nice if more campsites could be available.
It would be nice to have a campground with a proper beach & boat launch all in one setting.
It would be nice to have another boat ramp in the Syringa Campground.
It would be nice to see some shore stops along the lakes. Clean & safe. Signage about the history, wildlife *etc*.
It would be wonderful if the water level could be kept constant - even though I know that is not possible!
Its lovely, its tranquil and love the peace and quiet... will come here for many years to come.
Its nice peaceful and serene. I like it just the way it is.
Its time to spend some tax dollars or grant money and get this boat ramp and parking concern delt with! Its long over due!
Just love it!
Just the bug control if the water goes up and down daily.
Keep boat launch open after 10 pm. Awesome place, thanks!
Keep it accessible.
Keep it as natural as it is. No commerce please, not too many boats, they destroy the peace and quietness of this place.
Keep it clean!
Keep it up!!
Keep making it better for locals all year long.
Keep on focusing on keeping it great, thank you.
Keep stocking fish.
Kinbasket Lake and others should have been logged before flooded.
Lack of fish, very, very poor... where are they??? How is it that us lakes & reservoirs have more fish- something wrong here! Clean the beach of debris.
Least amount of level fluctuation is best.
Less ATV and 4x4 traffic, I am an ATV user but there is seems to be few responsible users witch is a shame.
Let's utilize this under-appreciated asset--not to be commercialized, but rather to be more available and user-friendly.
Lets get a functional ramp please.
Level fluctuations in summer cause a few problems at beach (water usually colder as it goes up and down through spring to fall seasons).
Looking forward for my first time visit.
Lots of floating logs but only on some days.
Love it.

Table 49 (cont'd). Additional comments about recreation on the water or on the shore of the Arrow Lakes.

Love it!
Love the area. [2 responses]
Love the Arrow Lakes.
Love the BC parks.
Love the fact it is not overly developed.
Love this god - place, absolutely love the Burton historical campground.
Lovely.
Lower camping costs for parks & more reasonable rates.
Lower H_2O is better. Better informing of when H_2O will be lower high & for how long.
Lower the levels!!
Lower the water to a level where the beaches are and can be used. Need to push highway up the lake pass deer park.
Marina-docks much needed. Walk way along beach maintained, this is a beautiful pristine area.
Maybe we will when we get back.
Maybe you could put another wharf on the north side of the boat ramp it would give more room, faster launches (instead of waiting 1 hour to put boat in or out of water) it would also act as breakwater so you don't bash your boat on the wharf in a south wind. Either leave water levels so wharfs are in water all year so fall + winter + spring can be done or put in moveable wharfs that can move with water levels up or down ramp so wharfs are in water all year long.
Minimize powerboats and ATVS... Keep area as quiet as possible.
Moorage pins needed at Bowman Beach and more at Sunshine Bay.
More blocked out swimming area would be nice (further into the deeper parts).
More boat launches/marinas. Running water (taps).
More water more access.
More work to be done to enhance fishery.
My husband has worked as a tugboat captain for 37 years.
Nakusp needs to grow and this is the best place to start.
Need a year round boat launch.
Need another set of washrooms. Need water close to washrooms (pumps?) Tap? To wash hands.
Need boat launch closer to Revelstoke. More shoreline areas need preserving for future rec/prov. Park sites.
Need more boat launch options at the south end. More camping is required. Syringa is near capacity all summer and completely closed for camping in the off-season. There is a need for more campsites in the area. A campground similar to the Buckley site above 7 mile would be wonderful above Keenlyside but still close to Castlegar.
Need more boat trailer parking and another ramp.
Need more dog beaches.
Need more fish in Arrow Lakes.
Need more hydro camping areas, would not mind paying a reasonable fee to maintain such areas. 7-mile dam is a fantastic facility. Also enjoyed Williston Lake (Bennet Dam) when we lived in that area. p.s. Great survey, thanks!
Need more shore/beach areas <> levels could fluctuate from year to year so you could repeat favorite things sometimes but if they are underwater you would find new sites to check out.
Need new dock!

Table 49 (cont'd). Additional comments about recreation on the water or on the shore of the Arrow Lakes.

Needs new road, docks, as stated above.
Nice area.
Nice to have charts for boaters and investors... Robson boat launch of which I am happy to say I had something to do with both as part of my stint with Castlegar Development board. Keep up the good work.
No condos please. Didn't like Pope & Talbot's sneaky selling of the properties on the lake.
No P.W.Cs. More refuse cans, stop smokers!
No - why are you doing this survey?
Not today, the weather has been rainy & it's early yet for lake activity. Thanks, beautifully kept.
Nothing- we enjoyed here so much! Cost for campsite is very reasonable! Thank you for taking care of this place & we witnessed osprey in this camp.
Once you lose the recreation values its hard to regain.
Only thing I could say is all the debris that is at the edge of the water, e.g. Big sticks, big rocks even logs. There are lots of kids that play here, kind of dangerous.
Opportunities are endless, more boat launches needed: 1. Halfway river area, 2. North end of lake east side.
Parking could be easier to find.
Perfect & enjoyable.
Please don't wreck anything! Appreciate things as they are.
Please fix ramp and improve fishing, thanks.
Please keep the McDonald Creek campsite (on the lake) primitive, possibly expand into Donnley Beach.
Please preserve the arrow lakes and keep them pristine for years and years to come.
Please try to keep water levels consistent, thanks.
Please upgrade Edgewood boat launch to the standard of Faquier & Burton ASAP, thank you.
Power generation time limits should be 7.30 9.30am. 7.30 8.30pm.
Power generation with consideration of the folks trying to enjoy.
Prefer this location for boat ramp much more than new location south of Burton.
Promote rare species conservation, educational lectures, water safety, explanation of need for water leveling, promote history.
Provide more forestry camp sites that provide privacy.
Raise the limit on kokanees to 15 again like Slocan lake. There are lots and it only took 45 mins to catch our quota. Has been a steady increase and size is not too bad also.
Ramp & docking facilities unsuitable & unusable at low water levels.
Really enjoyed our time here. We have enjoyed staying at many of the BC Rec Sites on our journey to and back from Alaska.
Renata is a very safe, clean area - off the main grid - peaceful. I would like to keep it that way.
Reopen hill creek facility.
Require boat access at blanket creek. More trailer parking at shelter bay. More site control to limit occupancy time (more on Revelstoke lake).
Secure mooring facilities on the Columbia River/Arrow Lake in Revelstoke within walking distance of retail stores, restaurants and fuel supply would make Revelstoke a boating destination for Arrow Lake. The boat ramp in Revelstoke is most hazardous that I have ever seen. I can't imagine how a boat of any size could be launched into the strong river current at that location. Boating safety could be improved by marking (or removing) all of the pilings that were placed during the log boom era. There are several in the Galena Bay area that don't appear to have any purpose and are significant navigation hazards.

Table 49 (cont'd). Additional comments about recreation on the water or on the shore of the Arrow Lakes.

Shoreline erosion severe due to varying water levels not allowing vegetation to establish including severe water turbidity.
Showers, slow sign by day park, bigger stalls for more than one trailer.
Shutting down the trout hatchery has reduced numbers of larger (4lbs+) gerrards. Kootney lake once lagged behind us in this area but now have superior catches regarding larger gerrerds... sad.
Small town with great people. See u soon again.
So far this small community seems friendly, clean & peaceful.
Some dock facilities at campground.
Sometimes the water level is too high that lots of debris is floating in the water - interferes with swimming near the shoreline.
Speed signs.
Stabilize the water level a little more.
Stop studying use to death. We want improvements. We want results. We want our boat ramps fixed. We want BC Hydro to stop studying everything and start doing something. What a waste of $$$ this study is. In 2019 I will still be looking at an inadequate boat ramp with another consultant doing another study Enough already. Tell BC Hydro if they can't be responsible to their requirements under their water license then just go away and provide the locals with the resources so we can do it right ourselves.
Stop the wild fluctuations!!
Thank you.
Thank you for the home-made hotdog sticks! Great job!
Thanks for asking.
The boat launch and parking must be dealt with. On a busy day there is vehicles parked everywhere including the hi-way. A paved lot with paved lines would probably help. A lot of people have no clue how to park with a trailer in tow.
The boat launch at Renata needs a lot of help!
The Code of Conduct Signs at access points to the lake are taken seriously by those of us who respect the area, yet there is constant disregard and abuse from many users this time of year & it`s frustrating to see no action taken when rules are broken. Signs have been defaced & in some cases torn down. Natural areas continue to be destroyed by motorized vehicles & fires. With no enforcement in place, the code of conduct has become a joke.
The Edgewood Community Park needs a new boat ramp to service the park. There are many people from all over BC that come to use the park year round.
The fishing here is not as good as it used to be in this area. The planted "dust control" is very disruptive to boat motors and campers.
The fishing seems to be getting worse every year.
The husbands want the surveyors job! All good, keep up the good work!
The lake water is cold all year long which makes the fish great.
The main reason i came here was to see the town of burton. Again, I love the wilderness and beauty of BC. Please take care of it, the world needs BC.
The marina needs more spots for mooring.
The most beautiful place on earth!
The natural beauty of this place will forever captivate everyone!! Thanks.
The new boat ramp is great!!

