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Peace Project Water Use Plan

Williston Recreation Use

Reference: GSMON-20

**BC Hydro Williston Reservoir Recreation Use Monitoring
Program, Data Report Year 8 (2016)**

Study Period: May – October 2016

Synergy Applied Ecology

July 2017

BC HYDRO WILLISTON RESERVOIR RECREATION USE MONITORING PROGRAM, DATA REPORT YEAR 8 (2016)

ABSTRACT

Improving boater access to the Williston Reservoir at all ice-free operating elevations is a requirement of Peace Region Water Use Plans. BC Hydro has committed to improving existing facilities and constructing new boat launches at existing recreation sites adjacent to the reservoir to comply with this obligation. A 10-year reservoir recreation use monitoring program was initiated in 2009 to assess use of boat launch sites, before and after improvements. To determine whether physical works to boat launches improved boater access between May 14 and October 31, 2016, vehicle counters and remote cameras were used concurrently to evaluate 2 primary management objectives: Does recreational use of Williston Reservoir boat launches increase after boat access is improved? What is the frequency of use of newly constructed boat launches? This is a data summary report presenting the results of Year 8 (2016) use monitoring at 6 major recreation sites along the Williston Reservoir. Sites include Cut Thumb Bay (38 Mile), Six Mile Bay, Finlay Bay (76 Mile) and Alexander Mackenzie Landing (22 Mile) in the Parsnip Reach. Elizabeth Creek and Dunlevy are situated in the Peace Reach. Total Year 8 (2016) recreation site use estimated from photo-validated counter data ranged from 369 discrete visits at Finlay Bay to 1525 visits at Cut Thumb Bay. Estimated boater visits ranged from 101 at Finlay Bay to 434 at Dunlevy.



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INTRODUCTION

Boat launch facilities along the Williston Reservoir are to be improved as part of the Access, Navigation, and Safety Management Plan within the Peace Water Use Plan (WUP). Design and construction of boat launches is intended to facilitate increased boater access to the reservoir at all ice-free water elevations. BC Hydro project GSMON-20 is a 10-year site use monitoring program implemented to evaluate seasonal use of 6 boat launches before and after improvements and allocate future efforts relative to this objective appropriately (BC Hydro 2008). To date, 2 boat ramps have been reconstructed and 2 recreation sites have been expanded to increase camp site capacity, while 2 sites will not be altered and act as controls for statistical analysis. Results of the monitoring program are expected to address 2 primary management questions:

- Does recreational use of the Williston Reservoir boat launches increase after boat access is improved?
- What is the timing and frequency of use of newly constructed boat launches? Specifically, does seasonal use change with improved access to new areas of the reservoir, and improved access during low reservoir levels?

This report provides a summary of project activities and accomplishments in Year 8 (2016). Recreation site photos can be found in Appendix A. A review of data collected between Year 1 (2009) - Year 5 (Cubberley and Hengeveld 2014) and projected analysis summary are available at:

http://www.bchydro.com/content/BCHydro/en/toolbar/about/sustainability/conservation/water_use_planning/northern_interior/peace_river/williston_reservoir.html/

METHODS

Study Area

Williston Reservoir

The Williston Reservoir is the largest man-made, hydroelectric reservoir in British Columbia with a surface area of 1,779 km² and a shoreline perimeter of 1,700 km (Figure 1). The reservoir offers considerable recreational, fishing, hunting and wildlife viewing opportunities as boaters can access remote, undeveloped areas of the watershed with relative ease. The maximum licensed water elevation is 672 masl and a minimum elevation of 640 masl, with the lowest water elevation typically reached in April annually.



Figure 1. The Williston Reservoir and surrounding watershed boundary in northern British Columbia. The W.A.C. Bennett and Peace Canyon hydroelectric dams are located on the Peace River adjacent to the community of Hudson's Hope.

Six recreation sites that offer boater access to the Williston Reservoir are included in the monitoring program (BC Hydro 2008). Two of these sites, Elizabeth Creek and Dunlevy, are in the Peace Reach while the other four sites, Finlay Bay (76 Mile), Six Mile Bay, Cut Thumb Bay (38 Mile), and Alexander Mackenzie Landing (22 Mile) are in the Parsnip Reach (Figure 2). Boat launch condition and amenities vary among sites.

