

Peace Project Water Use Plan

Williston Recreation Use

Implementation Year 6

Reference: GMSMON-20

BC Hydro Williston Reservoir Recreation Use Monitoring Program

Study Period: May-October 2014

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BC HYDRO WILLISTON RESERVOIR RECREATION USE MONITORING PROGRAM, DATA REPORT YEAR 6 (2014)

ABSTRACT

BC Hydro has committed to improving existing facilities constructing new boat launches at recreation sites accessing the Williston Reservoir as part of Peace Water Use Plans. A 10-year reservoir recreation use monitoring program was initiated in 2009 to assess use of boat launch sites before and after improvements. Vehicle counters and remote cameras were used concurrently to evaluate 2 primary management objectives. Does recreational use of the 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 6 (2014) use monitoring at 6 recreation sites. 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 located in the Peace Reach. Construction of low and high elevation boat launch structures was completed at Mackenzie Landing in May. Dunlevy was closed, and not monitored, in Year 6 (2014) due to extensive improvements to the recreation site parking lot and launch approach. Reconstruction of the boat launch structure is anticipated in the spring of 2015. Total Year 6 (2014) use estimated from photo-corrected counter data ranged from 399 visits at Finlay Bay to 1840 visits at Cut Thumb Bay between May 14 and October 31, 2014. Estimated boater visits ranged from 105 at Finlay Bay to 492 at Cut Thumb Bay.



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Reference: Peace River Water Use Plan; BC Hydro Project Q8-8964 Williston Reservoir Recreation Use; BC Hydro GMSMON 20; BC Hydro CO 82471; SAE SPN39.

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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 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). 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 6 (2014). 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.

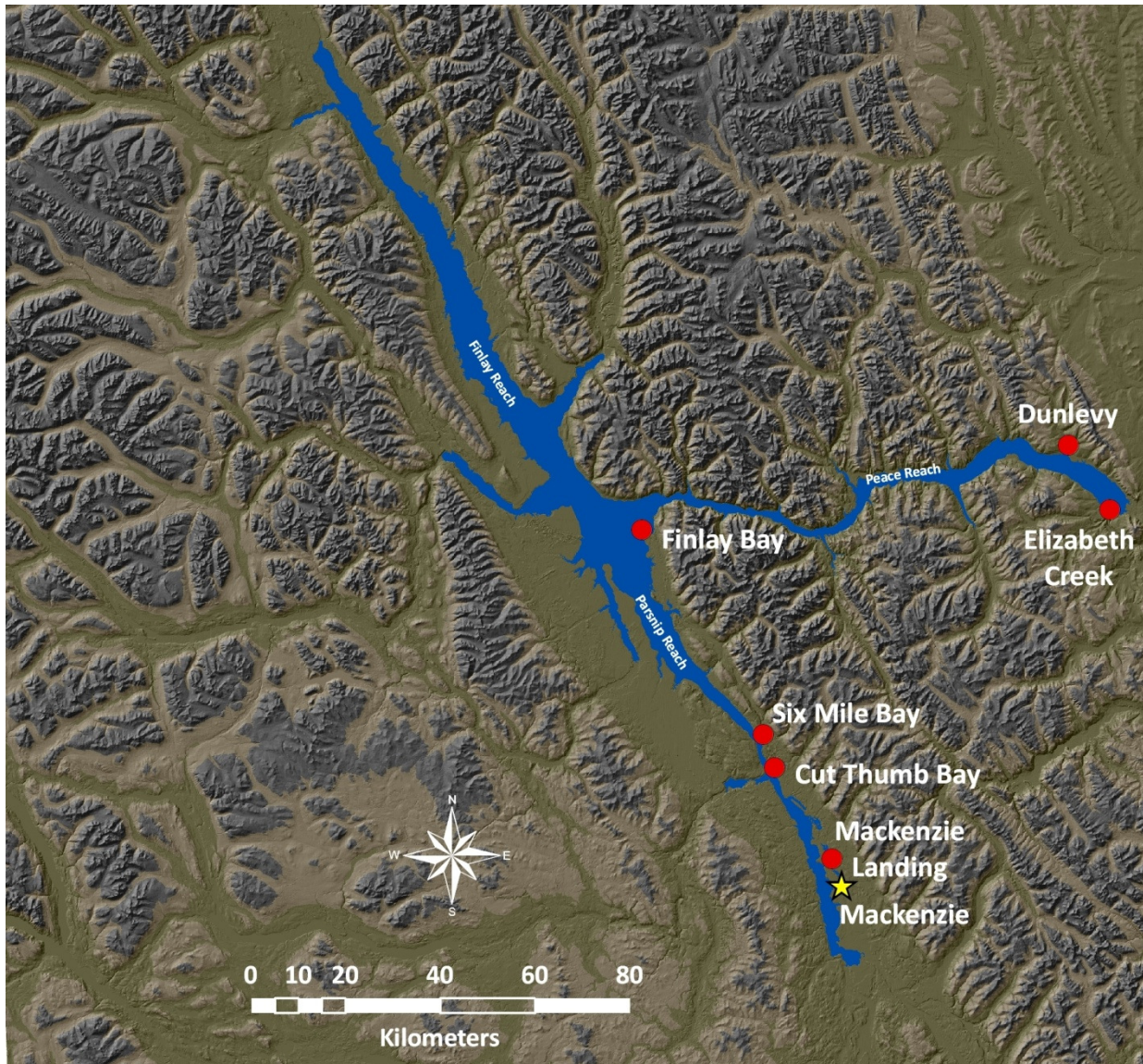


Figure 2. Williston Reservoir recreation sites monitored in Year 6 (2014).