Table 49 (cont'd). Additional comments about recreation on the water or on the shore of the Arrow Lakes.

The number of boats on the water is increasing every year. People love to camp overnight on the shores of the lake, either by driving up the east side, or boating up the lake to camp on either shore. Improved boat launch access will encourage and increase the amount of traffic on the lake. This may turn out to be a negative for the residents of the area, but it will serve to facilitate recreation on the water.
The only concern with water levels is the lack of sandy beach for recreation and swimming.
The teenagers have always found a place to party on the arrow lakes and need to be policed or monitored so as not to disturb all other residents.
The water could be a little lower.
The water level goes down way to far.
The water level is too high. No shore and land erosion.
The water seems clear & clean, the area is beautiful. We camp at a large variety of BC Parks - both on the island and off...on trips like this one we\'re on this summer we don't have specific destinations in mind so its a fluke that we found this park - it maybe years before we ever come back but not because we don't like it.
The wharf is in the wrong position.
There is always too much junk on the water; it makes it hard to waterski, fish & swim. The lake needs to be stocked with more fish. The water levels need to be the same every year from late spring to mid fall. The Syringa camp ground needs a lot of work to make it appealing to travellers, and get rid of the $10.50 a night for an extra car. This does nothing to encourage friends and family to get together.
There should be a designated area for ATVs. This will keep them off the road.
There should be more supervision of boaters who are drinking on the lake. We witnessed a water-skiing accident at McDonald creek where the boat operator was impaired and driving much too close to our canoes and the beach where children were playing
They should rebuild the dock and add another one across from it
This is a great campsite have had many great vacation here with family and friends.
This past winter the water levels in the Arrow reservoir seemed to stay higher for longer into the winter (with significant variations in the levels), which impacted the time available to X-C ski on the flats. Some skidoo operators have little respect for the tracks developed by skiers. However, one skidoo operator actually sets tracks for X-C skiing. It would be nice if BCHPA would provide regular (?Weekly) projections of anticipated reservoir levels in the newspapers in basin communities. I digress but wish to comment that the relatively stable levels of the High Revelstoke reservoir make it a very attractive spring summer and fall recreational site. Contrary to the claims projected for the Arrow reservoir before Keenleyside was built.
This survey is based on frequent users, not 1 day passing through campers as we are!
To many dead head on water? Late 10-o-clock closing.
To protect what areas are left in the Kootenays, tourism should not be promoted in the arrow lakes area. "in wilderness is the preservation of the world".
Too many deadheads on the water. Not enough amenities on the lake for boat users.
Too much driftwood. Keep water level constant!
Tourists should be charged a boat ramp fee for usage.
Try to keep it from becoming another Okanagan. I never stop there anymore.
Usually is a nice quiet place to visit.
Very clean and wild still.
Very nice park. We would like to see it maintained and expanded over the years.
Very nice place to visit.
Very nice, don't tell anybody...

Table 49 (cont'd). Additional comments about recreation on the water or on the shore of the Arrow Lakes.

Water levels are high this year but there has been a lot of runoff and they are quite high everywhere. Most years i find that the water levels are too low. The large fluctuation can be quite frustrating for recreational use.
Water levels make a huge difference in our enjoyment of Syringa.
We are camping at McDonald Creek , 1st time in this area and all is very good.
We are enjoying our stay at Arrow Lake.
We are lucky.
We are very lucky to live in such a wonderful & beautiful place. It is a great environment to raise my children.
We continue to enjoy our visits here. It has become our favourite camping location (McDonald creek).
We enjoy coming to the area, the people are friendly.
We found 1999 accidently a quiet, peaceful place at McDonald Creek. We are very disappointed by the development into a noisy marina like spot.
We have always been very happy about McDonald campground in all aspects.
We have been enjoying our stay.
We like coming to eagle bay forestry site but it is a little run down (neglected. Picnic tables need to be repaired, toilets need repairing, fire pits are scattered all over campsites and off site, parking lots etc. Entry roads could use upgrading.
We liked it very much, the campground near the shore here near burton was very nice.
We love coming here every time we are near the area. The best part about it is that it is not all developed and fancy pants. We hope it remains this way.
We love coming to Burton - it is so peaceful & beautiful here. Also love golfing & Fauquier.
We love it!
We love Nakusp & the Arrow Lakes. Thank you for keeping them beautiful!
We love the arrow lakes (Edgewood campground) and will be back annually.
We love the peacefulness, quiet and relaxing atmosphere, nice soft sand. Fish are great here.
We love the sturgeon release and Syringa beach!
We love to camp here and look forward to coming back in the years ahead
We moved to Nakusp from Calgary precisely because the Arrow Lakes are so beautiful and we fell in love with the area.
We need a new boat ramp.
We need a new ramp in Edgewood and better camp grounds.
We need lights (beacons, washrooms, sani-dump for boats on the new dock and a marina).
We need to control the water level when all are camping and boating!! The water level is always fluctuating: winter fishing high water??? Poor fishing.
We need to have better access to the lake by vehicle, more camping up the lake, more beaches to go to.
We travelled from Castlegar to Revelstoke fairy and found nowhere to put in a big boat with motorhome, leave it in the water and go find a camping spot. Locals were very helpful with info and helping pull boat every night.
We would love to see this area remain the same as it is now, thank you!
West ramp. Extend ramp to low water mark. Boat launch at campground required.
What is needed in the worst way and should be a priority is a sani-pump out facility for boats in at least 2 places on the Arrow Lakes. It is now against the law to dump raw sewage into water in the province (ocean included up to 2 miles offshore) UNLESS there is no facility available. In this day of ecological sensitivity, this oversight is an insult to the pristine nature we claim to protect.

Table 49 (cont'd). Additional comments about recreation on the water or on the shore of the Arrow Lakes.

When the lake is drawn down in spring, there should be much heavier presence by authorities to enforce the code of conduct and fines levied on those who abuse this area. It is disgusting to see the way many people destroy this important ecosystem in the name of recreation.
When the lake is full there is a lot of debris floating and no shoreline.
WHY do we have Trees growing in the water in a recreational lake? Planted by Hydro! Absolutely stupid and how Hydro got talked into that no one knows!
Would be nice to have more "dog friendly" beaches, as lots of people travel with dogs.
Would like to see more access & camping on the Eagle Bay/Fosthall side of the lake.
Would like to see more sailing clubs and opportunities. Possible charters.
Would like to see no sea-doos. Beaches everywhere- water not to high.
Wouldn't mind seeing the beach/shoreline not so full of driftwood and logs, thanx.
Yes you need to fix our boat launch and realise that fish stocks are down and your high level is causing dangerous conditions on this lake with drift wood.
Yes: we are not coming back to camp in Syringa again. We have about 12 other people that will never come back again. Its like a retirement home, we were not even allowed to sit and quietly talk in our campsite. Its sad when you pay top dollar for a site that has no running water, power or showers and then you are treated like children and told to go to bed at 10pm. We have camped all over BC and this place is the worst ever. They stock the campsite and see how many people there are if you have visitors watch out! We have a baby so we were being quiet and not to wake her, they were still coming round telling us to shhh.

Q3 – Additional comments

Table 49. Q3. Have you ever experienced any conflicts with other people or recreation activities while you were visiting the Arrow Lakes (elaboration)?

Response
On-site Responses (n = 99)
• Large chains and dangerous debris litter the ground which is very uneven. • We worry and wonder about the bottom of the lake. • Someone logged so much wood here yet there are no picnic tables? • Please add an anti-germ dispenser in the outhouse. • Thank you for really cleaning up.
[…] consulting that does the sturgeon monitoring had disrespectful staff last summer and no etiquette for load/unload protocol @ shelter bay boat launch.
5 years ago there was a pick up truck on the beach, throwing beer bottles, tried to escape towards Donnelley Beach, became stuck and then arrested by RCMP. Last year a car racing through the campground road late in the evening.
a couple noisy teenagers, but just let it go.
A resident of Renata was quite rude and threatened to kill my dog.
Although some of the staff at the provincial park are a little ridiculous with the rules they enforce.
Always peaceful & beautiful.
As campground park host have to address various issues *i.e.* noise, dogs, music *etc*.
At Syringa boat ramp. [2 respondents]
At the boat launch too many boats at one time waiting, and waiting, and waiting.
ATVs are loud, dangerous and intrusive.
ATVs in convoy driving along the river. Snowmobiles aquaplaning in Mt. Cartier Bay. [2 respondents]
• ATVs running off road in dog grass – fire hazard. • Misuse of road crossing private land to cross Renata Creek. • Crowding of boat ramps when water is high – also creating parking problem.
Boaters and seadoos inconsiderate to the swimmers and children playing along the shore, includes: noise of engines, waves, music, parking boats in beach area, alcohol use.
But brother's cabin has had break in/vandalism.
Cabin was broken into.
Camp attendants: the camp host and attendants are not very nice. You can't even have a juice box on your picnic table they will throw it away. I am so stunned by their actions. They have no respect for people. They don't care that people need a place to unwind. Last year they evicted our friends at 12am after they were drinking all night and they drove away drunk. Not very responsible.
Campfires when fire ban is on. Ignorant people.

