Columbia River Project Water Use Plan

Kinbasket and Arrow Reservoir Recreation Management Plan

Boat Ramp Use Study

Implementation Year 1

Reference: CLBMON-14

Boat Ramp Use Study

Study Period: 2010

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Boat Ramp Use Study

Kinbasket and Arrow Lakes

CLBMON 14

2010 (Year 1) Results

March 24, 2011

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CLBMON 14 STATUS of OBJECTIVES, MANAGEMENT QUESTIONS and HYPOTHESES after Year 1

Objectives	Management Questions	Management Hypotheses	Year 1 (2010) Status
The objective of this study is to monitor trends in public use of boat ramp facilities where access improvements have been made as part of the Columbia River WUP, and assess the effectiveness of these projects in providing benefits to recreational interests in the area.	1) Does public use of boat ramps increase on Kinbasket and Arrow Lakes reservoirs after installation and upgrading of the WUP boat ramp facilities?	H1: The volume of public use of existing boat ramps where improvements have been undertaken increases over time following implementation of the Water Use Plan.	Year 1 results do not provide sufficient data to measure changes in volume of public use or effectiveness of new access facilities. Expecting more data in 2011.
	2) If there is an increasing use of new or improved facilities, is it due to existing users visiting more often or new users being attracted to the area?	H2: The volume of public use of new boat ramps increases with the availability of new access opportunities. H2A: The volume of public use of new boat ramps does not reduce the usage of nearby existing boat ramps negatively. H2B: The volume of public use increases due to new users being attracted.	Year 1 results do not provide sufficient data to measure changes in volume of public use or effectiveness of new access facilities. Expecting more data in 2011.
	3) Does user satisfaction increase with improvements made to the existing boat ramps and construction of the new boat ramps?	H3: User satisfaction of the new and upgraded boat ramps is greater than that experienced by users of the older facilities.	Year 1 results do not provide sufficient data to measure changes in volume of public use or effectiveness of new access facilities. Expecting more data in 2011.

	4) Is there a need for installation of additional facilities to satisfy the needs of boat users on Kinbasket Reservoir and Arrow Lakes Reservoir?	H4: There are no changes in the socio-demographic or trip behavior characteristics of users of boat ramps on Kinbasket and Arrow Lakes reservoirs.	Year 1 results do not provide sufficient data to measure changes in volume of public use or effectiveness of new access facilities. Expecting more data in 2011.

Table of Contents

1. Executive Summary

Commissioned in 2010, the Boat Ramp Use Study is a 10-year study that will measure levels of public use and user satisfaction at boat launch sites on the Arrow Lakes and Kinbasket Lake where access improvements have been made. 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.

Concurrent to this study, BC Hydro is conducting the Arrow Lakes Recreational Demand Study (CLBMON 41), a 5-year study focusing on the relationship between reservoir levels and intensity of recreational use on the Arrow Lakes. Although the Boat Ramp Use study spans 10 years and encompasses both the Arrow and Kinbasket Lakes, there are significant similarities and overlaps between the two studies. In order to minimize the need for multiple interviews and the potential for survey fatigue these two studies have been combined into one delivery model that produces two separate and distinct reports. This report summarizes the 2010 results of CLBMON14.

1.1 Methodology

To address CLBMON14's management questions and supporting hypotheses, specific parameters are being measured through a combination of monitoring (traffic count and observational data collection) and interviews (onsite and online surveys). Beginning in 2010, the study period is over a 10 year horizon, with sampling occurring in Years 1 – 4 inclusive, and in Year 10.

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. Vehicle counters were installed at each boat access monitoring site and configured to most accurately record traffic at each site.

Surveyors also collected observational data about visitors they encountered, photographs of site conditions 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 was assessed using standardized forms developed for this purpose.

The survey instrument in use is a four-page booklet containing questions which comprehensively measure people's level of use, behaviours, preferences and level of satisfaction regarding boat ramp facilities on the Kinbasket and Arrow Lakes. The delivery of the onsite survey employed an entry/exit intercept survey method at six boat launches on the Arrow Lakes and two launch sites on Kinbasket Lake. An online survey was also administered in order to capture a broader set of people in and around the Kinbasket and Arrow Lakes.

1.2 Arrow Lakes Results

On the Arrow Lakes, a total of 12,337[1] vehicles used the boat ramps included in the boat ramp study from October 1, 2009 to September 30, 2010. Nakusp boat ramp accounted for about 48% of the recorded traffic. Weekly use patterns varied, with some sites receiving greater use on the weekends, and other sites receiving consistent traffic throughout the week. The consistent weekday traffic counts may be due to the construction activities that were taking place at these locations. Yearly use patterns are as expected with increasing activity in the summer months with most locations peaking in July, and then tapering off in the fall.

A total of 1,318 boat launch visitors were encountered by field staff at sample sites on the Arrow Lakes between April 2, 2010 and October 13, 2010. Field staff asked 391 visitors to participate in the survey; 313 completed questionnaires were returned, which represents an overall response rate of 80.1%

1.3 Kinbasket Lake Results

In the Kinbasket, a total of 1,354 vehicles used the boat ramps included in the study (Bush Harbour and Valemount Marina). Though only available for half the summer, the Bush Harbour ramp accounted for about 57% of the recorded boat ramp use on the Lake. As there is a marina associated with the Valemount boat ramp, there is likely significant repeated boating use that does not require the use of the ramp.

[1] Note that Anderson Point data collection began April 4, 2010 so does not represent a full year of use.

A total of 217 boat launch visitors were encountered by field staff at sample sites on Kinbasket Lake between June 16 and September 10, 2010. Field staff asked 123 visitors to participate in the survey; 79 completed questionnaires were returned, which represents an overall response rate of 62.4%. Two visitors completed the web-based survey.

1.4 Discussion

Preliminary results from the CLBMON 41 study (2010) indicate that proximity and convenience to other recreation facilities are the strongest motivations for visitors choosing a ramp facility. Visitors least like crowding and problems with dock/dock ramps at boat ramp facilities. Although preliminary, these results provide an indication of what might be important to consider in developing and maintaining reservoir access points.

Further data will indicate if daily distributions normalize during regular (non-construction) years, and whether increased use is due to improved ramp conditions.

1.5 Conclusion

Year 1 of the Boat Ramp Use study succeeded in testing the survey documents and capturing pre-improvement, and some post-improvement data, at many of the sites. At the end of the 10-year study horizon, information gained through this monitoring program will assist future decision making during the next WUP review regarding the value of implementing additional physical works to improve access to the reservoirs, and what level of continued maintenance of the existing sites is warranted.

2. Introduction

BC Hydro is currently undertaking boat ramp facility improvements at 6 locations on the Arrow Lakes and 2 locations on Kinbasket Lake (Table 1). In order to gauge the impact of these improvements, this monitoring program was commissioned in 2010 and will extend through 2019. The Boat Ramp Use Study (CLBMON 14) is a 10-year public use measurement study that will track use levels and user satisfaction at the boat launch sites where access improvements have been made. This study is one of a series of monitoring programs that fulfills BC Hydro's obligations under the Columbia River Water Use Plan as approved by the Comptroller of Water Rights.

Table 1. Locations and actions of boat ramp improvement projects.

Location	Upgrade Action	Status
Kinbasket Lake		
Valemount Marina	Ramp Extension, dock and breakwater	Not yet initiated
Bush Harbour	Complete new ramp, dock and breakwater	Ramp completed. No dock or breakwater yet installed
Arrow Lakes		
Nakusp	Replace ramp and dock	Not yet initiated
MacDonald Creek	Ramp extension, dock and breakwater	Completed
Burton	Complete new ramp, dock and breakwater	Under construction
Fauquier	Ramp extension, dock and breakwater	Completed
Edgewood	Ramp extension, dock and breakwater	Not yet initiated
Anderson Point	Complete new ramp, dock and breakwater	Not yet initiated

The study includes traffic count collection and carrying out of public surveys of boat ramp users at the eight locations identified for boat access improvements. This report summarizes and synthesizes survey responses received from onsite and online

respondents during the 2010 season, as well as traffic counter data collected from October 1, 2009 to September 30 2010. Information gained through this monitoring program will assist future decision making during the next WUP review about the value of implementing additional physical works to improve access to the reservoirs, and what level of continued maintenance of the existing sites is warranted.

Concurrent to this study, BC Hydro is conducting the Arrow Lakes Recreational Demand Study (CLBMON 41), a 5-year study focusing on the relationship between reservoir levels and intensity of recreational use on the Arrow Lakes. Although the Boat Ramp Use study spans 10 years and encompasses both the Arrow and Kinbasket Lakes, there are significant similarities and overlaps between the two studies. Therefore, these two studies have been combined into one delivery model that produces two separate and distinct reports. In order to minimize the need for multiple interviews and the potential for survey fatigue these two studies have been combined into one delivery model that produces two separate and distinct reports. This report summarizes the 2010 results of CLBMON 14. Study results are presented by geographic area, ie. Arrow Lakes and Kinbasket Lake.

2.1 Management Questions and Objectives

The key management questions to be addressed by the program are:

1. Does public use of boat ramps increase on Kinbasket and Arrow Lakes reservoirs after installation and upgrading of the WUP boat ramp facilities?
2. If there is an increasing use of new or improved facilities, is it due to existing users visiting more often or new users being attracted to the area?
3. Does user satisfaction increase with improvements made to the existing boat ramps and construction of the new boat ramps?
4. Is there a need for installation of additional facilities to satisfy the needs of boat users on Kinbasket Reservoir and Arrow Lakes Reservoir?

The main objective of the study is to monitor trends in public use of boat ramp facilities where access improvements have been made as part of the Columbia River WUP, and

assess the effectiveness of these projects in providing benefits to recreational interests in the area.

2.2 Management Hypotheses

As stated in the CLBMON 14 Boat Ramp Use Study terms of reference, there are four primary management hypotheses that will be tested by the monitoring program.

"The first hypothesis is associated with evaluating whether increasing the usability of the existing ramps over a wider range of reservoir water elevations results in increased public use relative to pre-WUP conditions, at times when water levels are low. Testing of this hypothesis is informed directly by observed trends in usage obtained through ongoing monitoring of these sites.

H1: The volume of public use of existing boat ramps where improvements have been undertaken increases over time following implementation of the Water Use Plan.

The second hypothesis is associated with determining whether construction of new ramp facilities results in increased access to the reservoir, or a shift in use away from existing boat ramps because of accessibility to the area (i.e., proximity to the boat ramp) or safer launch conditions. Testing of this hypothesis is informed both directly through use data collected during the monitoring, as well as through survey questionnaires related to user characteristics and level of user satisfaction.

H2: The volume of public use of new boat ramps increases with the availability of new access opportunities.

H2A: The volume of public use of new boat ramps does not reduce the usage of nearby existing boat ramps negatively.

H2B: The volume of public use increases due to new users being attracted.