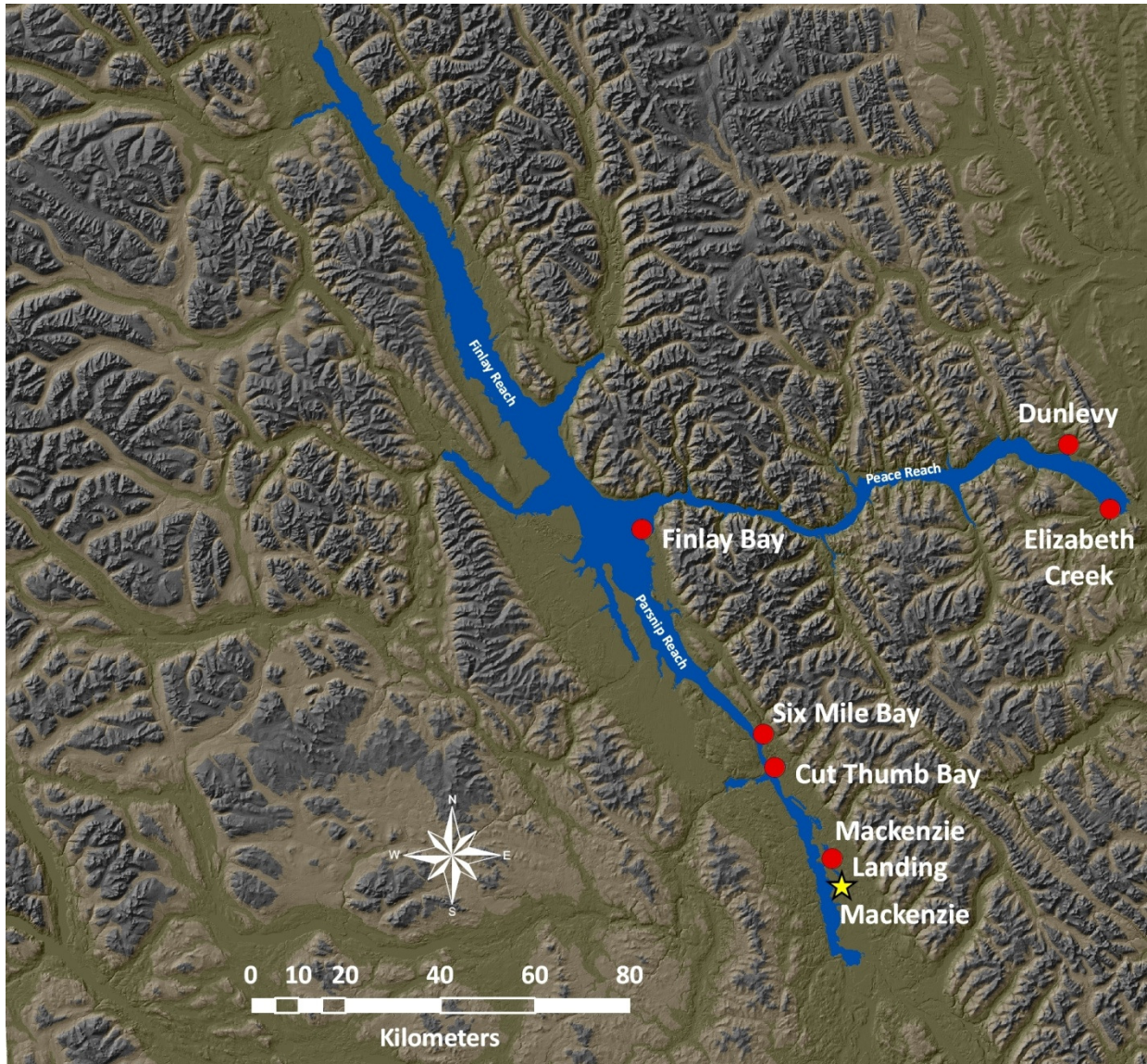


Figure 2. Williston Reservoir recreation sites monitored in Year 8 (2016).

Recreation Site Descriptions

Cut Thumb Bay recreation site is located approximately 35-40 minutes driving time from Mackenzie. Access is via the Parsnip West Forest Service Road (FSR), a well-maintained, radio-assisted gravel mainline, turning west between the 33 and 34 km markers onto a 4 km long gravel spur road. The site consists of 15 camp stalls with picnic tables and 4 outhouses. During low reservoir elevation there is a large gravel bar where users can park, camp, and launch boats (Appendix A). The narrow road that leads to the gravel bar becomes the boat launch at highest water elevation. The reservoir water elevation dictates how much room users have to launch boats and camp at this site. When reservoir elevation is low there is more room for parking and camping but decreases as water elevation increases.