Table 50 (cont'd.) Have you ever experienced any conflicts with other people or recreation activities while you were visiting the Arrow Lakes (elaboration)?

Response
On-site Responses (n = 99)
Camper camped next to our family was using a high frequency of profanities, with young children around; I felt very unhappy with this situation. Never any conflict because I never confronted situation, camper went to bed early (too intoxicated I suspect!!).
Caused by congestion at the boat launch.
City campgrounds are very adequate however we need provincial campgrounds with large private sites. People need nature! especially ones who come from large cities.
Congestion at boat launch.
Dogs!
Due to the boat launch/parking situation at Edgewood park – it need immediate attention/upgrades are long over due!
Enjoyed the playground for about 10 minutes today and saw 3 dogs in that time in a no dog zone. Needs to be enforced.
Everyone was awesome.
Excessive shoreline speed/wake of motorized watercraft. However, most lake users very responsible.
Feedback – there should be some incentive for this survey, Hydro gives out free pens for just 3 questions and this for four pages.
For the first time in 35 years we had a person come over to bother us about two weeks ago.
Friends have.
Full campgrounds, noise.
Had our gas can stolen. Others have had theft also.
Had things stolen from our property.
Had to tell noisy neighbours to respect 10pm quiet time, no problem after that.
Harassment from evening park ranger.
Have some parking issues boat & truck # of times.
Hunting. Fishing. Camping. Emergency services.
I was swimming at the public beach at Deer Park when two jet ski riders roared up, going fast. They did not see me until after they had gone past me. They came so close I was afraid I would be struck by one of them.
Idiot boaters.
Inconsiderate boaters at campers beach pulling up where people are sitting/playing at shoreline, and playing loud music.
Jet skiers usually AB plates at McCreek Park. Noisy, intrusive.
Jet skis that run all hours of the day are far too noisy.
Jet skis too close to the swimming area.
July long weekend had paid for site in McDonald Creek Park. When I showed up to set up site was occupied, camp host dealt with situation.
Just two conflict involving teenagers harassing my sister and stepfather with a pellet gun. When me and my brother turned up my brother knew them and defused the situation.
Just need one more boat launch half way from Revelstoke … [illegible].
Just some inconsiderate/poor drivers.
Loading and unloading boats.

Table 50 (cont'd). Have you ever experienced any conflicts with other people or recreation activities while you were visiting the Arrow Lakes (elaboration)?

Response
On-site Responses (n = 99)
Locals mud bogging on the shore when the lake is low.
Loose dogs.
Loose pets.
Loud campers late night.
Loud music and campers at late hours.
Love the people and atmosphere in and around the arrow lakes region – Edgewood rules!!
Many times at the very poor boat launch. It is not designed for heavy use and needs better docking and parking for trucks and trailers.
Mountain bikers not appreciating our right to ATV on rail bed, other berry pickers not liking the fact that we rode up the mountain to get to a berry patch.
Neighboring campers do not observe quiet times or plays music too loud.
Never experienced any conflict. Every one has been nice and courteous.
Noise/music/riding motors at night/people drinking.
Noisy campers late at night that were impolite at requests for quiet (2am).
Noisy campers – late at night. Excessive jet ski use.
Noisy generators.
Not at the arrow lakes. Have run into some reckless and unsafe drivers leaving the lake. I wish there was more policing on the water in regards to boats and inspections on how boats are loaded onto trailers etc. ... we have followed some unsafe vehicles.
Not enough shoreline when high level is in.
Not with the public but with the campground host of McDonald Creek. Had my RV parked in overflow for the day (it only had 2 other campers) and when we went to leave at 4.30pm the camp host made us pay for a night of camping even though we were not staying the night.
One year minor difficulty.
Ones who do not keep sites clean.
Only once, with dogs on the beach area.
Only waiting for people to load/unload their boats.
Operators of motorized boats here no respect for canoeists or kayakers.
Our trailer was broken into and property stolen.
Parents not supervising their children around the boat launching area.
Park staff being rude.
People are very impatient at the boat launch also pillars under water damage their boats!!
People bathing in lake.
People generally courteous.
People on the boat launch using the ramp as a beach to sun tan & swim off.
People think they own the beaches under the high water mark.
People trying to close trails and camping down. Areas regularly used, also to 4 wheelers. Not acceptable. No fish in lake, this winter really bad.
People who don't care about their surroundings and very drunk people.
Poor boatmanship displayed by individual who may have been intoxicated.

Table 50 (cont'd). Have you ever experienced any conflicts with other people or recreation activities while you were visiting the Arrow Lakes (elaboration)?

Response
On-site Responses (n = 99)
Property owners who think they own below high water level on shore, Using 4 wheeler and Albertans who think they own all the local campsites (pay and non-pay).
Provincial park campgrounds have such strict rules that it takes away from the enjoyment.
Quaders abusing facilities.
Rarely – more so with work.
Rude people at the boat launch, don't wait their turn when others are loading up. People taking too long and holding others up. No common sense.
Snowmobiles on road.
Some noisy campers, *i.e.* loud music in campsites.
Some people at the dock loading and unloading don't wait their turn and are very rude. Its a double wide ramp with only one dock so there is confusion when its is busy. A second dock would be great and act as a jetty.
Some people don't like having the dog around so we find more private beaches/places.
Sometimes our dogs and other dogs.
Sometimes the camp hosts or facility operator have a confrontational approach.
Swimmers on boat launch.
Syringa launch is not a friendly place to launch your boat. People are frustrated with long waits to put bots in or out of water. Short-tempered people lose their cool very fast. You need to wharfs in on north side of ramp so two boats can be put in or out of water at same time. North side wharfs should also act as a breakwater when you have a south wind. It is really difficult to load or launch boat in those conditions.
Taking a campsite but not actually attending it for several days, especially over a long weekend when sites are a hot commodity.
The world is over populated- we are in danger of becoming another lake Okanagan.
Too noisy, loud.
Too many dogs barking and pooping in my campsite.
Uncontrolled dogs [2 respondents]
Very polite on the trail and logging guys were very friendly.
Very roomy campsite, not too crowded. I hope it will remain that way for us to return every summer.
Wake boats and speedboats create problems for canoes. Seadoos are too noisy.
We are friendly people!
We have not experienced any conflicts, but there are a lot of inexperienced boaters on the water that could certainly lead to conflicts.
We've found that everyone we run in to is very friendly, great bunch of people.
While working at the park campground.
Witnessed arguments at Nakusp boat launch.

Table 50 (cont'd). Have you ever experienced any conflicts with other people or recreation activities while you were visiting the Arrow Lakes (elaboration)?

Response
Web Responses (n = 15)
1. People driving through fish-bearing streams with trucks, 4-wheelers & dirt bikes. 2. People burning fires in the grassland on the flats. 3. Dirt bikes riding on the sandbanks. 4. Dirt bikes entering private land through hydro land. 5. People dumping garbage on the flats & at boat launch. 6. People burning huge piles of pallets at parties on the flats. 7. People driving through vegetated areas in the drawdown zone.
Campers shooting guns, noisy off-road bikes, noisy watercraft, tossing garbage.
I have had some issues with people leaving garbage and throwing garbage out of boats. I am constantly picking up bottles and other floating material out of the water. There is a large amount of material coming from the Revelstoke area when I am fishing in the river close to Revelstoke. As well there are several spots on the system that are frequented by teenagers who light fires on the boat launch areas and leave broken glass and garbage behind.
Loud music and drinking excessively.
Many 4x4 and ATV vehicles ripping up the land and shore. Litter from people and poor campsite choices. Most folks are great to run into.
Noisy dirt bikes tearing up riverbanks and crossing streams. People ignoring or not even reading code of conduct signs, then dumping garbage and lighting fires anywhere. Dirt bikes and 4-wheelers trespassing on private property that they have accessed through hydro property.
Noisy, rude, and destructive motorized recreation.
People who litter and do not clean up after themselves on a camping or a day trip.
Roads are narrow if there is a lot of traffic - nowhere to pass - single track. ATV traffic mud bogging, noisy and destroying areas. Should stick to trails. People from Alberta poaching fish.
Seadoos, skidoos, dirt bikes & quads are a noisy intrusion.
Water skiers and sea-dooers not respecting fishing boats/swimmers.
YES! People disobey DDZM management rules and are on the flats, sandbars, etc. with ATV\'s, dirt bikes. This disturbs habitat and puts fossil fuels into the water. There are also increased jet ski and speedboat activity. These are different than lower speed anglers. The high speed rec stuff disturbs the shore line with their wake, and the jet boats are two stroke, way too much emissions, and very, very noisy. These folks are recreating at the expense of other users and the habitat.

Q5 – Additional comments

Table 50. Q5. Compared to the water levels that you experienced today, how might different water levels affect your use of the Arrow Lakes for recreation activities? Elaboration.