A third hypothesis addresses possible changes to the recreation experience offered to the users of the boat ramps. The simplest indicator of a quality recreation experience is user satisfaction, which is investigated as part of the survey questionnaires. Satisfaction analysis s also considers related information that is collected during the monitoring study. Other changes to the users, such as socio-demographic characteristics or reservoir recreation behaviour related variables, are also used as indicators.

H3: User satisfaction of the new and upgraded boat ramps is greater than that experienced by users of the older facilities.

Finally, satisfaction alone does not provide any insights about changes to user groups characteristics. Therefore, it is important to monitor if user characteristics change over time.

H4: There are no changes in the socio-demographic or trip behavior characteristics of users of boat ramps on Kinbasket and Arrow Lakes reservoirs."

(Terms of Reference, p.6)

One of the key issues with the CLBMON 14 management questions and management hypotheses is the timing of improvements at each of the boat launch ramps. Ramp locations that are improved early in the study period will not have much, if any, pre-improvement data against which the post-improvement data can be compared. Conversely, ramps that are improved later in the study period (after year 4) will not have as much post-improvement data, except that gathered in year 10. This will mean that *H2b, H3 and H4* hypotheses may not be uniformly tested over every boat launch ramp location.

3. Methodology

To address the management questions and supporting hypotheses, specific parameters are being measured through a combination of monitoring (traffic counters and observational data collection) and interviews (onsite and online surveys). The study period is over a 10 year horizon, with sampling occurring in spring, summer, and fall seasons in Years 1 – 4, inclusive, and in Year 10. Sampling intensity is higher during the summer to reflect the proportional increase in volume and diversity of recreational activities during this period. At the end of each sampling year, the data is summarized in an interim report format. A comprehensive report will be prepared at the conclusion of the study, including a detailed summary of the findings as they relate to the management questions and hypotheses. This section is presented under the following headings:

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

3.1 Traffic Data Collection

Vehicle counters are a reliable tool for monitoring public recreation use and have been found to be very useful in identifying use trends and patterns to better manage public access. 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. They have many benefits applicable to the Boat Ramp Use Study including:

- Advanced microelectronic design;
- Can be installed at roadside, above or below ground;
- Self-contained design, without external wires or tubes;

- Ideal for rural, rugged and remote roads;
- Can be used as a permanent or portable counter;
- Small and easy to hide — reduces 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;
- 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 at each boat access monitoring site as per the manufacturers specifications (see Appendix A – TRAFx Vehicle Counter Specifications) to monitor the number of vehicles using the ramp facilities. Traffic counters will remain in place year-round and will continue to collect vehicle counts in years 1-4, inclusive, and in year 10 of the study.

3.1.1 Arrow Lakes Traffic Counters

At the beginning of this study traffic counters were already in place at the Boat Ramp Study locations that overlap with the Arrow Lakes Recreational Demand Study locations (i.e., Nakusp, MacDonald Creek, Burton, Fauquier, and Edgewood). An additional traffic counter was installed at Anderson Point at the beginning of April 2010. In general, the traffic counters will remain in place at old boat ramps until the construction of new boat ramp locations is completed. In Burton, the traffic counter will remain at the Historic Park boat ramp until the new ramp south of town is completed. The counter at Fauquier was moved to a new location on the south side of the ramp to accommodate placement of the large cement dock anchor. The ramp remained in operation throughout construction activities this year. The Fauquier and MacDonald Creek boat ramp and breakwater upgrades were completed this year and

work has started at the new Burton location. No work has yet been initiated at the Nakusp, Edgewood or Anderson Point locations.

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 current settings at the Arrow Lakes sites are as follows:

Table 2. Traffic counter settings at Arrow Lakes.

Location	Mode	Period	Delay	Threshold	Rate
Nakusp	VEH_4d	000	96	16	S
MacDonald Creek	VEH_2s	000	120	16	S
Burton	VEH_2s	000	120	16	S
Fauquier	VEH_2s	000	120	16	S
Edgewood	VEH_2s	000	120	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
Rate: S is slow (<50 km/h)

3.1.2 Kinbasket Lake Traffic Counters

Traffic counters were installed at the Bush Harbour and Valemount Marina boat ramps at the beginning of April 2010. Traffic counter sensitivity and delay settings were configured to most accurately record traffic at each site. The current settings at Kinbasket Lake sites are as follows:

Table 3. Traffic counter settings at Kinbasket Lake.

Location	Mode	Period	Delay	Threshold	Rate
Bush Harbour	VEH_2s	000	120	16	S
Valemount	VEH_2s	000	120	16	S

Notes:
Mode: Veh_2s = single lane traffic; Veh_4d = double lane traffic

Table 3 (cont'd). Traffic counter settings at Kinbasket Lake.

Period = 000: means timestamps
Delay: 8 = 1 sec; 96 = 12 sec; 120 = 15 sec
Threshold: Range is 3-16; 16 is least sensitive
Rate: S is slow (<50 km/h)

Extension of the boat ramp at Bush Harbour was completed this year (Figure 1).

Figure 1. Before and after photos showing new boat ramp construction at Bush Harbour.

The Valemount Boat Ramp did not have any construction upgrades performed this year and the traffic counter location is such that it should be able to remain in-situ while construction takes place in 2011.

Figure 2. Boat ramp at Valemount, October, 2010.

3.2 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 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 was assessed using standardized forms developed for this purpose (Appendix C).

Table 4. Observation data collection: variables collected each field day.

Observation	Comment
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 onsite survey. • Party size was also recorded where possible to compare with established Park stats.
Number of cars in parking lot (and origin)	• The number and origin of license plates was recorded 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 (below)
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: observational data collected each field day at 13h00.

3.3 Sampling Design

This section outlines the sampling design including details about the methods of data collection: observational data collection, traffic counter installation, onsite survey, and online survey.

The eight sampling sites included in this study (see Table 1) represent those sites that have been approved by the Comptroller of Water Rights for access improvement work, including the construction of new boat ramps and extension of existing ramps.

Sampling periods were designed to maximize the response to the user survey and to capture a broad selection of outdoor recreation participants.

Table 1. Location and actions of boat ramp improvement projects.

Location	Upgrade Action	Status
Kinbasket Lake		
Valemount Marina	Ramp Extension, dock and breakwater	Not yet initiated
Bush Harbour	Complete new ramp, dock and breakwater	Ramp completed. No dock or breakwater yet installed
Arrow Lakes		
Nakusp	Replace ramp and dock	Not yet initiated
MacDonald Creek	Ramp extension, dock and breakwater	Completed
Burton	Complete new ramp, dock and breakwater	Under construction
Fauquier	Ramp extension, dock and breakwater	Completed
Edgewood	Ramp extension, dock and breakwater	Not yet initiated
Anderson Point	Complete new ramp, dock and breakwater	Not yet initiated

3.3.1 Arrow Lakes Sampling Strategy

Sampling of the CLBMON 14 boat ramp sites on the Arrow Lakes was synchronized with the sampling days already scheduled for CLBMON-41 Arrow Lakes Recreational Demand Study. Survey days at sample sites were randomly selected (Gregoire & Buhyoff, 1999). The random sample was stratified by four factors: (1) section of the Arrow Lakes; (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 sampling horizon, this approach provides a representative sample of visitors to boat ramp sites on the Arrow Lakes.

Data collection for the 2010 season commenced Friday April 2, 2010 and finished Wednesday, October 13, 2010 (Tables 5-7). As a further step to ensure the representation of a wide range of 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). Adoption of the CLBMON 41 sampling design meant that the Lower Arrow boat ramp site (Anderson Point) averaged 10 sampling days during the year while each of the Middle Arrow boat ramp sites averaged 5 sampling days during the year. Boat ramp sites included in the CLBMON 14 study are highlighted in the following tables in **bold**:

Table 5. Spring 2010 sampling schedule - Arrow Lakes.

Date	Upper Arrow Lakes	Middle Arrow Lakes	Lower Arrow Lakes
Friday April 2	Shelter Bay	**Nakusp Boat Launch**	**Anderson Point**
Sunday April 4	Eagle Bay	**MacDonald Creek Park**	**Anderson Point**
Saturday April 10	Revelstoke Boat Launch	**Edgewood Park**	Syringa Boat Launch
Friday April 16	Eagle Bay	**Fauquier Boat Launch**	**Anderson Point**
Monday April 26	Eagle Bay	**Burton Historic Park**	Syringa Creek Day Use
Wednesday May 12	Shelter Bay	**MacDonald Creek Park**	Syringa Creek Day Use
Monday May 17	Revelstoke Boat Launch	**Nakusp Boat Launch**	Syringa Creek Day Use

Table 6. Summer 2010 sampling schedule - Arrow Lakes.

Date	Upper Arrow Lakes	Middle Arrow Lakes	Lower Arrow Lakes
Monday May 24	Eagle Bay	**Fauquier Boat Launch**	Syringa Creek Day Use
Saturday May 29	Revelstoke Boat Launch	**Fauquier Boat Launch**	**Anderson Point**
Sunday May 30	Revelstoke Boat Launch	**Edgewood Park**	**Anderson Point**
Friday June 4	Revelstoke Boat Launch	**MacDonald Creek Park**	Syringa Boat Launch
Sunday June 6	Revelstoke Boat Launch	**Burton Historic Park**	Syringa Creek Day Use
Saturday June 19	Shelter Bay	**MacDonald Creek Park**	**Anderson Point**
Saturday June 26	Shelter Bay	**Edgewood Park**	Syringa Creek Day Use
Thursday July 1	Eagle Bay	**Nakusp Beach**	**Anderson Point**
Saturday July 3	Shelter Bay	**Fauquier Boat Launch**	Syringa Creek Day Use
Thursday July 8	Eagle Bay	**Nakusp Beach**	Syringa Boat Launch
Friday July 23	Eagle Bay	**Burton Historic Park**	Syringa Boat Launch
Friday July 30	Revelstoke Boat Launch	**Nakusp Boat Launch**	**Anderson Point**
Sunday August 8	Shelter Bay	**Edgewood Park**	**Anderson Point**
Monday August 23	Shelter Bay	**Nakusp Boat Launch**	Syringa Boat Launch
Tuesday August 24	Revelstoke Boat Launch	**Nakusp Boat Launch**	**Anderson Point**
Sunday September 12	Shelter Bay	**Nakusp Beach**	Syringa Boat Launch
Tuesday September 14	Eagle Bay	**Burton Historic Park**	**Anderson Point**
Wednesday September 22	Eagle Bay	**MacDonald Creek Park**	Syringa Creek Day Use

Table 7. Fall 2010 sampling schedule - Arrow Lakes.