Six Mile Bay recreation site is located approximately 45-50 minutes driving time from Mackenzie. Access is via the Parsnip West FSR, turning west at the 41 km marker onto an approximately 1 km long, dirt access road. The site consists of 17 camp stalls with picnic tables, 3 outhouses, and boat trailer parking. At low reservoir elevation, an open, gravel area provides additional parking or camping space. Access to this gravel bar is via the dirt road that also serves as the boat launch. At elevations lower than 667 masl, it may be difficult to launch larger boats as there is a steep drop off to the water and the sandy substrate may cause vehicles to become stuck (Appendix A).

Finlay Bay recreation site is located approximately 1.5-2 hours driving time from Mackenzie. Access is via the Parsnip West FSR. At the 96 km marker, the Parsnip terminates and there is a turn off onto a 1 km long, narrow (approx. 4 m wide) gravel road leading to the recreation site. The site consists of 11 camp stalls with picnic tables and 3 outhouses. There is also a large open field area where many users prefer to camp and where boat trailers are parked. The boat launch is a short gravel road that is approximately 4 m wide (Appendix A). There are remnants of old slabs of concrete and pieces of rebar laying off to the side, indicating that a concrete launch once existed. At low reservoir elevation, vehicles must drive over rocks and sand to reach the water. Finlay Bay will not be improved and is a designated Parsnip Reach control site for the monitoring program.

Elizabeth Creek recreation site is located approximately 20 minutes driving time from Hudson's Hope. Access is via paved Highway 29, turning right (north) approximately 300 m after crossing the crest of the WAC Bennett Dam. The site is intended for day-use, as there are no defined camp stalls, but overnight parking is common. There are two outhouses on site and a gravel parking lot with area for vehicles with boat trailers. The boat launch is approximately 6 m wide, constructed of concrete and in good condition (Appendix A). The boat launch has been constructed to allow all sizes of boats to access the reservoir at both low and high water elevation. Elizabeth Creek will not be improved and is a designated Peace Reach control site for the monitoring program.

Dunlevy recreation site is located approximately 40 minutes driving time from Hudson's Hope. Access is via Highway 29, turning north on 12 Mile Road and following this well-maintained gravel road for 26 kms to the site. The boat launch is a 6 m wide concrete ramp and provides reservoir access at 660.5 masl (Appendix A). There is a large open area for parking and 2 outhouses. Although the site is intended as a day use site, there is evidence that the site is used for overnight camping. This site is part of Butler Ridge Provincial Park.

Alexander Mackenzie Landing recreation site is located approximately 10 minutes driving time from Mackenzie. Access is via the Parsnip West FSR for approximately 7 km with several signs that lead users to the site from Highway 39. The site is well-maintained and designated for day use with a picnic area, cooking shelter and amphitheater. There is parking with 2 outhouses on site. Immediately adjacent to the day use site is the BC Hydro Alexander Mackenzie Landing campsite which contains 10 camp stalls suitable for all RVs. A foot path joins the two sites. The primary boat launch is approximately 6 m wide, constructed of concrete and in good condition (Appendix A). Users launch directly from the concrete slab at elevation 665 masl or above, but must travel further down foreshore area on a newly constructed, gravel road to access the reservoir using a secondary low elevation concrete boat ramp that extends to 658 masl. As the reservoir elevation increases the low elevation launch is submerged. Buoys mark the underwater road to boaters.

Recreation Site Improvement Summary

No improvements to recreation sites or boat launch structures in Year 8 (2016). However, over the course of the GSMON-20 monitoring program, several improvements and events have influenced recreation site use. Table 1 provides a summary of events to consider for final data analysis from Year 1 (2009) - Year 8 (2016). Events will be added to the table as necessary throughout the remainder of the monitoring program.

Table 1. Summary table of events to consider from 2009 - 2016 for GSMON-20 final analyses.