Response
On-site Respondents (n = 219)
2011 is the highest we have ever seen.
A consistent level is the key. The fluctuations are the problem.
A little lower would provide more beach for the kids.
A safe place for boats on the lake would be nice for campers.
All good, high or low.
Allowing over pool conditions causes considerable erosion and must be prevented.
Although things like shore launches are affected by higher water levels, it would not prevent me from visiting Kinbasket lake.
Arrow lake is beautiful.
As long as boat launches are useable given water level. Eagle bay ramp is not long enough for low water.
As long as it does not drop too far down, a long walk to the water is tough.
At low flow i have to carry my kayak to get into Mt Cartier Bay.
At this time the water is high- very limited, useable shoreline.
Aug. 2011 levels are higher than they have been in past 14 years. Results in less beach space around the lake.
Beach is important.
Beach is important to campers.
Boat dock is not even in the water!
Can't put a boat in at the Revelstoke ballpark. Launch is in terrible shape.
Cant say, don’t know what the difference is.
Come to see lifetime friends. Too beautiful to miss.
Constant level more stabilized.
Current level high limited beach access & debris in water.
Depends on how low and how much "planted grass!" is on the shore.
Despite water levels it doesn't matter for we have enjoyed all levels over the last 9 years.
Difficult to put boat in at low water levels.
Doesn't matter how high or low the water, its awesome!!
Doesn't matter, just nice to come and appreciate what we have in this area.
Doesn’t really matter.
Don't really know but if there is no beach we might not come back.
Don't really make a huge difference on the main things do here.
Enjoy experience of arrow lakes.
Establish a useable water level that will support a wider variety of aquatic life.
Extremely high water level resulting in loss of beach.
First time camping in this location.
Floating debris in water i.e., logs.
For a boat launch the wharf is on dry land.
From what we have seen, and for our swimming and beach use, all levels would be acceptable.

Table 51 (cont'd). Compared to the water levels that you experienced today, how might different water levels affect your use of the Arrow Lakes for recreation activities? Elaboration.

Response
On-site Respondents (n = 219)
Go for fish ladders in coulee dam to restore salmon runs.
Has frequently been to low- great this year.
High H_2O such as today is my least favorite. It is the most limiting as to what you can do on the lake for me. It would be nice to know when H_2O will be up or down & for how long. There is much less recreation available on the lake when H_2O is high especially around Revelstoke.
High water = warm water.
High water level makes a wonderful sandy beach.
High water like today is better than low water for my purposes.
Higher levels make better hiding grounds for fish, and it also increases possible natural vegetation cover from predator fish.
Higher the better.
How low is low? How high is high?
I always have fun in the water no matter what level it is at.
I beach comb & collect minerals, driftwood items for craft purposes- I adapt to water levels.
I can't say I won't be back.
I do not want the water so high that there are no beaches- we love beaches.
I don't use the water when it is low because it is also cold.
I enjoy the amount of beach available when water is low.
I fish at any water level.
I have been coming to Kinbasket lake since i was a child.
I have fished and travelled the Columbia system from headwater to the 49th parallel.
I know nothing about this area being from the Coast (Langley). I'm not impressed with the shoreline here at bush as there is too much debris even to swim.
I live here.
I live here and do not like the fluctuations - gets too low.
I live here and will always come back.
I live here so I'll always be back.
I live here so will come back no matter what the level is. A stable level would be best for habitat.
I live here so will swim anyway & do recreational activities.
I live in Edgewood and coming to the lake is part of life here.
I lose land every year but I get a very poor from Hydro.
I love it here the levels could be a little lower but if not I will still come back.
I love this place, the boat ramp needs to be upgraded!
I prefer water levels to be lower to expose beaches to a certain extent. However, i like the marinas and boat ramps to be safe and satisfactory. We need more marinas.
I understand the need for fluctuating water levels.
I will always come back because I love it.
I will always come back here; staff welcomed us home this year and loved it. I love the quiet and love to unwind here. Hate that it is getting busier each year we come.
I will always come back. It would just be nice to maintain one level. It is not possible i know but you asked.
I will stay as I am used to all levels.

Table 51 (cont'd). Compared to the water levels that you experienced today, how might different water levels affect your use of the Arrow Lakes for recreation activities? Elaboration.

Response
On-site Respondents (n = 219)
I wish to use the hot springs.
I would be skeptical of fluctuating water levels drastically.
I'd prefer it lower as in past years, but will enjoy my stay if it is bit higher.
I'll always come back as long as there is enough water to launch. 10-12' below full pond would be ideal.
I'm in a canoe so water level not so important.
If I can launch my boat I'm happy.
If I want to go fishing I have no choice in the water levels.
If it gets too low it is dangerous with the rocks.
If the water is too high the levels limit beach-camping-picnic space.
If the water level is higher there isn't much for beaches, if its lower we go for picnics or 4x4ing.
If the water levels were to change from their seasonal levels, i.e., low in spring, high in winter, I would be disappointed.
If too low, harder to launch boat.
If water levels were any higher there would be no beach.
In the summer the water level needs to be higher to access the beach for swimming.
Increase length dock.
It can adapt.
It is a great place to spend some time- great balance of water, shops etc.
It is a reservoir/lake. I grew up in trail and witnessed just how the flooding prior to the dam - quite something to see in the day, so whatever the level I'll use and enjoy!
It is beautiful here come back many times no matter what unless flooding.
It is nice if the water levels allow use of beaches along the lake.
It really doesn't matter to me.
It was our first time here - I will remember this on our next trip here!
It would be nice to see a steady level.
It's beautiful.
It's comfortable.
It's nice not to have to walk a mile for my kids to swim & be active.
It's too beautiful an area to let H_2O levels dissuade me from coming.
Just came for a swim.
Just let us have some shoreline without an empty bay.
Just use this water with nature in mind 1st. People will get by as nature allows them.
Keep H_2O level up except for emergency flood control.
Lake is full; more water will flood campsites.
Large fluctuations can cause launching problems.
Less beach if any higher.
Levels have improved over the years.
Like to be by water regardless of level.
Like to have boat access @ different water levels.
Live here.

Table 51 (cont'd). Compared to the water levels that you experienced today, how might different water levels affect your use of the Arrow Lakes for recreation activities? Elaboration.

Response
On-site Respondents (n = 219)
Live here, support local.
Love fishing.
Love it.
Love it here.
Low water challenging for sailing.
Low water level = more beaches.
Lower = bigger beaches. Higher = less beach but also less people on said beaches. Same = good fun.
Lower arrow lake is my home, water levels I have to live with.
Lower levels would make it difficult to access the areas we like to access.
Lower water is fun for quadding or for looking for rigging or tackle.
Lower water levels the public boat ramp is on land, not the water, therefore makes it very difficult to launch or retrieve your boat.
Maintaining higher water levels in the summer is very desirable.
Many reasons for water fluctuations but does not stop us from returning.
Marginal boat launch capability currently.
More beach.
More stable water levels. Boat ramp out of water at lower levels.
Most of the beaches are all under water for most of the year.
Need more fish.
Needs to be lowered, no shore, land erosion.
Needs to have better parking for trucks trailers.
No beach left to walk on July 2011.
Not much choice is there now really!!!!
Not pleasant when water level is down to minimum.
Not sure what normal levels are for the area.
Note appropriate for larger sailboats that cant be moved. Same for houseboats and large powerboats.
Occasional visitor so can't comment.
Only been here in the summer.
Prefer higher lake level.
Purely aesthetics.
Regardless of water levels I will always come up the lake.
Requires more beach area.
Resident. Safe harbour issues. Channel of edge creek needs work.
Small area for beach time to share with public and locals, growth is happening.
So far the camp ground and hot springs I know about have not been flooded.
So much debris floating on account of higher than usual water level. Boating hazard! When water levels so low it makes boat ramps un-usable (Eagle Bay).
Sold our cabin because of too much fluctuation of water level!
Some years the H_2O drops too much for scenery & swimming.
Stabilize the lake- no low water.

Table 51 (cont'd). Compared to the water levels that you experienced today, how might different water levels affect your use of the Arrow Lakes for recreation activities? Elaboration.

Response
On-site Respondents (n = 219)
Stable water levels are the key to support me coming back.
Syringa is a great campground.
The Arrow Lake is the most beautiful camping spot in BC! This is our 2nd time and we plan to come back every year!
The bugs need to be controlled when the water levels go up and down. It is always nice on the arrow lakes no matter the water level.
The different water levels provide different opportunities to enjoy the area...so very beautiful!
The incredibly high levels a few years ago damaged shore.
The lake is beautiful.
The level of the water doesn't affect my recreational activities.
The water definitely affects how people spend their time here.
The water is at the highest I have experienced to date. I would not have as good of an experience if it was much higher.
The water level fluctuates way too much in the spring and summer. It screws up fishing. One year there's no beach, high water, the next year there's no beach because you're down in the rocks.
The water level has been high this year all over but is now coming down.
The water level is very high this year compared to last year at this same time.
The water level was not affecting my experience today.
The water level, as far as we can remember is the highest for this time of the year. We have been coming out here about the same time for about 10 years.
The water levels don't affect whether we come back or not.
There are almost always things to do or see regardless of the water level.
There is no beach along the campsites to even put a lawn chain. It would be much nicer if the water level was lower.
There was a perfect amount of sandy beach at the public beach- not too far to walk to get o water, but enough sand for people to spread out.
They should keep it up higher.
This is only the 2nd time I've been here this summer due to high water levels!
This is systemic to our enjoyment of Arrow Lakes.
This level would be great year round.
This site is always accessible at different levels. Wouldn't want water level to be much higher.
This year is the highest ever but still ok.
This year water level too high.
Today it's higher than ever - less fluctuation of level is best.
Today's water level must be close to peak reservoir level (July 9, 2011).
Too high not enough beaches!!
Too high- sand is all under water. Too low - sand is too far from water.
Too many variables- water levels.
Typically too low for marinas with boats.
Unable to launch with low water levels.
Water is way too high!