Date	Upper Arrow Lakes	Middle Arrow Lakes	Lower Arrow Lakes
Sunday October 3	Eagle Bay	**MacDonald Creek Park**	**Anderson Point**
Tuesday October 5	Revelstoke Boat Launch	**Nakusp Boat Launch**	Syringa Boat Launch
Saturday October 9	Revelstoke Boat Launch	**Edgewood Park**	Syringa Boat Launch
Monday October 11	Shelter Bay	**Burton Historic Park**	Syringa Boat Launch
Wednesday October 13	Shelter Bay	**Fauquier Boat Launch**	Syringa Creek Day Use

3.3.2 Kinbasket Sampling Strategy

The sampling strategy adopted for Kinbasket Lake provides that survey days at sample sites were randomly selected (Gregoire & Buhyoff, 1999). The random sample was stratified by three factors: (1) season (the number of sample days in each season is proportional to the number of days in that season); (2) type of day (*i.e.*, weekends, week days, holidays), and (3) the time of day that sampling occurs (*i.e.*, morning or afternoon).

During 2010, each sample site on Kinbasket Lake was sampled eight times. Data collection for the 2010 season commenced Thursday June 17, 2010 and finished Saturday, October 9, 2010 (Table 8). As a further step to ensure the representation of a wide range of respondents, surveyors were on site during randomly selected six-hour periods (8:00 am to 2:00 pm or 1:00 pm to 7:00 pm).

Table 8. 2010 sampling schedule - Kinbasket Lake.

Date	Location	
Spring Season		
None due to snow and water levels.		
Summer Season		
Thursday June 17	Valemount Marina	Bush Harbour
Tuesday July 20	Valemount Marina	Bush Harbour
Saturday July 24	Valemount Marina	Bush Harbour
Monday August 9	Valemount Marina	Bush Harbour
Sunday September 5	Valemount Marina	Bush Harbour
Monday September 6	Valemount Marina	Bush Harbour
Tuesday September 28	Valemount Marina	Bush Harbour
Fall Season		
Saturday October 9	Valemount Marina	Bush Harbour

3.4 Survey Delivery

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

3.4.1 Onsite Survey

All parties at a sample site were approached for inclusion in this study. People were approached *after* using a boat ramp facility so that their responses would be based on their use of the facilities 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 onsite. 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. 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 and access points on the Arrow and Kinbasket Lakes. Contact information for the project team was provided in the event that anyone had questions or concerns about the project.

3.4.2 Online Survey

In addition to the onsite survey, information about the use (or non-use) of the Kinbasket and Arrow Lakes (and reasons for non-use) was assessed through on online survey. This sample was a convenience sample that was solicited through local media (local newspapers, television, and radio). This self-selected sample was invited to participate in the online survey in order to capture a broader range of attitudes and opinions about boat ramp use (or non-use) on the Kinbasket and Arrow Lakes.

The online version of the survey was also available for onsite visitors that preferred to provide their information online. The online survey is identical to the onsite survey and is available at www.arrow-kinbasket-recreation-survey.ca.

3.5 Survey Design

Questions that specifically addressed the usage of boat ramp facilities were added to the visitor questionnaire already in use for the Arrow Lakes Recreational Demand Study (CLBMON 41). By combining surveys for CLBMON 14 with those conducted for CLBMON 41 the need for multiple interviews and the potential for survey fatigue was minimized.

The Visitor Survey questionnaire 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 and boat ramp use on the Kinbasket and Arrow Lakes be identified.

In March 2010, drafts of the additional survey questions specific to boat ramp use were circulated in order to promote discussion around question ordering, question wording, answer options, and/or question instructions. Reviewers included the ELAC team, the BC Hydro team, and members of the *Collaborative for Advanced Landscape Planning* at the *University of British Columbia*. The resulting final questionnaire now includes four questions pertaining specifically to boat ramp usage, added to Section 6. The other sections remain 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 Kinbasket and Arrow Lakes. A distinct version of the questionnaire is used in the Kinbasket sampling and Arrow Lakes sampling to avoid confusion about which lake users are being asked about (Appendix B).

The questions permit the isolation of variables to characterize boat ramp use on the Kinbasket and Arrow Lakes. 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 recreational access points (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, 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. CLBMON 14-specific questions were added to section 6:

Section 1: Arrow/Kinbasket Lakes Outdoor Recreation Activities.

Section 2: Important Outdoor Recreation Activities.

Section 3: Arrow/Kinbasket Lakes Outdoor Recreation Experiences.

Section 4: Use and Familiarity of Arrow/Kinbasket Lakes.

Section 5: Arrow/Kinbasket Lakes Outdoor Recreation Management.

Section 6: Arrow/Kinbasket Lakes Outdoor Recreation Experiences.

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.*, traffic counter and observational data and questionnaire-elicited data). Table 9 illustrates the links between the specific monitoring parameters and the management hypotheses.

Table 9. Relationship of monitoring components to management hypotheses.

Management Hypothesis	Related Data or Questionnaire Subsection
H_1: The volume of public use of existing boat ramps where improvements have been undertaken increases over time following implementation of the Water Use Plan.	Traffic Counters and Observational Data
H_2: The volume of public use of new boat ramps increases with the availability of new access opportunities. H_{2A}: The volume of public use of new boat ramps does not reduce the usage of nearby existing boat ramps negatively. H_{2B}: The volume of public use increases due to new users being attracted.	Traffic Counters and Observational Data Section 1: Outdoor Recreation Activities Section 2: Important Outdoor Recreation Activities Section 3: Outdoor Recreation Experiences Section 4: Use and Familiarity Section 5: Arrow Lakes Outdoor Recreation Management
H_3: User satisfaction of the new and upgraded boat ramps is greater than that experienced by users of the older facilities.	Section 6: Outdoor Recreation Experiences
H_4: There are no changes in the socio-demographic or trip behavior characteristics of users of boat ramps on Kinbasket and Arrow Lakes.	Section 7: Demographics

The following sections demonstrate how the data captured by the questionnaire will further inform the management questions being examined in CLBMON 14, and how the questions address the theoretical framework of the study. Figure illustrations are taken from the Arrow Lakes version of the questionnaire.

3.5.1 Section 1: Outdoor Recreation Activities

The questions in this section (Figure 3) ask about the recreation activities done on the water or onshore of the reservoir. 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_2 by measuring the frequency of use by season.

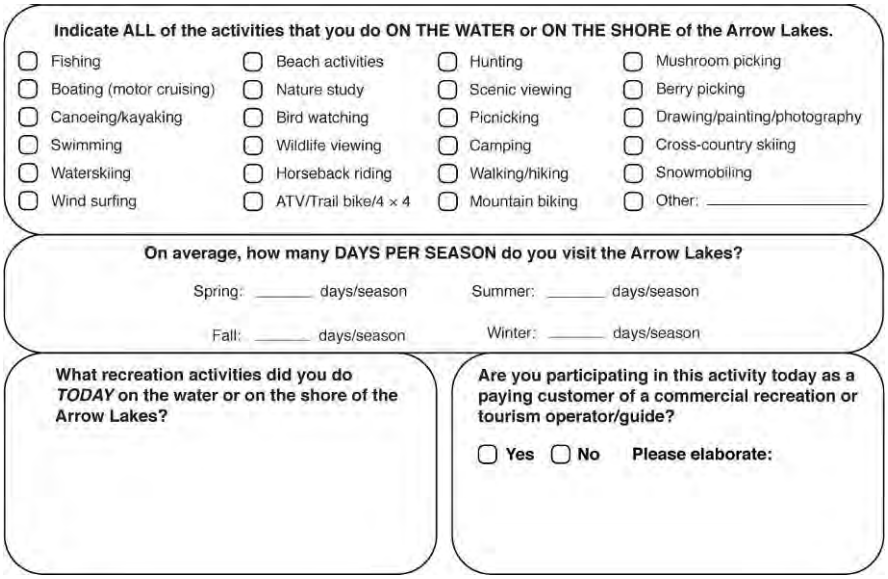
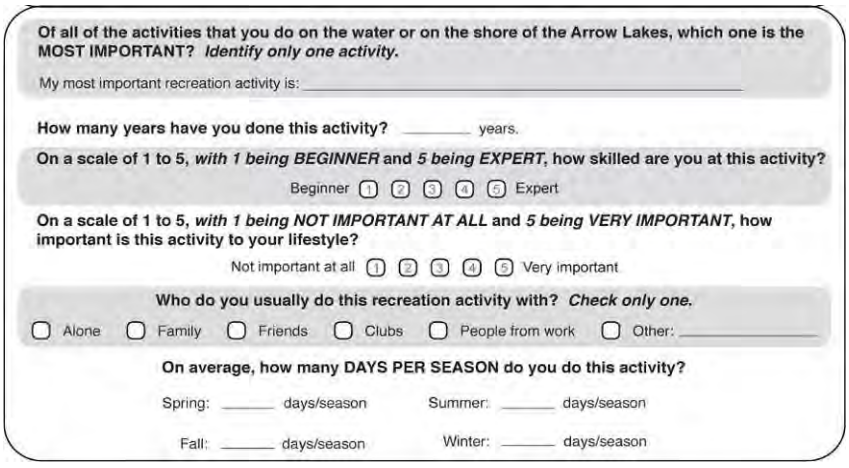


Figure 3. Section 1 questions.

3.5.2 Section 2: Important Outdoor Recreation Activities

Section 2 asks about respondents' most important outdoor recreation activities. These questions inform H_2 by providing information about the type of user, their degree of specialization and how long they have been engaged in an activity.



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.

3.5.3 Section 3: 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 reservoir 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).

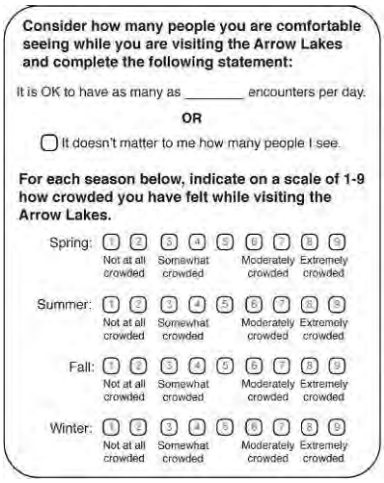


Figure 5. Section 3 questions, part 1.

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.

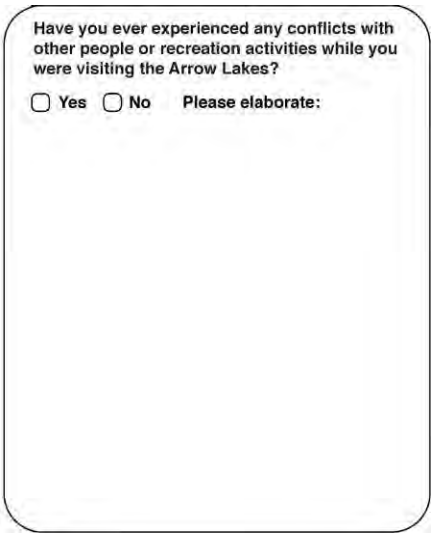


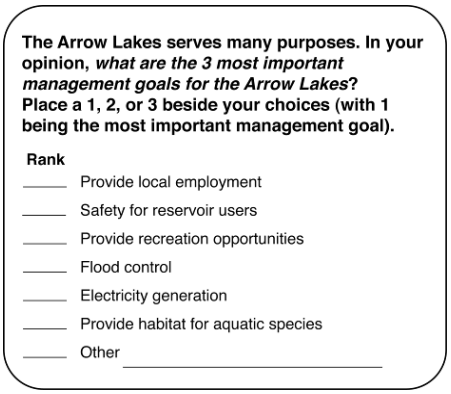
Figure 6. Section 3 questions, part 2.