Event	Site	Date
Year 1 (2009)		
Closed by BC Parks (website notice)	Dunlevy	May 14-October 31
Community fishing derby	Cut Thumb	August 29-30
Year 2 (2010)		
Lowest reservoir level in 10 years	All sites	May 14-October 31
Closed by BC Parks (website notice)	Dunlevy	May 14-October 31
Community fishing derby	Cut Thumb	August 28-29

Year 3 (2011)

Monitoring discontinued ¹	Strandberg	
Added to monitoring program	Mackenzie Landing	May 14-October 31
Community fishing derby	Cut Thumb	August 27-28
GMS spillway scaling Yr1 (pilot car)	Elizabeth Creek	May -October 31
Closed due to construction	Mackenzie Landing	July 12-22
Mackenzie community event	Mackenzie Landing	June 10
Family Fishing Weekend Derby	Mackenzie Landing	June 18-19

Year 4 (2012)

Closed due to spilling	Elizabeth Creek	June 26-August 3
Mackenzie community event	Mackenzie Landing	June 8-9
Mackenzie community event	Mackenzie Landing	June 10
Family Fishing Weekend Derby	Mackenzie Landing	June 16-17
Community fishing derby	Cut Thumb	August 18-19
GMS spillway scaling Yr2 (no pilot)	Elizabeth Creek	May 14-October 31

Year 5 (2013)

Site capacity increased	Cut Thumb	July 4-31
Community fishing derby	Cut Thumb	August 24-25
Family Fishing Weekend Derby	Mackenzie Landing	June 15-16

Year 6 (2014)

Closed due to wildfire	Elizabeth Creek	July 16 - 18
Community fishing derby	Cut Thumb	August 23-24
Closed due to construction	Dunlevy	May 14-October 31
Closed due to construction	Mackenzie Landing	May 14-20

Year 7 (2015)

Community fishing derby	Cut Thumb	August 22-23
Site capacity increased	Six Mile	July 15-August 20

Year 8 (2016)

Community fishing derby	Cut Thumb	August 20-21
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¹Monitoring discontinued at Strandberg due to low use (Cubberley and Hengeveld 2011).

Data Collection and Analysis

Recreation site use monitoring was accomplished using remote vehicle counters and motion-sensitive digital cameras synchronized by date and time. Counters provide primary data, while camera data adds redundancy and improved confidence in monitoring trends by identifying 'false' events such as maintenance vehicles and ATVs. Site use is based on discrete vehicle visits where repeat users are given a unique identification number for each visit regardless of how many times they visit the site. The combination of counter and camera data allows for estimates of the following:

- The number of recreation site users with boats
- The duration of site user visits with and without boats
- The number of repeat users at each site

We favoured placing the monitoring equipment along the access roads into each site in order to keep data capture consistent between sites, monitoring years and, after launch improvements. Due to differences in layout at Elizabeth Creek and Mackenzie Landing, sites designated for day use only, remote monitoring equipment was installed directly adjacent to the concrete boat launch. All data are compiled in a secure MS Access database. A detailed description of data collection methods and equipment settings can be found in Cubberley and Hengeveld (2012).

RESULTS

Recreation Site Use

Remote monitoring equipment operated continuously throughout the 171 day monitoring period. In Year 8 (2016), over 57,000 photos were processed and a total of 15,744 new data records were added to the site use database. Of these records, 13,743 (87%) are photo-validated. Overall recreation site use ranged from 369 visits at Finlay Bay to 1325 visits at Cut Thumb (Table 2). At all sites, total monthly user visits were relatively consistent throughout the monitoring period (Figure 3).

Table 2. Estimated total use, including boaters and non-boaters, by site for monitoring Year 6 (2014), Year 7 (2015), and Year 8 (2016). Parentheses indicate lower and upper estimates among sites. Monitoring period: May 14 – October 31.

Site	2014	2015	2016
Cut Thumb Bay	1840 (1484-2169)	1583 (1537 - 1733)	1325 (1274 - 1460)
Six Mile Bay	480 (462-527)	519 (504 - 673)	638 (596 - 746)
Finlay Bay	399 (277-503)	417 (409 - 463)	369 (365 - 433)
Elizabeth Creek	715 (616-1276)	514 (455 - 929)	494 (408 - 868)
Dunlevy ¹	--	1119 (1046 - 1144)	1061 (923 - 1070)
Mackenzie Landing	1025 (932-1412)	706 (685-1270)	558 (547-941)
Total visits	4,459	4,858	4,445

¹Dunlevy was closed for construction through Year 6 (2014) and not monitored.