Table 51 (cont'd). Compared to the water levels that you experienced today, how might different water levels affect your use of the Arrow Lakes for recreation activities? Elaboration.

Response
On-site Respondents (n = 219)
Water level does not affect us.
Water level has no bearing on my camping, affects wildlife & fish.
Water level is high & dirty. Not great condition for fishing.
Water level is high, hardly any beach available. Shoreline is rocky & grassy but the water temperature is beautiful!
Water level so high no place to beach your boat!
Water level too high today, Aug 15/11.
Water levels a little too high for McDonald creek rec area & the shores across. But otherwise, all good.
Water levels are too high at this time, there are no beaches to land on for boat camping.
Water levels determine where we go on lake. Not many beaches on high water as today.
Water levels have not affected our enjoyment of the campsite or of canoeing.
Water table high or low I'm ok with!
Water too cheap for USA.
We are not interested in boating/fishing.
We enjoy our private beach near our campsite but when water level is high we don't have a beach area.
We enjoyed the lower levels.
We find it nice if water levels are a little low then there is more beach.
We love it here!
We understand the way the lake operates and are never surprised about the water level.
We visit our cabin regardless of the water level.
We want change B.C Hydro's policies.
We were here two years ago and the water levels were much lower. As a result the beach was much lower and nicer. Water is really high this year so beach is very small- too small!
We work with what is available & understand we are dealing with a fluctuating reservoir. We enjoy our outing regardless.
We would like it more stable.
We would like to see the water levels stay at what ever is required to satisfy local energy needs.
We\'re here only one day so we can't distinguish.
When it is higher than today there is so much debris and quite an excessive number of logs which make swimming unpleasant.
When it is so low, can't easily get boat in!
When water level about 3/4 full - more shore line.
When water level is too high, no beach area for swimming. When water level is too high lots of driftwood on beach & in the water causes more danger when boating. Fishing is poor when water level is high.
Will tell on radio if levels change.
With mooring pins and creek mouths water usual poses no problem.
Would like level 3m lower.
Would like more stable lake level.
Would like to see lake level more stable.
You have to understand the need for power generation and what that does to the lake levels.
You make do with what it is.

Table 51 (cont'd). Compared to the water levels that you experienced today, how might different water levels affect your use of the Arrow Lakes for recreation activities? Elaboration.

Response
Web (n = 14)
You see different things when the water is at different levels.

Response
Web (n = 14)
I like to fish in the Columbia river system between Revelstoke and Arrow lake. This is next to impossible for a good portion of the year because the water is too low and the boat launch facilities are terrible. I also fish in Arrow lake. I have spent many days on the Arrow lake over the last 30 years. I have been up and down the entire lake several times. There needs to be some fish enhancement programs in place soon. The numbers of fish, especially the Dolly Varden and trout is dwindling.
I understand the evolution of the arrow lakes, however I feel the Arrow Lakes and Nakusp should focus on the recreational opportunities present and package that with the other tourism opportunities.
I will always find a way to enjoy the recreational opportunities of the area, no matter what the water levels are.
I would like to see the level stay at a minimum 1330ft level until Thanksgiving for good fishing access.
IT IS A RESERVOIR. We live with the fluctuating water level, that is why it exists. Now that there is a minimum flow things are better. It is still not a safe place to boat, why do we allow so much high-speed use? It is crazy and BCH may get sued with a cigar boat whams into a deadhead...
Not the today. Would like to know water levels before heading there. Was searching for that information and found this survey
The date is April 6, 2011. It is too early to camp. The reservoir is very low. There is no snow on the uninundated land ("the flats" as the locals refer to these high and dry reservoir basin) so you cannot X-C ski there. The reservoir has little appeal when it is this way.
The shoreline is enjoyable at low levels as well as higher ones. During the summer, the river itself provides recreation.
The water levels are dropping lately. This is an improvement compared to the higher water levels. Lower water levels allow for more shore access, less erosion along the banks, and less debris in the water. It is better for all users of the water and shores.
The winter drop level of the Arrow Lakes creates Spring creek run-off that erodes the surrounding banks.
Too high water levels are a barrier to using shorelines, for obvious reasons. A prime example of this is the past flooding of the estuary areas off the Revelstoke Green Belt (downtown and below Arrow Heights subdivision area)--no access, not safe, etc. With permanently lower flows and water levels, an expanded and beautiful estuary trail system could be established with educational and historical benefits.
Water level should be balanced using the capability of the dam to spill, against the highest historic runoff potential, with the purpose to maintain the level within a generally more acceptable range. This is especially true beginning in April and running through until end of October. Optimum high level would be 1440 with a calculated (as above) lower level based on snowpack.
Water levels are high for this time of year with terrestrial habitat in drawdown zone partially flooded. Critical period of use for wildlife and migratory birds.
Water levels fluctuate too drastically for good/safe boating access which makes the use of the existing boat launches dangerous at some times. Both water fluctuation and poor existing boat launch construction/maintenance contribute to this problem.

Q6 – Additional comments

Table 51. Q6. Based on your experience today, will you come back to the Arrow Lakes for recreation activities? Elaboration.

Response
On-site Respondents (n = 148)
1st time.
A gem of a place, paradise, great fishing, boating, exploring, love to see a cheap marina to keep a boat here.
A public access to the lake with a good boat ramp between Nakusp & Gelena Bay would be good like around halfway river.
All the docks or wharf was still in the water - bonus. Did you ever load your boat on a trailer without a dock??
Always for camping, swimming or picnics.
As a young family this is a great place for a wide variety of activities.
As long as our friends live here.
Beautiful.
Beautiful area no matter what.
Beautiful area!
Beautiful clean water.
Beautiful lake, this is where we live!
Beautiful, relaxing atmosphere. Plants, neatness of town, friendliness of locals, waterfront walkway.
Beautiful!
Beauty.
Born and raised in this valley. Will always comeback for some reason or an other.
But coming from Germany its not so easy.
Camping.
Camping at Syringa.
Campsite needs upgrading (toilet, pump water, garbage cans).
Can't stay away, I love it here.
Catch more Dolly.
Clean water, respectful people, good facilities (although wheelchair accessibility could be improved), vibrant wildlife, beautiful scenery. I will definitely come back!
Clean, quiet, beautiful.
Close to home (convenient) easy access.
Close to home, not busy.
Desire somewhat lower water level to restore beach.
Diverse, quiet, accessible.
Don’t use boat ramp facility.
Every year.
Far more tranquil than other valleys.
Fishing. [3 responses]

Table 52 (cont'd). Based on your experience today, will you come back to the Arrow Lakes for recreation activities? Elaboration.

Response
On-site Respondents (n = 148)
Fit the activity with the water levels.
For the most part it is the only recreation area we use.
Friend has cabin on the lake.
From Cranbrook- almost didn't get a camping spot. More camping spots.
God's gift- small piece of paradise.
Great camping & shoreline.
How every year levels has caused a huge amount of drift wood and is dangerous.
However, would avoid weekends because too many people & no beaches (water level too high!).
I grew up @ Castlegar.
I have a cabin on the lake.
I know the lake will fill up.
I like the fish out of the lake, the bull trout are the best eating, Kokanee [illegible]
I like the outdoorsy feel of Arrow Lakes.
I live here. [10 responses]
I live here it's across the road from my house.
I live here since 1950.
I live here, local #1.
I live in the area, arrow lakes is a convenient recreation area.
I love it out here. Great camping and picnic facilities.
I love the place.
I love this lake.
I will always come back to this unique, scenic, green, beautiful area.
I will be back many things to see and learn!
I will come back because it is my hometown. There could still be improvements.
If I come back to Nakusp.
If the water levels come back down to expose the beaches.
If we pass by at another moment.
I'm local.
It is a beautiful lake. I hear from others that the lake level now is quite high - we are enjoying it as it is.
It is beautiful here.
It is difficult to retrieve/unload boat.
It is like a natural lake with normal water levels.
It was a lovely day.
It's a great vacation spot.
It's close to home.
Just bought a place here, hope to be coming back a lot!
Just starting out.
Live here. [8 responses]

Table 52 (cont'd). Based on your experience today, will you come back to the Arrow Lakes for recreation activities? Elaboration.