3.5.4 Section 4: Use and Familiarity of Arrow Lakes/Kinbasket Lake.

This section includes two questions. The first question (Figure 7) asks about respondents' use of, and familiarity with, the reservoir. 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 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 and Kinbasket Lakes. 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 and Kinbasket Lakes, their expectations may not be realistic, and their satisfaction affected.



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 _____

Figure 8. Section 4 questions, part 2.

3.5.5 Section 5: 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 reservoir. 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 boat ramp use.

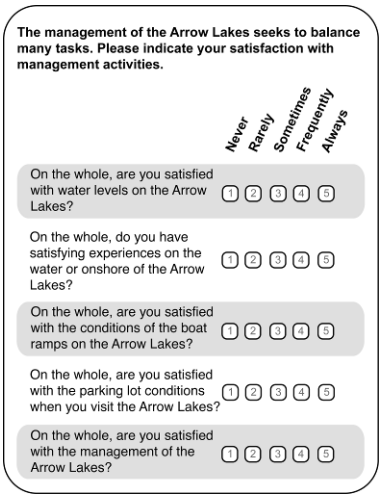


Figure 9. Section 5 questions, part 1.

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 and Kinbasket Lakes 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).

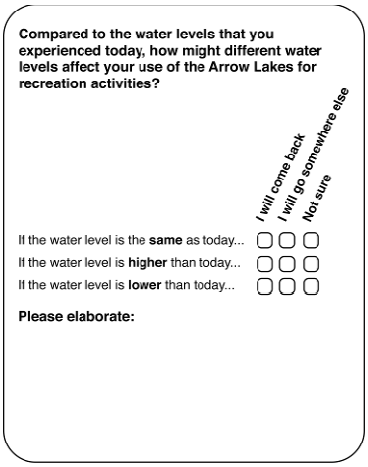


Figure 10. Section 5 questions, part 2.

3.5.6 Section 6: Arrow Lakes Outdoor Recreation Experiences.

This section has three parts (Figure 11) which ask about respondents' recreation experiences on the reservoir. The first part of this section establishes respondents' familiarity with the 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.

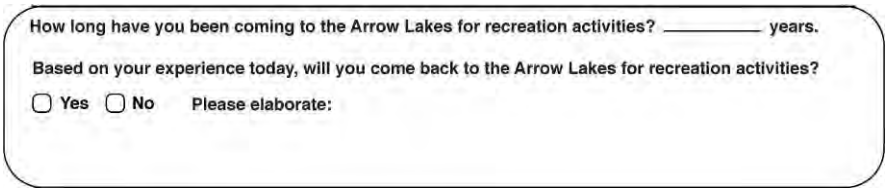


Figure 11. Section 6 questions, part 1.

The second part includes 4 questions related to respondents' experience while using boat ramp facilities (Figure 12). These questions address H_3 by asking about people's motivations, and their degree of satisfaction.

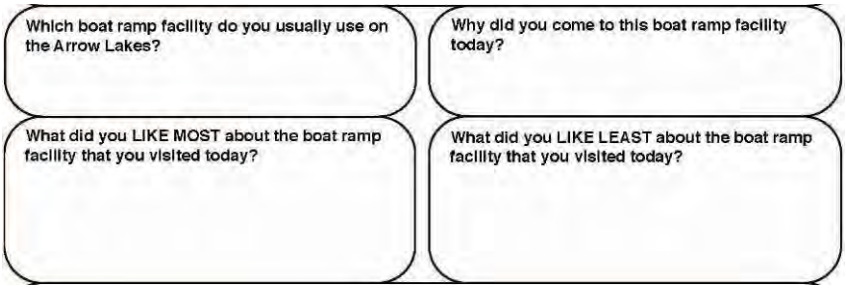


Figure 12. Section 6, part 2, questions pertaining to boat ramp use.

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

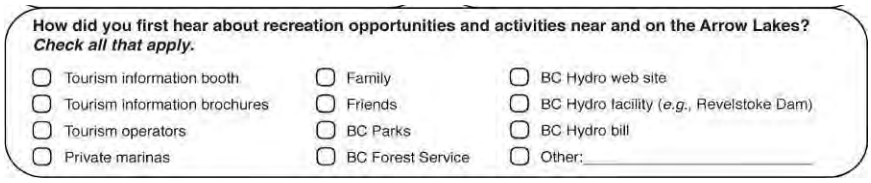


Figure 13. Section 6 questions, part 3.

Section 7: Demograhics.

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_4. This question provides data about socioeconomic characteristics, which addresses the *subjective evaluation* component of the conceptual model of satisfaction.

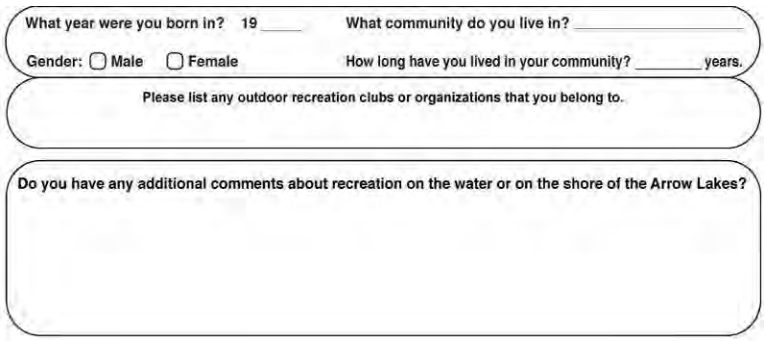


Figure 14. Section 7 questions.

3.6 Sampling 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 was calculated for questions that use an interval scale. These statistics will be presented in a future report.

3.6.1 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 was checked for outliers or obvious patterns; when these were identified they were checked against the corresponding questionnaire. No obvious “protest votes” were identified.

4. Arrow Lakes Results

4.1 Traffic Count Results

In the year from October 1, 2009 to September 30, 2010, a total of 12,337[2] vehicles used the Arrow Lakes boat ramps included in this study (Figure 15).

Year	Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AADT†	Days with data	Totals
2009	Burton[DF]									*123**	*36**	16	0	1.198	106	*437***
	Edgewood[DF]									*166**	101	101	75	3.478	113	*1,269***
	Fauquier[DF]									*70**	*17**	17	10	0.829	111	*303***
	McDonald Cr[DF]									*141**	55	31	19	1.805	113	*659***
	Nakusp[DF]									*483**	354	286	298	11.250	112	*4,106***
2010	Anderson Point[DF]				66	100	196	197	190	107	*88**			4.556	196	*1,663***
	Burton[DF]	5	8	*9**	*16**	*66**	167	215	249	35	*60**			2.890	272	*1,055***
	Edgewood[DF]	195	203	*273**	131	119	176	348	204	53	*78**			6.067	284	*2,214***
	Fauquier[DF]	8	38	*44**	28	76	55	23	16	28	*5**			1.106	282	*404***
	McDonald Cr[DF]	10	43	*42**	*67**	248	263	594	431	176	*117**			6.777	283	*2,474***
	Nakusp[DF]	302	331	*340**	388	494	661	1,502	*1,062**	323	*506**			19.643	283	*7,170***

† 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.

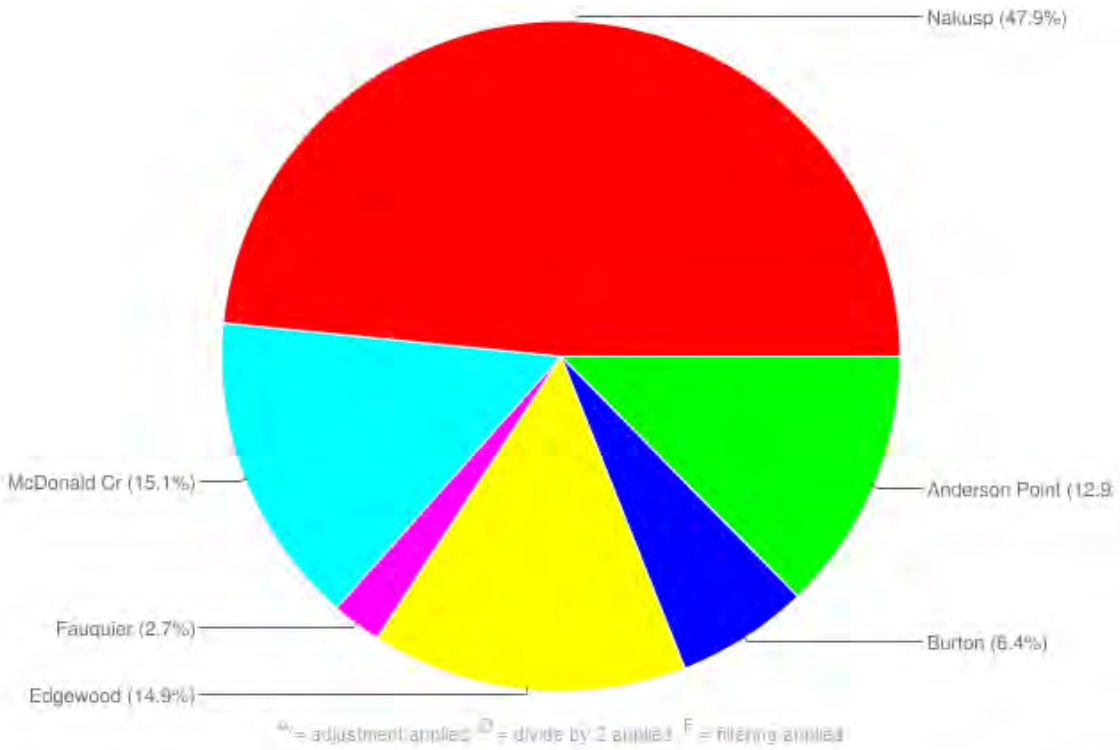
** Totals in years where data is incomplete are calculated by multiplying the AADT by the number of days in that year.

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

Figure 15. Arrow Lakes - Traffic Summary

Figure 16. Nakusp boat ramp was the busiest of the sites, with 48% of traffic in 2010.

[2] Note that Anderson Point traffic data collection began April 4, 2010, so does not represent a full year of use.