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. 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 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. There is one camping spot at high water, located right beside the top of the boat launch, with one outhouse available. 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 (Appendix A). At low water elevation, it may be difficult to launch boats as there is a steep drop off to the water and the sandy substrate may cause vehicles to become stuck. If the one camp spot is taken at high water elevation, it constrains the amount of room that visitors have to maneuver, and may deter use of the launch and limit parking.

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.

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 modest gravel parking lot with sufficient area for large vehicles. 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 the designated 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 to the site. 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. The boat launch is not usable during low reservoir elevation due to a steep sandy drop-off (Appendix A). As well, the launch is in disrepair, as the concrete slabs on one side of the launch have collapsed due to shoreline erosion and were removed in Year 5 (2013), rendering only one side (3 m wide) of the launch usable. 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 high reservoir elevation, 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. As the reservoir elevation increases the low elevation launch is submerged. Buoys mark the underwater road to boaters.

Recreation Site Improvement Summary

Dunlevy and Mackenzie Landing recreation sites were improved by BC Hydro in Year 6 (2014). Due to the large extent of site reconstruction, Dunlevy was closed in Year 6 (2014) and not monitored. These improvements did not extend the launch to early season water elevation, and launching when reservoir elevation is less than 667 masl is still difficult (Appendix A). Further improvements to the boat launch are anticipated prior to Year 7 (2015) monitoring.

As well, reconstruction of the Mackenzie Landing boat launch was undertaken by BC Hydro in Year 6 (2014) to increase boater use at low reservoir elevation (Appendix A) complementing previous improvements in Year 3 (2011) to repair the access road to the site and stabilize an eroding bank adjacent to the parking lot. Additional work to expand the parking lot was completed in Year 5 (2013).

Over the course of the GSMON-20 monitoring program, several events such as site closures have influenced recreation site use. Table 1 provides a summary of events to consider for final data analysis from Year 1 (2009) - Year 6 (2014). Events will be added to the table as necessary.

Table 1. Summary table of events to consider 2009 - 2014 for GMSMON-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

¹ Monitoring 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. The combination of counter and camera data allow 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).

Scoutguard model SG550 cameras used from Year 1 (2009) - Year 5 (2013) were replaced with Browning Spec Ops BTC-3XR remote trail cameras at all sites in Year 6 (2014). The new cameras have an improved shutter speed of 0.67 seconds compared to 0.968 seconds. As well, the larger SD card capacity allows more images to be securely stored. We used the same camera settings as Scoutguard cameras for consistency (Table 2).

Table 2. Browning Spec Ops BTC-3XR remote camera settings for use site monitoring Year 6 (2014).

Parameter	Setting
Mode	Camera
Shot mode (No. photos per event)	Single (1)
Photo quality (MP)	1.3 (low)
Delay (sec.)	6
Date / Time stamp	On
Temperature units	Celsius

RESULTS

Recreation Site Use

A total of 18,049 new data were added to the site use database in Year 6 (2014). Of these records, 14,490 (80%) are photo-validated. Overall recreation site use ranged from 399 visits at Finlay Bay to 1840 visits at Cut Thumb (Table 3). The latter a three-fold increase in total user visits from Year 5 (2013).

Table 3. Total use by site estimated for monitoring Year 4 (2012), Year 5 (2013), and Year 6 (2014). Estimates include both boaters and non-boaters. Parentheses indicate lower and upper confidence limits among sites. Monitoring periods: May 23 – October 31 2012, May 16 - October 31 2013 and May 14 - October 31, 2014

Site	2012	2013	2014
Cut Thumb Bay	725 (541-1606)	639 (444-1827)	1840 (1484-2169)
Six Mile Bay	439 (330-578)	415 (271-539)	480 (462-527)
Finlay Bay	296 (185-384)	420 (316-490)	399 (277-503)
Elizabeth Creek	468 (306-735 ¹)	638 (449-951)	715 (616-1276)
Dunlevy	824 (525-1063)	911 (580-1005)	-- ²
Mackenzie Landing	878 (570-1224)	953 (788-1125)	1025 (932-1412)
Total visits	2,752	3,976	4,459

¹ Counter events excluded while launch closed.