Response
On-site Respondents (n = 148)
Live here for 40 years.
Live in the area.
Local. [2 responses]
Love fishing.
Love it. [2 responses]
Love it here.
Love Nakusp town.
Love the "Kootney speed of life" here!
Love the camping.
Main purpose is to visit friends but recreation is second.
Maybe.
Not much choice.
Nothing for children, e.g., playground or even slides. No power.
Only because its close to home and work. In a few years when we retire we will go somewhere else. The campground is too small, no showers. The fishing is 50/50 because of constant water fluctuations.
Only to boat, not camping.
Own waterfront property.
Peaceful.
Personal favorite.
Personal growth thru peaceful mountain hiking and fitness.
Plan on "annual" two week visit in July.
Planning more camping trips in this area in future.
Probably never in summer.
Really enjoyed the lakeside campsites directly along the beaches. Free rec sites are great & makes for repeated weekend visits.
Resident.
S'good
Still a great campground. Lake is clean, water is high but still ok for recreational purpose.
The camping is free and open to every one; almost every time people are excellent to get along with.
The lake is beautiful & clean. Water is great for swimming. Campsites are well maintained, outhouses are clean & no strong odour. Lots of trails to hike on.
The lake is beautiful and generally clean and not crowded.
The lake scenery is 2nd to none. Fishing is usually great. When the lake is lower there is lot of spot to boat camp.
The location is beautiful.
The wharf was in the water.
This is a beautiful and clean recreation area.
This is a great campsite. Clean and always good people.
This is one of the most beautiful places in BC, Canada, the world!

Table 52 (cont'd). Based on your experience today, will you come back to the Arrow Lakes for recreation activities? Elaboration.

Response
On-site Respondents (n = 148)
This is our 3rd time to McDonald Creek and we enjoy it.
This is our favorite vacation spot- burton park. Lots of space, good hosts, not as commercial as other vacation areas.
Too busy, too much tourists.
Very beautiful place.
Very nice place.
Very nice place to relax.
Was born on arrow lakes.
Water is really pleasant to swim in.
Water is too low.
We definitely will come back!!
We don't know yet.
We enjoy camping along the arrow lakes. It would be great to have some beach area.
We have grown up coming here and enjoy it more every year!
We live here.
We love it here!!
We love our visits here!
We love the Arrow Lakes for camping, boating and water sports.
We love to camp and boat and the arrow lakes provide a great setting for this.
We think it is beautiful and fun.
We would come back more if there were showers.
Within 50km of home; a beautiful, well maintained campsite; good space between sites; meet friends here. I look forward to camping here every spring.
You never know what you will catch and every day the scenery is different.
Response
Web (n = 11)
BUT we need better boat launches and windbreaks. Also better stability with respect to water levels.
I have a summer cabin on the Upper Arrow lake.
I have lived in the area all of my life and intend to retire here.
I live here.
I live in Revelstoke.
I live in Revelstoke and chose to do so because of the proximity to recreation areas such as the Arrow Lake.
I live in Revelstoke and the Arrow Lakes area is a big attraction.
I live in the vicinity & this area is part of my life in all seasons.
Love it, it just needs to develop a bit more.
My back yard.
We live on the arrow lakes. We use the lake regularly for recreation but also to cross the water to the west shore to our property.

APPENDIX D – COMPLETED QUESTIONNAIRES BY SAMPLE DATE

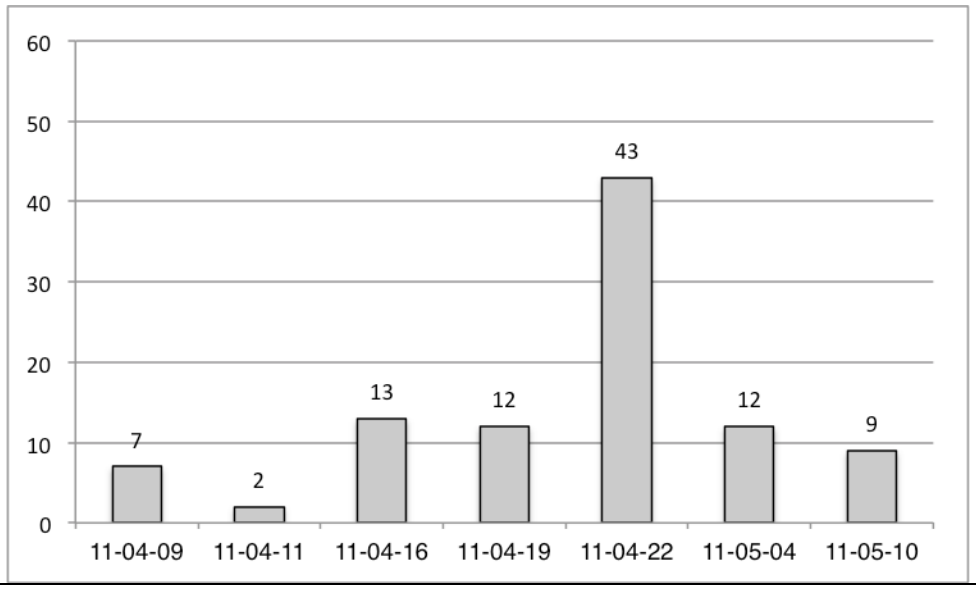

Figure 25. Completed spring questionnaires by sample date, April-May (n = 98).

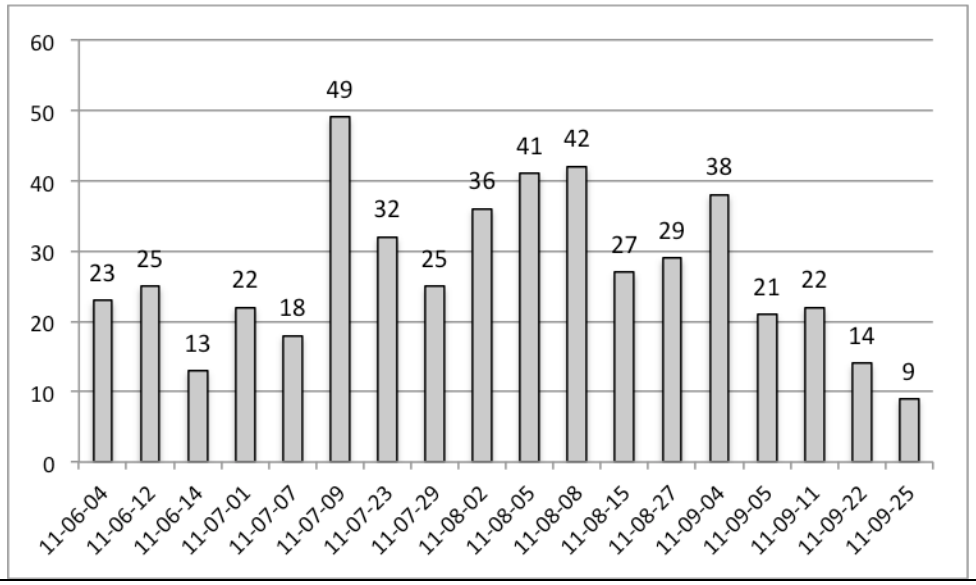

Figure 26. Completed summer questionnaires by sample date, June-September (n = 486).

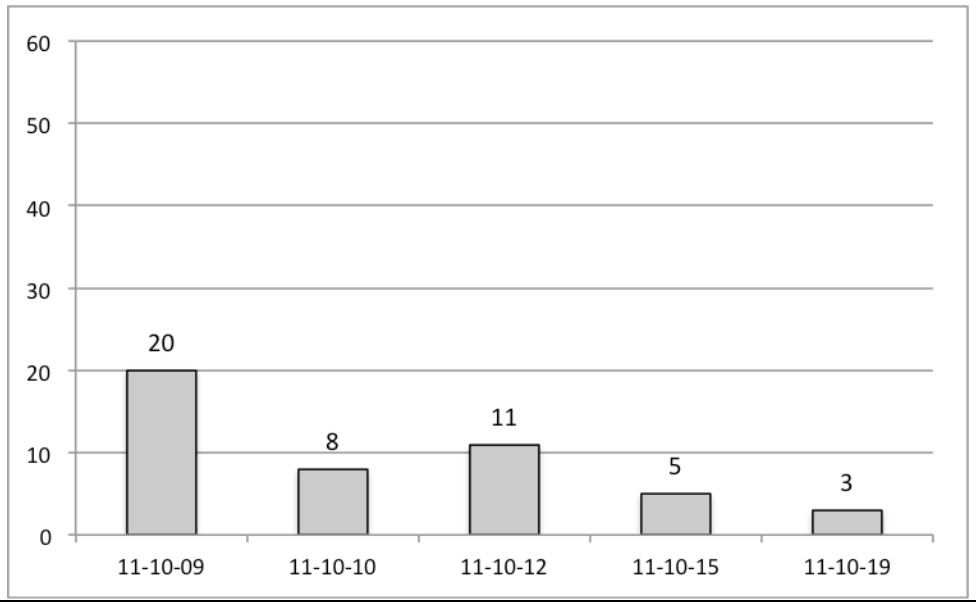

Figure 27. Completed fall questionnaires by sample date, October (n = 47).