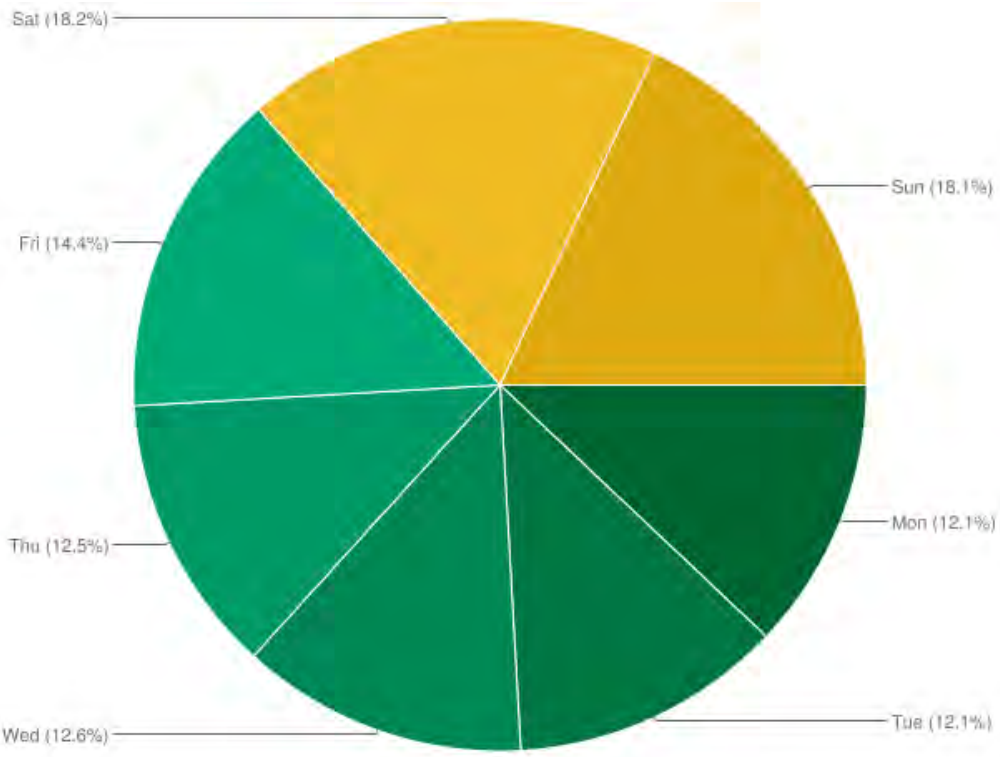
Site name	Daily average
Anderson Point[DF]	4.7 (12.9%)
Burton[DF]	2.3 (6.4%)
Edgewood[DF]	5.4 (14.9%)
Fauquier[DF]	1.0 (2.7%)
McDonald Cr[DF]	5.5 (15.1%)
Nakusp[DF]	17.4 (47.9%)

Figure 17. Arrow Lakes – Traffic by site

In 2010, the Nakusp boat ramp accounted for 48% of the recorded traffic at the selected boat ramp locations on the Arrow Lakes in this study.[3] This percentage might increase somewhat in a normal year as many of the traffic counts in May and June 2010 at MacDonald Creek were due to construction equipment activities. However, the

[3] This percentage reflects boat ramp locations monitored for this study only and does not represent the overall percentage of boat ramp use on the Arrow Lakes. The Arrow Lakes Recreational Demand Study results indicate that Nakusp Boat Launch accounts for about 27% of the overall recorded boat ramp counts on the Arrow Lakes.

construction also precluded normal boat launching activites to occur so there might also be an offsetting increase in weekday vehicle counts in a normal year.

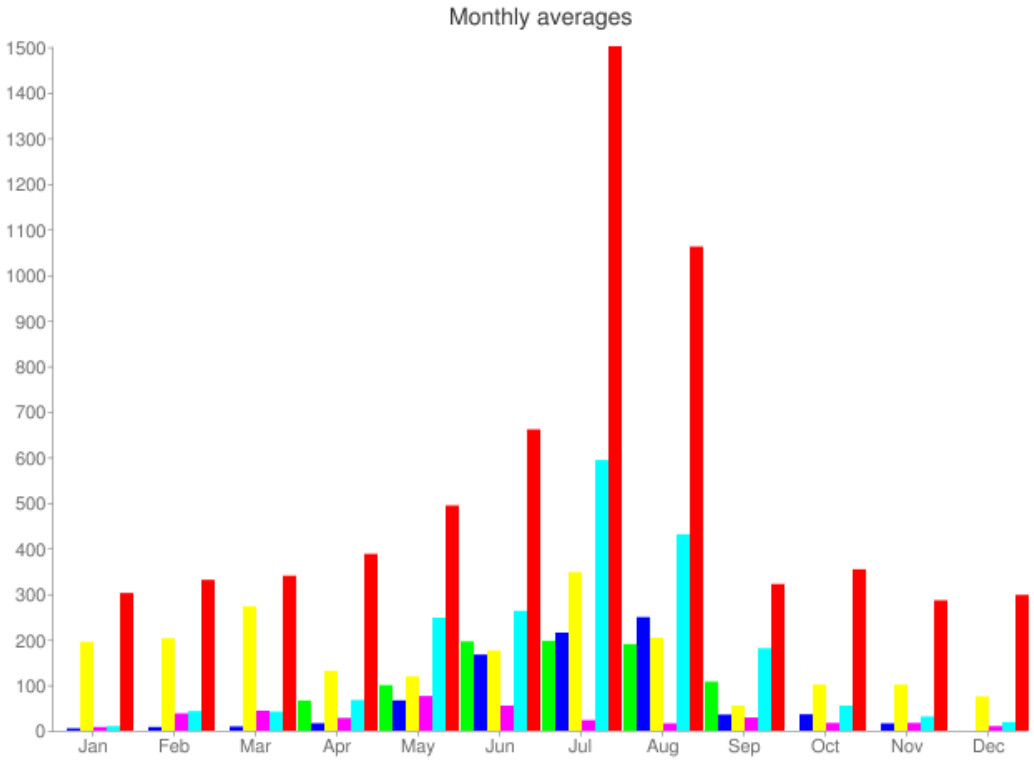


site name	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Anderson Point[DF]	4.5	3.8	3.0	4.0	5.9	5.5	6.0
Burton[DF]	2.1	2.2	2.0	1.7	2.2	3.1	3.1
Edgewood[DF]	4.5	5.0	5.3	5.1	5.8	6.6	5.9
Fauquier[DF]	0.8	1.5	0.8	0.9	0.8	1.1	1.0
McDonald Cr[DF]	5.2	5.2	4.5	5.1	5.1	6.6	6.6
Nakusp[DF]	13.6	13.1	16.3	15.0	16.8	23.4	23.4
daily averages	5.1	5.1	5.3	5.3	6.1	7.7	7.7

Figure 18. Arrow Lakes – Traffic by Days of the Week

Nakusp, Burton and Anderson Point boat ramps had an expected relationship of greater weekend than weekday use, ie. Saturdays and Sundays received about 1.5 – 2.0 times as much traffic as weekdays. Anderson Point had a higher percentage of weekday use (especially Mondays and Fridays) than other locations. This may be

attributed to a higher component of commuter rather than recreational traffic. Fauquier and MacDonald Creek had more consistent use throughout the week but this is likely due to the counts from construction activities that were taking place at these locations. Thus, one would expect that overall numbers at these two ramps might decrease and daily distributions normalize during regular operating years. This however may also be offset by increased use due to improved ramp conditions.



Site Name	Mean	Median	STDV (σpop)	Min	Max
Anderson Point[DF]	142.8	148.8	53.2	66.0	197.0
Burton[DF]	68.6	25.8	85.3	5.0	249.0
Edgewood[DF]	165.1	153.5	82.1	54.8	348.0
Fauquier[DF]	30.1	25.5	19.3	8.0	76.0
McDonald Cr[DF]	165.3	61.1	179.5	10.0	594.0
Nakusp[DF]	528.3	347.0	363.1	286.0	1,502.0

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

Figure 19. Arrow Lakes - Traffic by Months of the Year

Annual use patterns are as expected with increasing activity in the summer months with most locations peaking in July, and then tapering off in the fall. The two anomalies were Anderson Point and Fauquier. Anderson point had similar use in June, July and August which is again likely due to the high component of commuter traffic from the summer residents living across the lake. The construction improvements at the Fauquier ramp were primarily carried out over July and August so would contribute to the low numbers and variance in the pattern of activity during that time.

Figure 20. Before and after photos showing improvements at Fauquier boat launch.

Figure 21. Before and after photos showing improvements at MacDonald Creek boat launch.


Figure 22. Photos showing Burton Historic Park boat launch, and new construction south of town.

Figure 23. Nakusp boat launch.

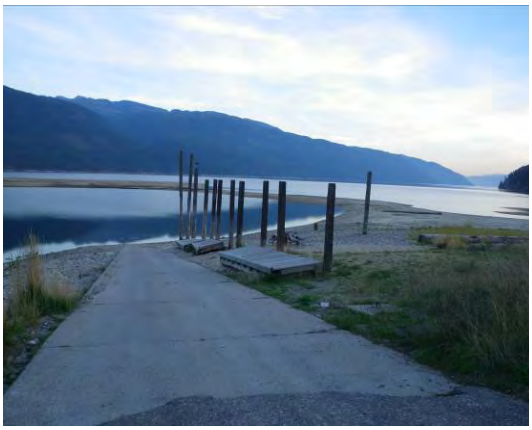


Figure 24. Edgewood boat launch.

Figure 25. Anderson Point boat launch.

4.2 Survey Results

A total of 1,318 boat launch visitors were encountered by field staff at sample sites on the Arrow Lakes between April 2, 2010 and October 13, 2010. Field staff asked 391 visitors to participate in the survey; 313 completed questionnaires were returned, which represents an overall response rate of 80.1% (Table 10). The frequency of completed questionnaires by date is illustrated in Figure 26; the frequency of completed returns by sample site is illustrated in Figure 27.

Table 10. CLBMON-14 visitor encounters and survey response rates.

Season	# Visitors Encountered	# Visitors Asked to Participate	# Completed Questionnaires	Response Rate
Spring	223	104	76	73.08%
Summer	940	218	201	92.20%
Fall	155	69	36	52.17%
TOTAL	**1,318**	**391**	**313**[†]	**80.05%**[†]

[†] 314 completed questionnaires were returned; however, one was missing information about the sample date.

In preliminary (2010) results from the CLBMON 41 study, Arrow Lakes visitors cited proximity and convenience to other recreation facilities as the most common motivations for using the boat ramp facility that they did on the day that they were surveyed. Not crowded was the element that respondents liked most about the boat ramp facility that they visited on the day that they were surveyed. Problems with dock/dock ramp was identified most frequently as the element that they liked least about the boat ramp facility that they visited on the day that they were surveyed (LEES + Associates 2010).