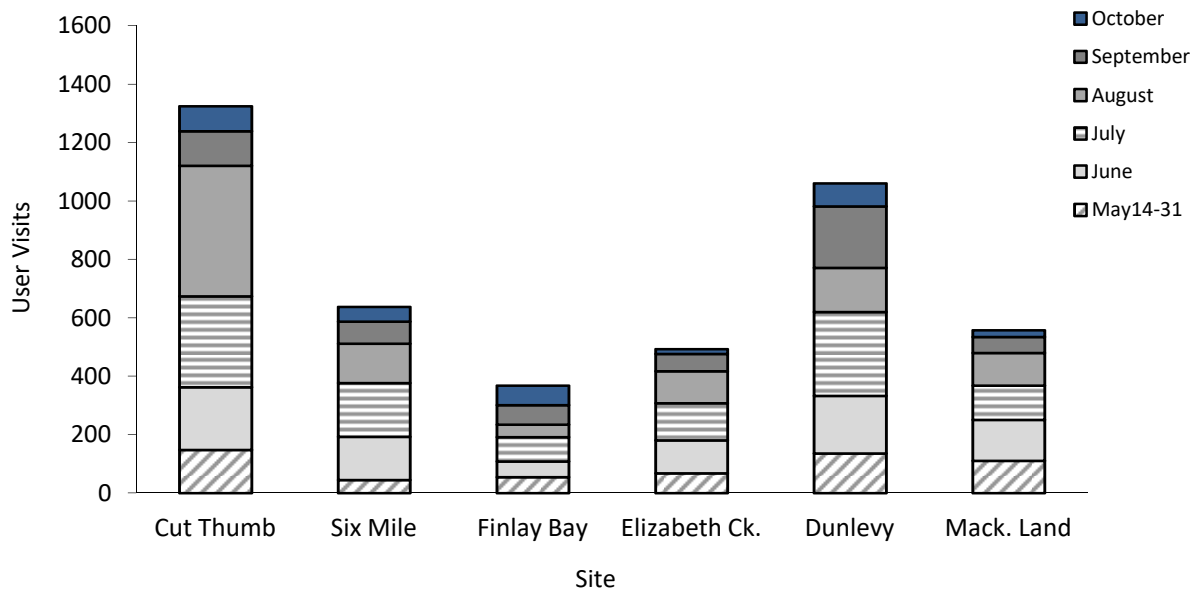


Figure 3. Estimated total monthly use by site in Year 8 (2016) between May 14 and October 31.

Estimated boater visits ranged from 101 at Finlay Bay to 434 at Dunlevy. Most sites received less user visits in Year 8 (2016) than the previous year, except at Six Mile Bay. At Dunlevy, the number of photo-verified boater visits was similar to Year 7 (2015), suggesting consistent boater visits since boat ramp improvements (Figure 4). Six Mile Bay and Dunlevy had an increased proportion of photo-verified boater visits in Year 8 (2016) from the previous year (Table 3).

Table 3. Proportion (%) of photo-validated vehicles bringing boats to recreation sites during the Year 6 (2014), Year 7 (2015), and Year 8 (2016) monitoring periods. Parentheses indicate total number of photo-verified site users annually.

Site	2014	2015	2016
Cut Thumb Bay	26.8 (1484)	25.2 (1537)	25.4 (1274)
Six Mile Bay	28.1 (462)	23.6 (504)	30.4 (596)
Finlay Bay	26.4 (277)	32.8 (409)	27.4 (365)
Elizabeth Creek	64.4 (616)	61.8 (455)	55.9 (408)
Dunlevy ¹	--	38.2 (1046)	40.8 (923)
Mackenzie Landing	28.5 (932)	45.0 (685)	37.8 (547)

¹Dunlevy was closed for construction through Year 6 (2014) and not monitored.

After a full season since campsite expansion, duration of stay at Six Mile Bay increased for both boaters and non-boaters. As in previous years, site users left recreational vehicles at some sites occupying camp stalls for extended periods in excess of 3 weeks (Table 4). Recreation sites located closer to population centres continue to receive the highest number of repeat users (Table 5).