APPENDIX E – OBSERVATIONAL DATA FORMS AND DEFINITIONS

Data Forms

- Site and Survey Log
- Detailed Daily Sample Summary

Definitions

- Wind Condition Definitions
- Water Surface Condition Definitions
- Forecasting Terminology
- Sky Conditions Definitions
- Air and Water Temperature Data Collection Procedures

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Arrow Lakes Recreation Study
Site and Survey Log

Date (dd/mm/yr)	Location	Time of env record	Sky Cond (1-14)	Wind (0-12)	Wind Dir (from)	Water Surface Cond (1-5)	Air Temp (°C)	Water Temp (°C)	# BC Plates	# Other Canada Plates	# Intn'l Plates	# Parties	Total # People visiting site	# invited to take survey	# prev taken survey this yr	# who decline taking survey	# completed surveys	# surveys to be mailed in	Staff Initials	Comment

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Page ____

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Arrow Lakes Recreation Study – Detailed Daily Sample Summary

Date: Sample Site: Surveyor: Page ____ of ____

Total # in Group	Gender	Age Range										
	Total M/F	1 – 10	11 – 15	16 – 20	21 – 30	31 – 40	41 – 50	51 – 60	61 – 70	71 +	Activities	Comments

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Arrow Reservoir Recreational Demand Study
Water Surface Condition Definitions

Water Condition	Description
1. Calm	Flat surface – some ripples, no noticeable breeze
2. Gentle	Noticeable breeze; low gentle waves
3. Small waves	Light winds – larger waves but no white caps
4. Moderate waves	Moderate winds; choppy water; white caps
5. Stormy	Strong winds; steep waves

Arrow Reservoir Recreational Demand Study
Forecasting Terminology

Condition	Description
Duration of Precipitation	• Brief - short, sudden showers or periods of rain • Intermittent - on and off intervals, not continuous • Occasional - irregular, infrequent intervals of precipitation • Frequent - persistent short intervals, happening regularly and often • Periods of precipitation - rain or snow falling most of the time with breaks
Distribution of Precipitation, as in showers	• Isolated - showers separated during a given period of time • Few - indicated in time, not over an area • Local - restricted to a smaller area • Patchy - irregularly occurring in an area • Scattered - not widespread but of greater occurrence than isolated showers
Precipitation Intensity	• Light - each drop or small flake of precipitation can be easily seen, puddles form slowly, some water flow in gutters • Moderate - water puddles quickly, roads and other surfaces collect water, rain streams down windows • Heavy - numerous flakes or sheets of rain, large puddles form, flooding can occur, visibility reduced
Cloud Cover	• Clear or sunny - free of clouds or less than one tenth cloudy • Partly cloudy or partly sunny - three tenths to six tenths of the sky is clouded • Mostly cloudy - the sky is predominantly clouded or seven tenths to eight tenths of the sky has clouds • Cloudy or overcast - the sky is covered with clouds from nine tenths to a hundred percent cloud covered
Showers vs. Rain: A Difference of Duration and Intensity	• Rain - forms from stratus clouds, more widespread over larger area, uniformly steady, less intense • Showers - forms from cumulus clouds, more isolated, short-lived, affects a smaller area, sometimes more intense
Partly Cloudy vs. Partly Sunny	According to the National Oceanic and Atmospheric Administration there is no official difference between the two terms. One or the other may be emphasized, to help clarify the meaning of the term used.

Read more: http://weatherforecasting.suite101.com/article.cfm/meteorologist_forecasting_terms#ixzz0QBMaiiTT

Arrow Reservoir Recreational Demand Study
Wind Condition
Definitions

International Description	Specifications	Beaufort Number	MPH	Knots
Calm	• Calm, smoke rises vertically	0	< 1	< 1
Light air	• Direction of wind shown by smoke drift but not by wind vanes	1	1 - 3	1 - 3
Light Breeze	• Wind felt on face • Leaves rustle • Vanes moved by wind	2	4 - 7	4 - 6
Gentle Breeze	• Leaves and small twigs in constant motion • Wind extends light flag	3	8 - 12	7 - 10
Moderate	• Raises dust, loose paper • Small branches moved	4	13 - 18	11 - 16
Fresh	• Small trees in leaf begin to sway • Crested wavelets form on inland waters	5	19 - 24	17 - 21
Strong	• Large branches in motion • Whistling heard in telegraph wires • Umbrellas used with difficulty	6	25 - 31	22 - 27
Near Gale	• Whole trees in motion • Inconvenience felt walking against wind	7	32 - 38	28 - 33
Gale	• Breaks twigs off trees • Impedes progress	8	39 - 46	34 - 40
Strong Gale	• Slight structural damage occurs	9	47 - 54	41 - 47
Storm	• Trees uprooted • Considerable damage occurs	10	55 - 63	48 - 55
Violent Storm	• Wide Spread Damage	11	64 - 72	56 - 63
Hurricane	• Wide Spread Damage	12	73 - 82	64 - 71

Source: Oregon Emergency Management Net – Net Protocol

Arrow Reservoir Recreational Demand Study
Sky Condition
Definitions

Sky Condition	Description
1. Clear (Sunny)	< 10% cloud cover
2. Partly Cloudy (mostly sunny)	30 - 60% cloud cover
3. Mostly Cloudy (partly sunny)	70-80 % cloud cover
4. Overcast	≥ 90% cloud cover
5. Fog	Report visibility in tenths of a kilometer (*e.g.*, 100m, 200m, etc.)
6. Trace of Rain or Snow	Not enough to measure
7. Light Rain	from stratus (layers/blanket) clouds, more widespread, steady, less intense; each drop of precipitation can be easily seen, puddles form slowly, some water flow in gutters
8. Moderate Rain	water puddles quickly, roads and other surfaces collect water, rain streams down windows
9. Heavy Rain	numerous sheets of rain, large puddles form, flooding can occur, visibility reduced
10. Showers	forms from cumulus clouds, more isolated, short-lived, affects a smaller area, sometimes more intense
11. Drizzle	Fine consistent light rain, <1mm droplet size (no wind)
12. Light Snow	Visibility is > 1 km; often very little accumulation results
13. Moderate Snow	Visibility between 400m - 1km; < 10 cm in 12 hours
14. Heavy Snow	Numerous flakes, visibility <400m; 10 cm in 12 hrs or 15 cm in 24 hrs

Source: http://weatherforecasting.suite101.com/article.cfm/meteorologist_forecasting_terms

Arrow Reservoir Recreational Demand Study
Air and Water Temperature
Data Collection Procedures

Field staff should take air and water temperature readings any time between 11:00 am and 2:00 pm on each survey day. First collect air temperatures then water temperatures.

Summary of procedure for air temperature readings

1. Expose the thermometer to the air yet suspended away from any other material that may affect an accurate air temperature reading. The thermometer should be sheltered from direct solar radiation and other weather related influences.
2. Allow the thermometer to equilibrate before reading.
3. Read temperature.
4. Record temperature in the field form, along with ancillary information such as site, date, and time.

Summary of procedure for near surface water temperature readings

1. Select a representative area of the water body 2m from shore and hold the thermometer directly in the water 10 cm below the surface (*e.g.,* attach thermometer to a fishing line and pole and hang so as to have thermometer bulb about 10cm below surface).
2. Allow the immersed thermometer to equilibrate before reading (hold in water about 2 minutes).
3. Read temperature. If the thermometer is unreadable while it is immersed in the water, pull the thermometer out and check the reading quickly. Do this multiple times until an accurate reading is achieved (the lowest reading for a reading from cold water when the air is hot and still, or the highest reading if the water is warm and a wind is cooling the wet thermometer).
4. Record temperature in the field form, along with ancillary information such as site, date, and time.
5. If temperature readings are unstable (which can occur in lakes or poorly mixed streams), take multiple readings.

Suggested tips for taking the water-temperature measurements

Be careful not to break your thermometer and keep it in the shade at all times. While reading temperature, avoid warming the thermometer bulb or water sample with your hands or by the sun. Read the temperature measurements to the nearest ½ degree C.

Source: Adapted from SFU Water Studies (http://www.educ.sfu.ca/nbcr/tempprot.html), and Washington State Department of Ecology Environmental Assessment Program Standard Operating Procedures for Instantaneous Measurements of Temperature in Water http://www.ecy.wa.gov/programs/eap/qa/docs/ECY_EAP-SOP_011InstantMeasureofTempinWater.pdf
Note: Thermometers used in study: waterproof pocket thermometer (-30/+50c), not calibrated.