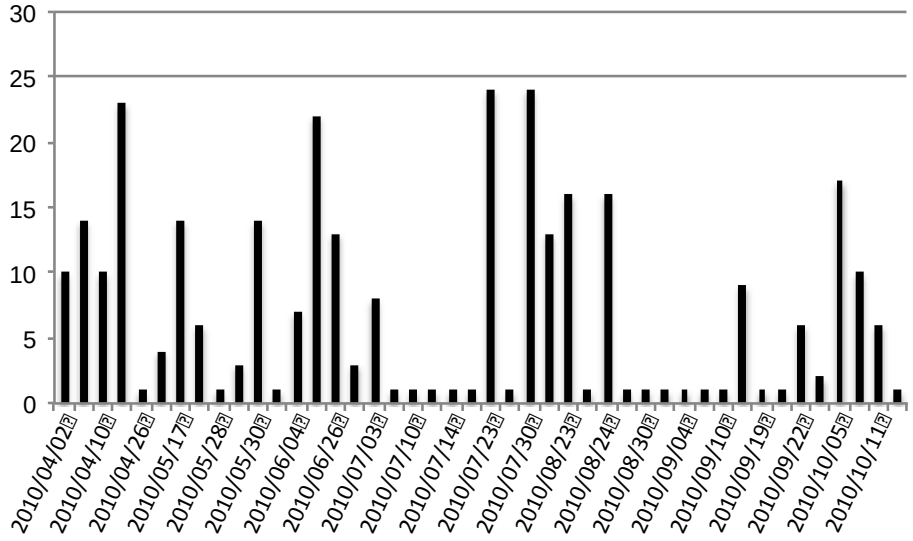


Figure 26. Completed questionnaires by sample date (n = 313†).

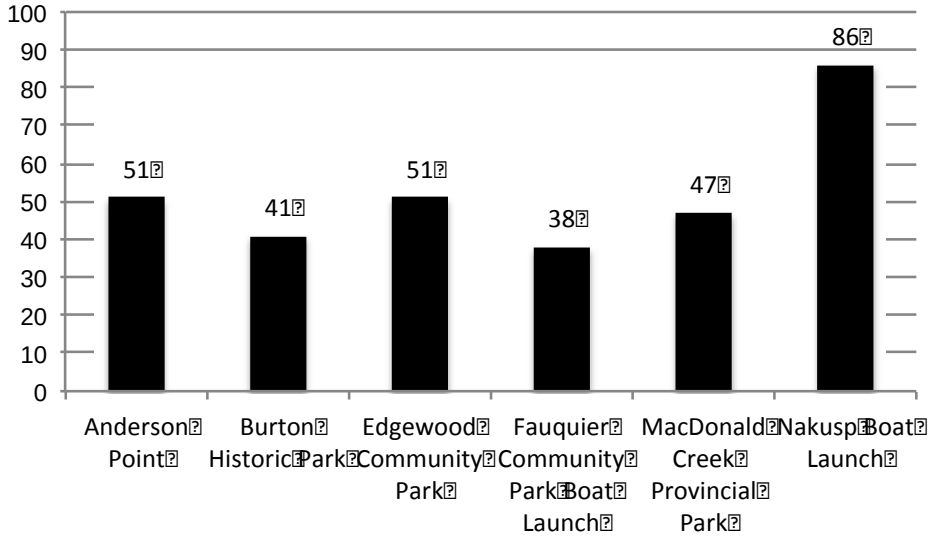


Figure 27. Completed questionnaires by sample location (n = 314).

5. Kinbasket Lake Results

5.1 Traffic Count Results

From April 4, 2010 to September 30, 2010, a total of 1,354 vehicles used the boat ramps on Kinbasket Lake included in this study (Figure 28). The Bush Harbour boat ramp construction began in early July and was completely operational on August 10, 2010. The Bush Harbour traffic counter was initially installed on the "commercial" ramp and remained there while the public ramp was being constructed about 120m to the north east. However, the water levels did not enable the launching of boats from the commercial ramp until the new ramp was virtually finished so boat ramp traffic was negligible. Thus prior to August, traffic counter readings primarily consisted of construction vehicles and equipment.

Year	Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AADT†	Days with data	Totals
2010	Bush Harbour[DF]				7*	17	11*		173*	78	103*			2.078	129	758**
	Valemount Marina[DF]				27*	14	27*	121	61	48	31*			1.632	182	596**

† 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

Figure 26. Kinbasket Lake - Traffic Summary[4]

[4] As this study began in April 2010 there is not a complete year of results. Thus extraoplations using the AADT to a full year will not be accurate.

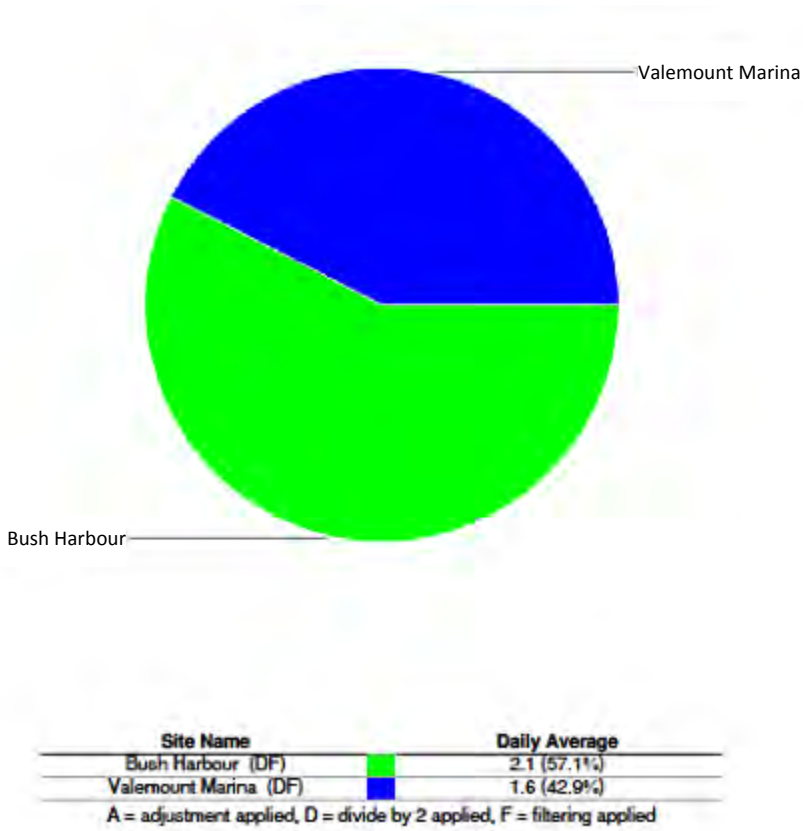
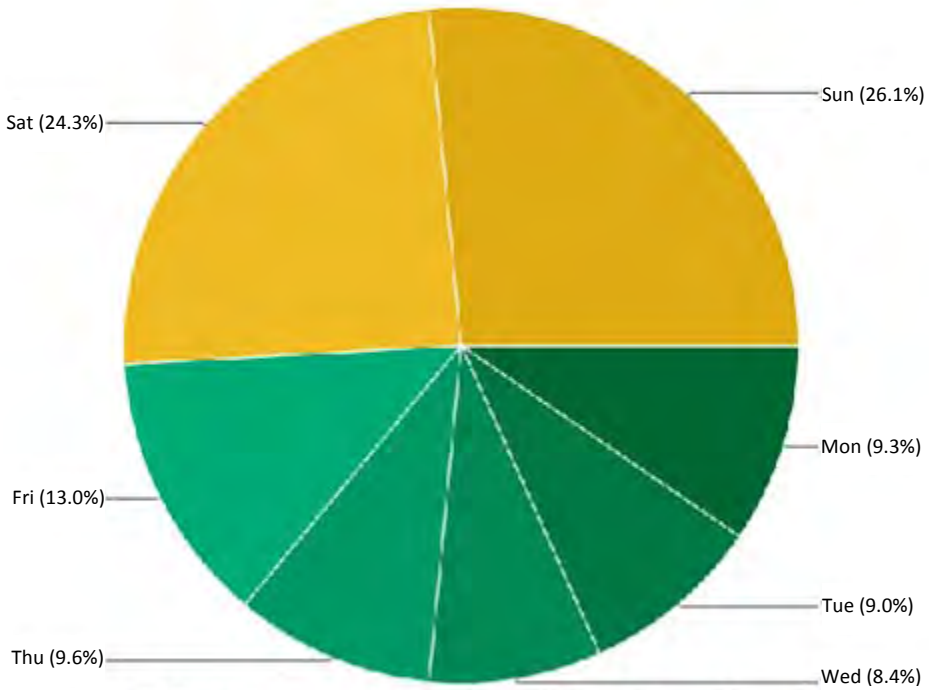


Figure 27. Kinbasket Lake - Traffic by Site

Though only available for half the summer, the Bush Harbour ramp accounted for about 57% of the recorded boat ramp use on the Lake. However, the traffic counts prior to August are primarily due to construct equipment activity. Thus, a full year of regular use will provide a better indication of actual use. Also, as there is a marina associated with the Valemount boat ramp, there would be significant repeated boating use that did not require the use of the ramp.



Site Name	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Bush Harbour (DF)	1.3	1.5	1.1	1.3	1.9	3.3	4.3
Valemount Marina (DF)	1.1	0.8	1.1	1.1	1.4	2.9	2.4
Daily Averages	1	1	1	1	2	3	3

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

Figure 28. Kinbasket Lake – Traffic by Days of the Week

As expected, most recorded use occurred on the weekends with over 50% of counts attributed to those days. Saturdays and Sundays receive two to three times as much use as other days of the week. Fridays receive about 1.5 times as much use as other week days. Sundays get the heaviest use in Bush Harbour while Saturdays do so in Valemount. In Valemount, boats are kept at the Valemount Marina dock and there are several Tourism and Recreation campgrounds close by so there would likely be more boating activity than the recorded boat ramp traffic indicates. There are no similar marinas or camping facilities in proximity to Bush Harbour so there may be more boat ramp use accommodating daily launching and loading. Bush Harbour is about a one

hour drive from Golden with 43 of the 72 km being gravel road and the Valemount Marina is 26 km south of Valemount also on a gravel road.