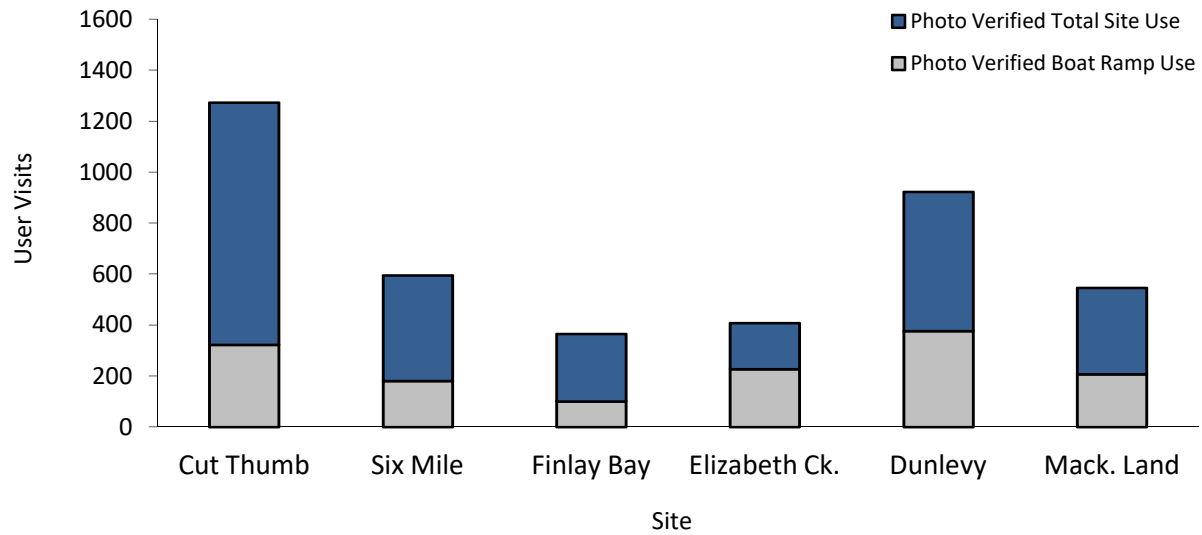


Figure 4. Proportion of site users with boats, verified by photos in Year 8 (2016) between May 14 and October 31.

Table 4. Mean duration of stay (hours) for site users with or without boats in Year 8 (2016).

Site	Boaters			Non-boaters		
	n	mean	range	n	mean	range
Cut Thumb Bay	275	37.2	0.08 – 288.1	685	23.4	0.01 – 548.0
Six Mile Bay	149	36.6	0.07 – 559.0	306	18.7	0.05 – 220.9
Finlay Bay	97	66.0	0.08 – 311.7	250	23.0	0.006 – 236.1
Elizabeth Creek	214	21.0	0.01 – 170.2	173	0.5	0.001 – 29.0
Dunlevy	276	31.5	0.015 – 401.4	243	2.4	0.006 - 88.2
Mackenzie Landing	185	10.3	0.021 – 102.5	338	0.2	0.001 – 5.1

Table 5. Number of easily recognized repeat visitors per site during the Year 8 (2016) monitoring period, May 14 – October 31.

Site	Repeat visitors
Cut Thumb Bay	411
Six Mile Bay	136
Finlay Bay	79
Elizabeth Creek	109
Dunlevy	196
Mack. Landing	96

Effects of Reservoir Elevation on Boat Launch Use

At the beginning of the Year 8 (2016) monitoring period, Williston Reservoir elevation was over 2 m higher compared to the previous year. As a result, the low elevation ramp was submerged at Mackenzie Landing prior to the start of the monitoring period. Reservoir elevation was higher than the 15-year average throughout the Year 8 (2016) monitoring period (Figure 5).

A substantial amount of vegetation and woody debris had accumulated along the shoreline at Cut Thumb prior to the beginning of Year 8 (2016) monitoring. Wood debris blocking the boat ramp at Cut Thumb reduced the number of boaters launching in May and June by 50%. Given higher than average reservoir elevation, and its close proximity, it appears boaters preferred launch conditions at Six Mile Bay during this same period. A sharp increase in boater use at Cut Thumb and Six Mile Bay on monitoring day 100 (August 21) is the result of well attended, community fishing derby (Figure 6).