APPENDIX F – OBSERVATIONAL DATA SUMMARIES

APPENDIX G – SURVEY SITES LOCATION MAP

Upper Arrow

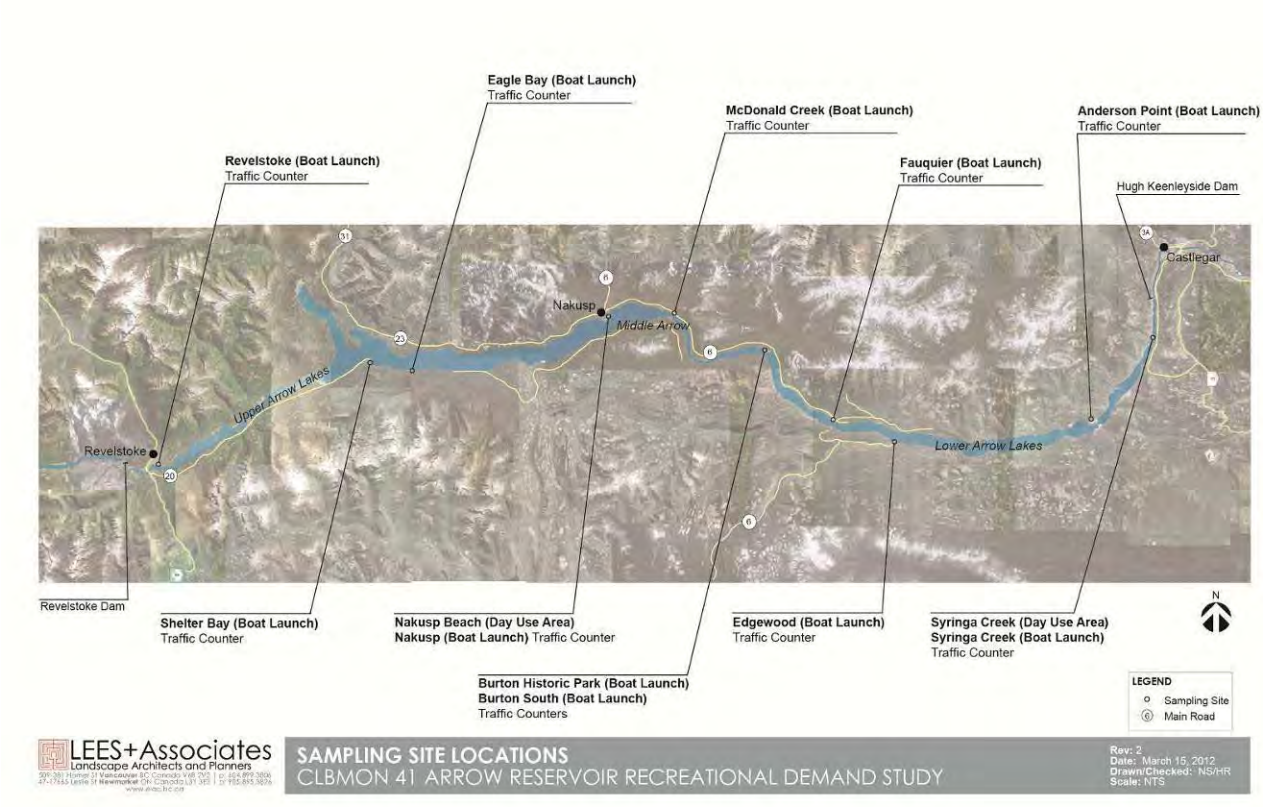
- Eagle Bay Recreation Site Boat Launch
- Shelter Bay Park Boat Launch
- Revelstoke Boat Launch

Middle Arrow

- Edgewood Park Boat Launch
- Fauquier Park Boat Launch
- Burton Historic Park Boat Launch
- Burton South Boat Launch
- McDonald Creek Park Boat Launch
- Nakusp Municipal Boat Launch
- Nakusp Beach Area

Lower Arrow

- Syringa Creek Park Boat Launch
- Syringa Creek Park Day Use Area
- Anderson Point Boat Launch



APPENDIX H – NEWS ARTICLES

- BC Hydro online survey to understand recreational use of Arrow Lakes Reservoir and Kinbasket boat ramp use. (2011, March 31). *Revelstoke Current.*
- BC Hydro online survey studies recreational use of Arrow Lakes Reservoir. (2011, April 6). *Revelstoke Times Review*.
- BC Hydro survey seeks input on Arrow Lakes boat ramp use. (2011, April 6). *The Valley Voice*.
- BC Hydro launches revised recreation survey. (2011, April 6). *Arrow Lakes News.*

BC Hydro online survey to understand recreational use of Arrow Lakes Reservoir and Kinbasket boat ramp use | Revelstoke Current

http://w w w .revelstokecurrent.com/2011/03/31/bc-hydro-online-survey-to-understand-recreational-use-of-arrow -lakes-reservoir-andkinbasket-boat-ramp-use/ April 6, 2011

Posted by editor on March 31, 2011

Harry Anderson and Dave Fitchett are two of the LEES and Associates surveyors finding out what people hope to see done with boat ramps on the Kinbasket and Arrow Lakes. *Photo courtesy of BC Hydro*

BC Hydro has announced an improved online survey now available at www.arrow-kinbasket-recreationsurvey.ca as part of its studies to understand water and shore-based recreational use of Arrow Lakes Reservoir and boat ramp use of Kinbasket Reservoir.

The online survey asks questions about reservoir recreation including boat ramp use, frequency of recreational activity, location, infrastructure requirements, user demographics, and level of familiarity with Arrow and Kinbasket Lakes reservoirs.

“BC Hydro wants to better understand current recreational use of Arrow Lakes Reservoir and use of Kinbasket Reservoir boat ramps as recommended by the Columbia River Water Use Plan,” Alan Chan-McLeod, Hydro’s Columbia River Water Use Plan Physical Works Lead, said in a statement Thursday. “This information will help guide future decision-making on recreational improvements.”

The studies are being delivered by LEES and Associates. Data on recreational use is being collected at established recreation sites on Arrow Lakes Reservoir through traffic counters, face-to-face surveys with reservoir users, and online surveys. Kinbasket boat ramp use data is being collected through face-to-face surveys, online surveys and traffic counters installed at existing boat ramps.

“Last year, traffic counters installed at established boat launch locations recorded close to 24,000 boat launches at Arrow Lakes Reservoir ramps between October 1, 2009 and September 30, 2010,” said Erik Lees from LEES and Associates, “and a total of 1,354 boat launches were recorded at Kinbasket Reservoir ramps between April 9, 2010 and Sep 30, 2010.

Study staff will be at randomly selected Arrow Lakes and Kinbasket reservoir access points from spring to fall this year to continue face-to-face surveys with reservoir users. To date a total of 641 face-to-face surveys have been completed as well as 39 responses to the pilot online survey that operated last year. The Columbia River Water Use Plan, now in its fifth year of implementation, recommends a large number of monitoring programs and projects over 12 years to provide benefits to a variety of nonpower interests along the Columbia River mainstem including recreation, fish and fish habitat, wildlife, vegetation, and heritage. The plan calls for debris management, boat ramp improvements, and recreation demand studies on Arrow Lakes and Kinbasket reservoirs to benefit boat recreation.

Revelstoke Times Review - News

BC Hydro online survey studies recreational use of Arrow Lakes Reservoir

By Aaron Orlando - Revelstoke Times Review
Published: **April 06, 2011 12:00 PM**

BC Hydro has announced an improved online survey is now available at www.arrow-kinbasket-recreation-survey.ca as part of studies to understand water and shore-based recreational use of Arrow Lakes Reservoir and boat ramp use of Kinbasket Reservoir.

The online survey asks questions about reservoir recreation including boat ramp use, frequency of recreational activity, location, infrastructure requirements, user demographics and level of familiarity with Arrow and Kinbasket Lakes reservoirs.

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The survey will run through until mid-2014 and results of the survey and other study activities will be made available in a recreation demand report around at the end of 2014.

Find this article at:
http://www.bclocalnews.com/kootenay_rockies/revelstoketimesreview/news/119294809.html

The Valley Voice (April 6th, 2011)
Serving every home between Edgewood,
Kaslo and South Slocan (on the Arrow Lakes)

BC Hydro survey seeks input on Arrow Lakes boat ramp use

submitted by BC Hydro

BC Hydro has recently posted an improved online survey as part of studies to understand water and shore-based recreational use of Arrow Lakes Reservoir and boat ramp use of Kinbasket Reservoir.

The online survey asks questions about reservoir recreation including boat ramp use, frequency of recreational activity, location, infrastructure requirements, user demographics, and level of familiarity with Arrow and Kinbasket Lakes reservoirs. Alan Chan-McLeod, BC Hydro's Columbia River Water Use Plan Physical Works Lead, said the information will help guide future decision-making on recreational improvements.

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"Last year, traffic counters installed at established boat launch locations recorded close to 24,000 boat launches at Arrow Lakes Reservoir ramps between October 1, 2009 and September 30, 2010," said Erik Lees from LEES and Associates, which is conducting the study. "A total of 1,354 boat launches were recorded at Kinbasket Reservoir ramps between April 9, 2010 and September 30, 2010."

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To participate visit www.arrow-kinbasket-recreation-survey.ca.

BC Hydro launches revised recreation survey

By Staff Writer - Arrow Lakes News
Published: **April 06, 2011 5:00 PM**
Updated: **April 07, 2011 12:09 PM**

BC Hydro has announced an improved online survey is now available at www.arrow-kinbasket-recreation-survey.ca as part of studies to understand water and shore-based recreational use of Arrow Lakes Reservoir and boat ramp use of Kinbasket Reservoir.

The online survey asks questions about reservoir recreation including boat ramp use, frequency of recreational activity, location, infrastructure requirements, user demographics and level of familiarity with Arrow and Kinbasket Lakes reservoirs.

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The survey will run through until mid-2014 and results of the survey and other study activities will be made available in a recreation demand report around at the end of 2014.

Find this article at: http://www.arrowlakesnews.com/news/119367584.html