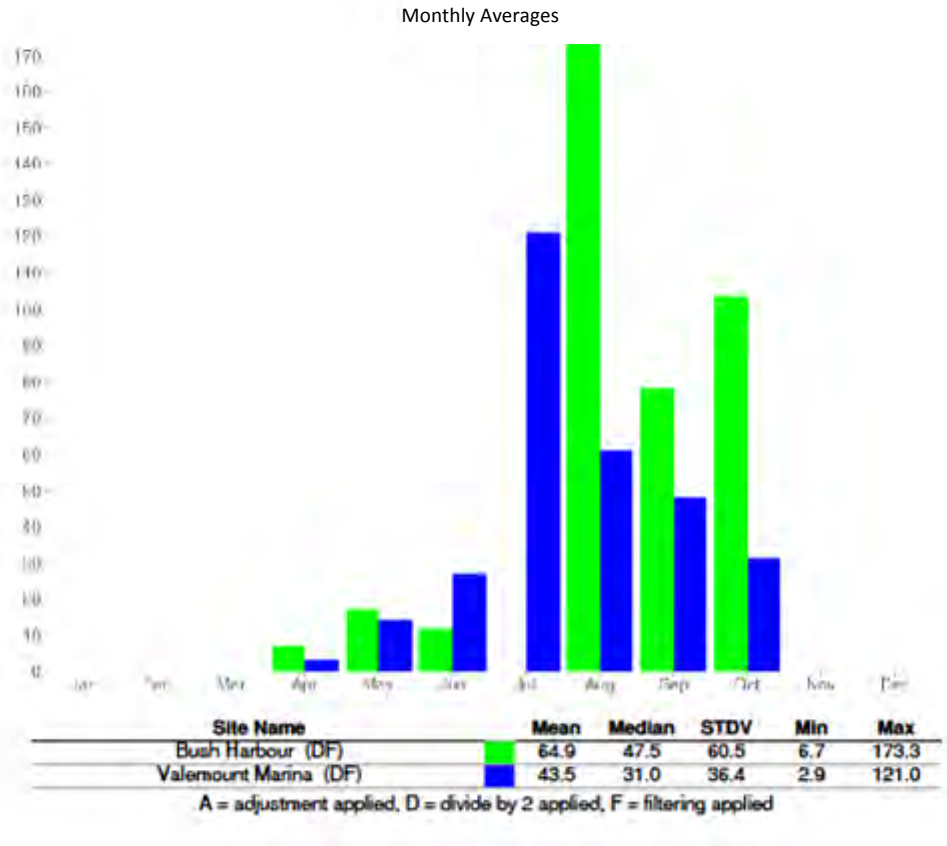


Figure 31. Kinbasket Lake – Traffic by Months of the Year

The Bush Harbour boat ramp was under construction through all of July and inaccessible to boaters. The 'commercial' ramp was available during this time but the water levels were too low to launch a boat from it until August. Thus, all recorded traffic prior to August was likely due to construction equipment or sight seers.[5] The traffic counter was moved to the new public boat ramp on Aug 12, 2010and the boat ramp was ready for public use that evening.

[5] At the 'commercial' Bush Harbour site 27 records were lost due to data transfer problems for the period June 15 – August 12, 2010 but most of those records would have been generated by construction equipment as the water levels were not sufficient to enable boat launching.

In Valemount, the heaviest boat ramp use occurred in July. Because many boats are tied up at the Marina docks once launched, overall boating use may be higher than indicated by the recorded boat ramp traffic.

5.2 Survey Results

A total of 217 boat launch visitors were encountered by field staff at sample sites on Kinbasket Lake between June 16 and September 10, 2010. Field staff asked 123 visitors to participate in the survey; 79 completed questionnaires were returned, which represents an overall response rate of 62.4% (Table 11). The frequency of completed questionnaires by date is illustrated in Figure 32; the frequency of completed returns by sample site is illustrated in Figure 33. Two visitors completed the web-based survey.

Table 11. Kinbasket Lake visitor encounters and survey response rates.

# Visitors Encountered	# Visitors Asked to Participate	# Completed Questionnaires	Response Rate
217	123	79	64.2%

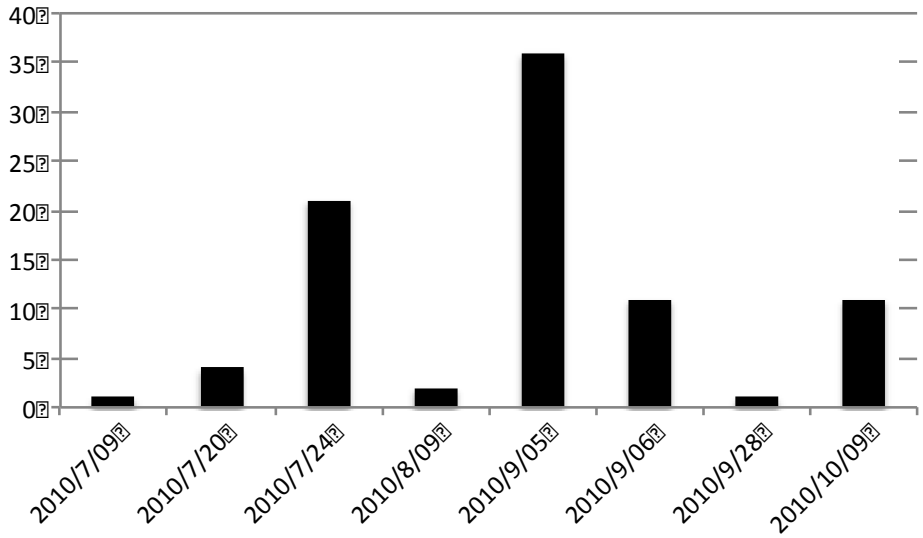


Figure 32. Completed questionnaires by sample date (n = 87).

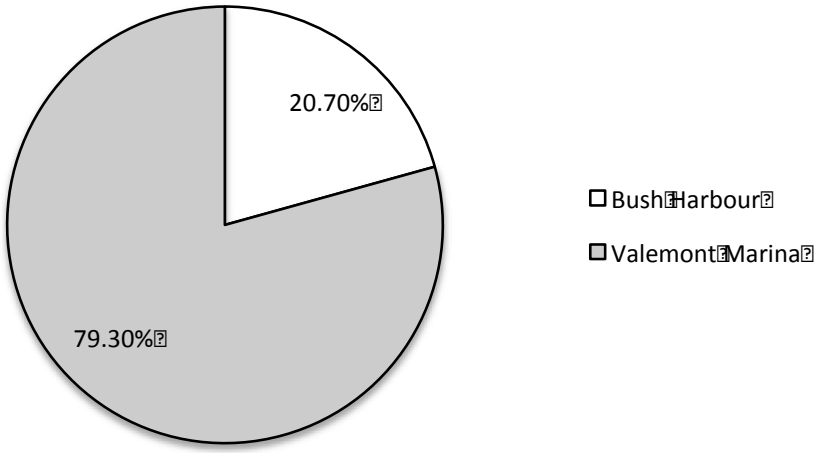


Figure 33. Completed questionnaires by sample site (n = 87).

6. Discussion

Year 1 of the study has been successful in capturing data in all seasons and in testing the online version of the survey documents and procedures. Pre-improvement and some post-improvement data was collected on the Arrow and Kinbasket Lakes. As of 2010, two ramp improvement projects were completed, two are under construction and four have yet to be initiated.

On the Arrow Lakes, Nakusp boat ramp accounted for about 48% of the recorded traffic. Weekly use patterns varied, with some sites receiving greater use on the weekends, and other sites receiving consistent traffic throughout the week. The consistent weekday traffic counts may be due to the construction activities that were taking place at these locations. Yearly use patterns are as expected with increasing activity in the summer months with most locations peaking in July, and then tapering off in the fall.

In the Kinbasket, a total of 1,354 vehicles used the boat ramps included in the study. Though only available for half the summer, the Bush Harbour ramp accounted for about 57% of the recorded boat ramp use on the Lake. As there is a marina associated with the Valemount boat ramp, there is likely significant repeated boating use that does not require the use of the ramp.

Preliminary (2010) results from the CLBMON 41 study indicate that proximity and convenience to other recreation facilities are the strongest motivations for choosing a boat ramp facility. Visitors least like crowding and problems with dock/dock ramps at boat ramp facilities. Although preliminary, these results provide an indication of what might be important to consider in developing and maintaining reservoir access points.

The comprehensive results of this 10-year study will be used to generate year round use characteristics to determine the effectiveness of these access improvement projects in providing benefits to recreational interests in the area. Further data will indicate if daily distributions normalize during regular (non-construction) years, and whether increased use is due to improved ramp conditions.

7. Conclusion

Year 1 of the Boat Ramp Use study succeeded in testing the survey documents and in capturing pre-improvement, and some post-improvement data, at many of the sites. At the end of the 10-year study horizon, information gained through this monitoring program will assist future decision making during the next WUP review regarding the value of implementing additional physical works to improve access to the reservoirs, and what level of continued maintenance of the existing sites is warranted.

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APPENDIX A – TRAFx Vehicle Counters

How were traffic counters used in this study?

Traffic counters were configured and installed at 8 boat launch facilities that were slated for construction upgrades and improvements. This includes two on Kinbasket Lake (Valemount Marina and Bush Harbour) and six on the Arrow Lakes (Nakusp, MacDonald Creek, Burton, Edgewood, Fauquier, and Anderson Point). 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 are 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 provincial and territorial governments, and numerous countries in Europe and the South Pacific

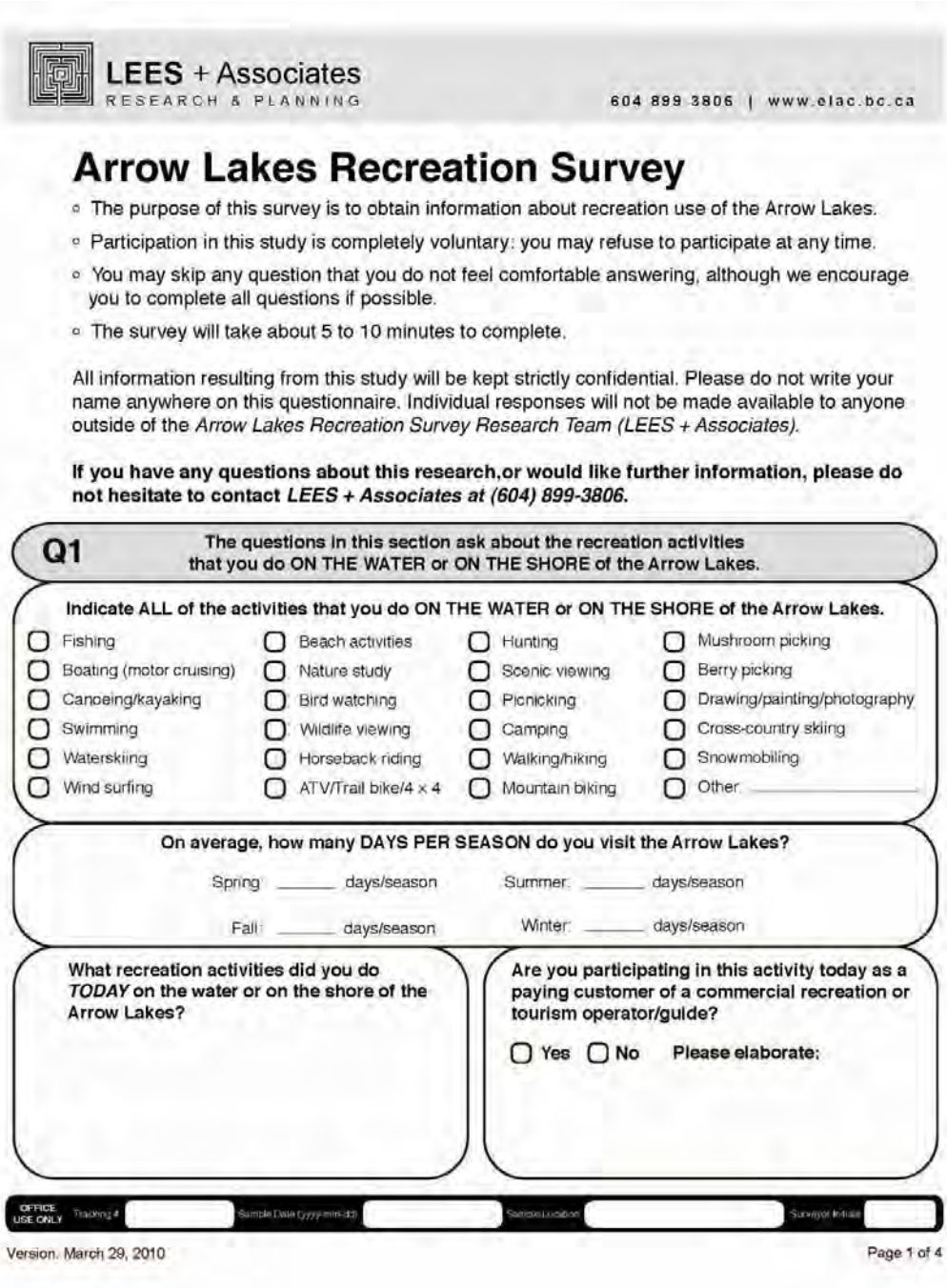
Annual Traffic Counts are collected and automatically compiled by the TRAFx DataNet system for each full calendar year. This is done to standardize the calculation and application of average daily use to missing data. The system then enables the selection of any time period across years for calculating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