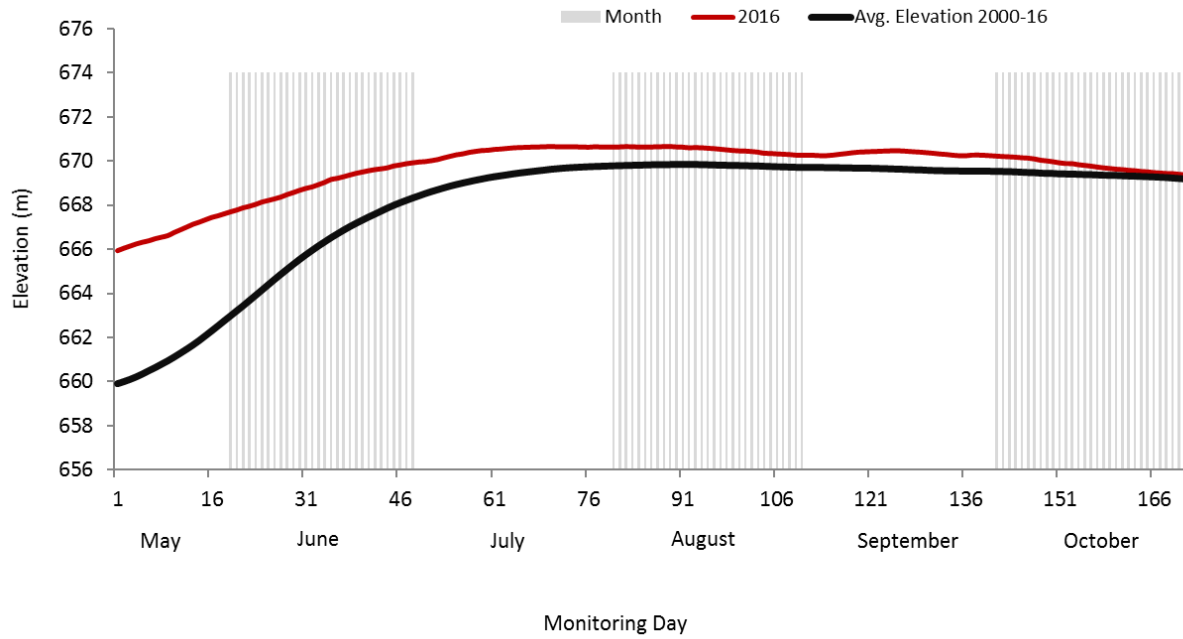


Figure 5. Williston Reservoir daily average elevation during the Year 8 (2016) recreation site monitoring period compared to the mean of daily average reservoir elevation between 2000 and 2016. Monitoring day 1 corresponds to May 14 while monitoring day 171 corresponds to October 31.

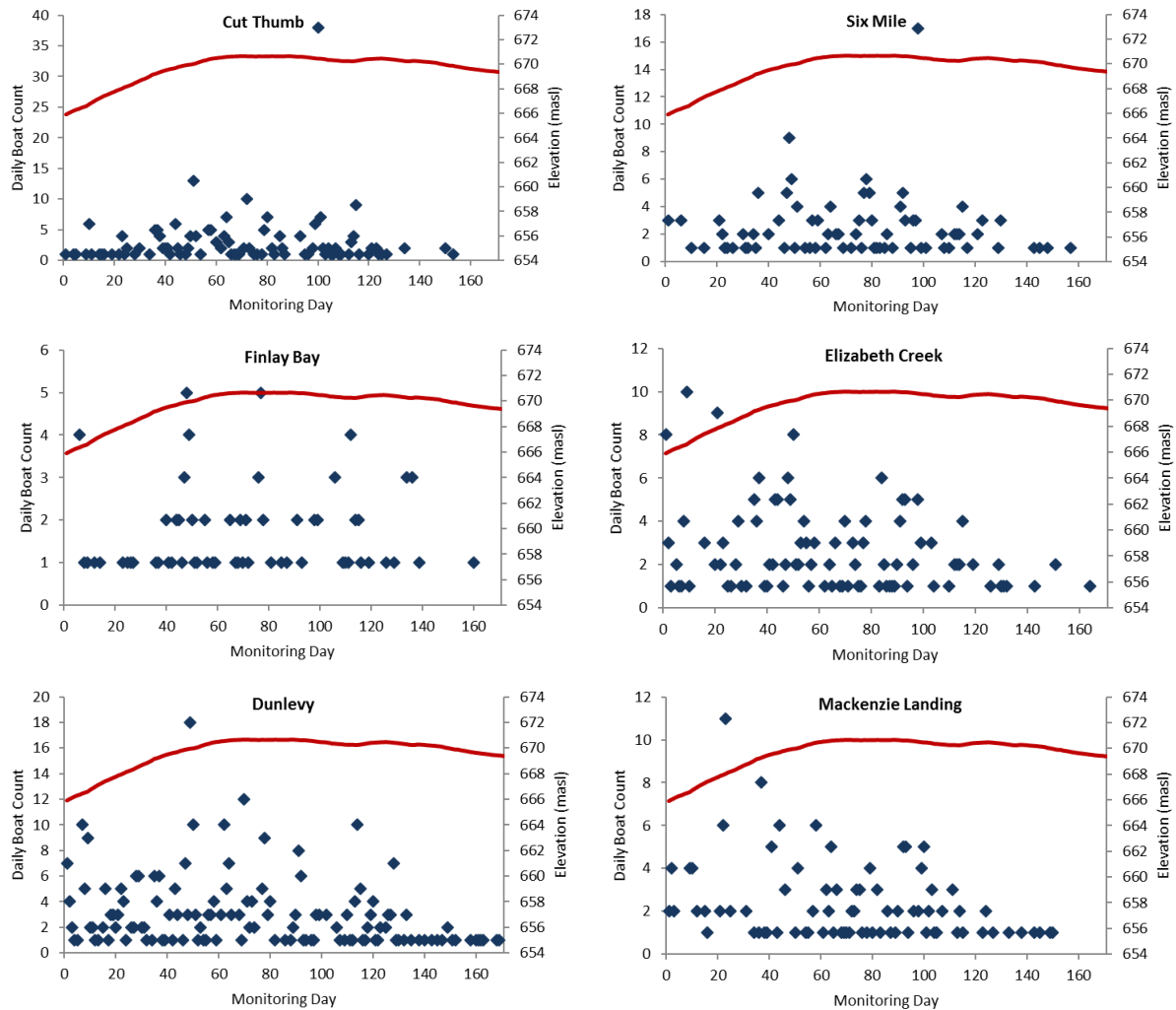


Figure 6. Daily boater use count (points) as a function of monitoring day and reservoir elevation (line) for each recreation site in Year 8 (2016). Monitoring day 1 corresponds to May 14 while monitoring day 171 corresponds to October 31.

DISCUSSION

The reconstruction of low reservoir elevation launch facilities at Dunlevy has increased boater use considerably at this site compared to pre-reconstruction levels. This includes some users who were observed previously launching at Elizabeth Creek. As expected, user visits at Six Mile Bay have increased due to increased camp site capacity.

LITERATURE CITED

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http://www.bchydro.com/content/BCHydro/en/toolbar/about/sustainability/conservation/water_use_planning/northern_interior/peace_river/williston_reservoir.html

APPENDIX A. SITE PHOTOS



Cut Thumb alt. launch May 12 2016 666 masl



Cut Thumb May 12 2016 666 masl



Cut Thumb June 20 2016 669 masl



Cut Thumb June 20 2016 669 masl



Cut Thumb alt. launch July 25 2016 671 masl



Cut Thumb September 4 2016 670 masl



Six Mile Bay May 12 2016 666 masl



Six Mile Bay May 12 2016 666 masl



Six Mile Bay June 20 2016 669 masl



Six Mile Bay July 25 2016 671 masl



Six Mile Bay July 25 2016 671 masl



Six Mile Bay November 2 2016 669 masl



Finlay Bay May 12 2016

666 masl



Finlay Bay May 12 2016

666 masl



Finlay Bay June 24 2016

670 masl



Finlay Bay July 25 2016

671 masl



Finlay Bay September 4 2016

670 masl



Finlay Bay November 2 2016

669 masl



Elizabeth Creek May 13 2016 666 masl



Elizabeth Creek May 13 2016 666 masl



Elizabeth Creek September 5 2016 670 masl



Elizabeth Creek September 5 2016 670 masl



Elizabeth Creek November 3 2016 669 masl



Elizabeth Creek November 3 2016 669 masl



Dunlevy May 13 2016

666 masl



Dunlevy May 13 2016

666 masl



Dunlevy May 13 2016

666 masl



Dunlevy July 29 2016

671 masl



Dunlevy September 5 2016

670 masl



Dunlevy November 3 2016

669 masl



Mackenzie Landing April 17 2016 663 masl



Mackenzie Landing May 14 2016 666 masl



Mackenzie Landing May 14 2016 666 masl



Mackenzie Landing June 24 2016 670 masl



Mackenzie Landing July 27 2016 671 masl



Mackenzie Landing September 2 2016 670 masl