In simple terms, the TRAFx DataNet estimates 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 an annual average daily traffic count (AADT) is applied to all those days of complete months that are missing. The sum of recorded and calculated counts generates the total estimate for the year.

Information courtesy of TRAFx, 2010.

APPENDIX B – Visitor Survey

(Arrow Lakes Version)



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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 x 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?

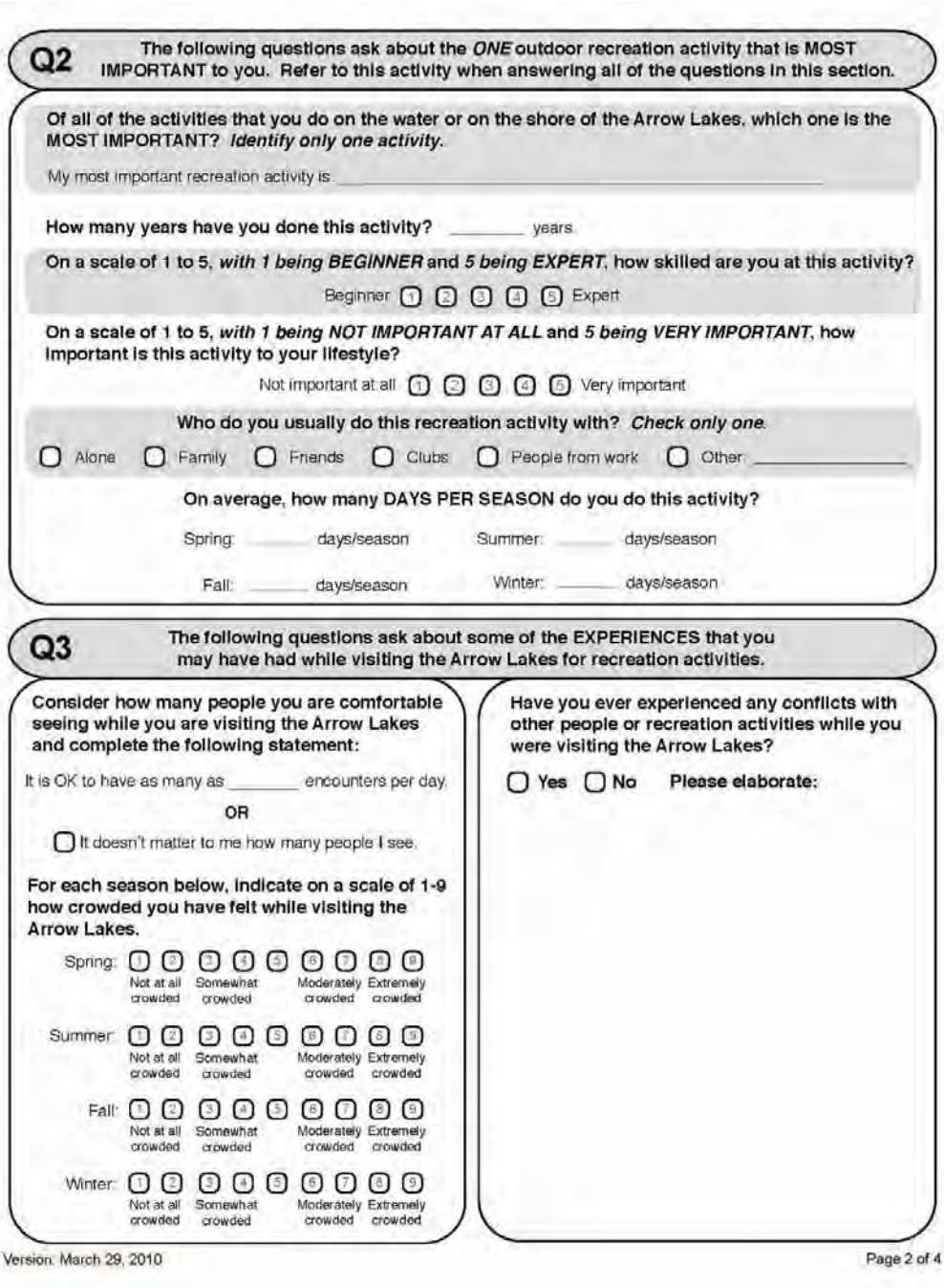
Are you participating in this activity today as a paying customer of a commercial recreation or tourism operator/guide?

☐ Yes ☐ No **Please elaborate:**

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

Version: March 29, 2010

Page 1 of 4



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

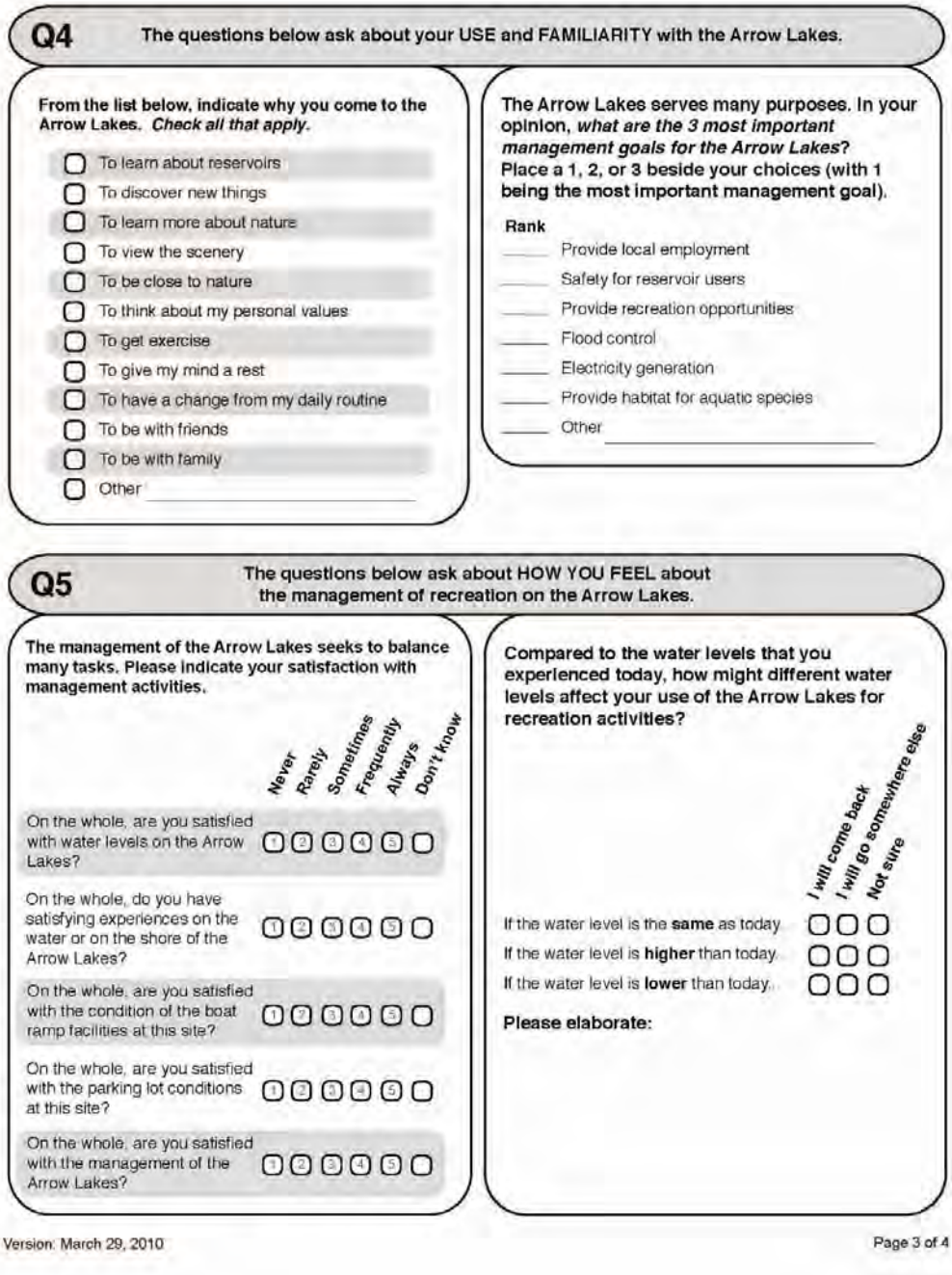
Winter: ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨
Not at all crowded — Somewhat crowded — Moderately crowded — Extremely crowded

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

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

Version: March 29, 2010

Page 2 of 4



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:

Version: March 29, 2010

Page 3 of 4

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?

Version: March 29, 2010 Page 4 of 4

APPENDIX C – Observational Data Forms

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Arrow Lakes Recreation Study
Site and Survey Log

Date (dd/mmm/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	# completed surveys	Staff Initials	Comment

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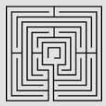

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Arrow Lakes Recreation Study – Detailed Daily Sample Summary

Date: Sample Site: Surveyor: Page ____ of ____

Total	Gender	Age Range										
# in Group	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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