²Dunlevy was closed for construction through Year 6 (2014) and not monitored

Forest fires in the Mt. McAllister area influenced the number of visits at Elizabeth Creek as Hudson's Hope residents were on evacuation alert for several days in July and late August (Figure 3). Evacuation orders were issued for Hudson's Hope including W.A.C. Bennett and Peace Canyon Dam staff July 16-17. In response to another evacuation alert on August 29, BC Hydro restricted access to W.A.C. Bennett Dam and subsequently, Elizabeth Creek. Fire activity in the Hudson's Hope area may have prompted users sighted at Elizabeth Creek to travel to Finlay Bay to access locations along the Peace Reach. Conversations with users during data download visits indicate several users travelling from Northeast BC and Alberta.

Over 40,000 photos were captured overall in Year 6 (2014). However, faulty SD cards supplied with new units caused some early season data loss at Finlay Bay and Mackenzie Landing. All SD cards were replaced with better quality 8 GB cards and performed reliably throughout the remainder of the monitoring season.

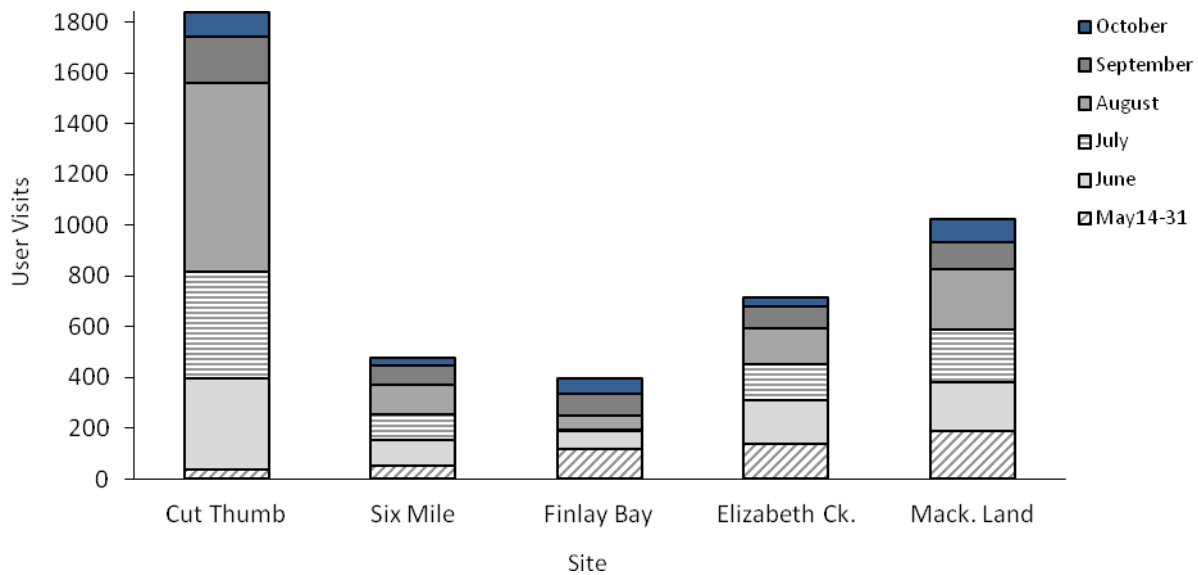


Figure 3. Estimated total monthly use by site in Year 6 (2014) between May 14 and October 31.

All recreation sites had increased boater visits in Year 6 (2014) but also had more visits by non-boaters as well (Table 4). While boater use increased overall at Mackenzie Landing, boater use during May and June was similar to counts prior to construction. Numerous short duration non-boater visits to Mackenzie Landing early in the season, post-construction, indicated local interest in the improvements. Boater use at Cut Thumb doubled from Year 5 (2013) counts through the monitoring season (Figure 4).

Table 4. Proportion (%) of photo-validated vehicles bringing boats to recreation sites during the Year 3 (2011), Year 4 (2012), and Year 5 (2013) monitoring periods. Parentheses indicate total number of photo-verified site users annually.

Site	2012	2013	2014
Cut Thumb Bay	37.9 (541)	45.7 (444)	26.8 (1484)
Six Mile Bay	33.9 (330)	28.4 (271)	28.1 (462)
Finlay Bay	46.5 (185)	33.2 (316)	26.4 (277)
Elizabeth Creek	79.1 (306)	76.2 (449)	64.4 (616)
Dunlevy	33.5 (525)	34.0 (580)	-- ¹
Mackenzie Landing	17.5 (570)	23.4 (788)	28.5 (932)

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

Photo success, the number of photos matching counter events, was markedly improved with the installation of new cameras. New remote cameras operated well in inclement weather and improved low light images employing a black light flash to better illuminate users throughout the night and reduce equipment detection by visitors.

Blank photos were reduced primarily due to faster camera shutter. As a result, the number of complete records (in-out events) used to estimate user duration of stay increased considerably from Year 5 (2013). Extraordinary long site user times, in excess of 65 days, were recorded at Cut Thumb, Elizabeth Creek, and Mackenzie Landing (Table 5). With the exception of Six Mile and Cut Thumb which had a large increase, the number of repeat visitors was relatively similar to previous monitoring years (Table 6).

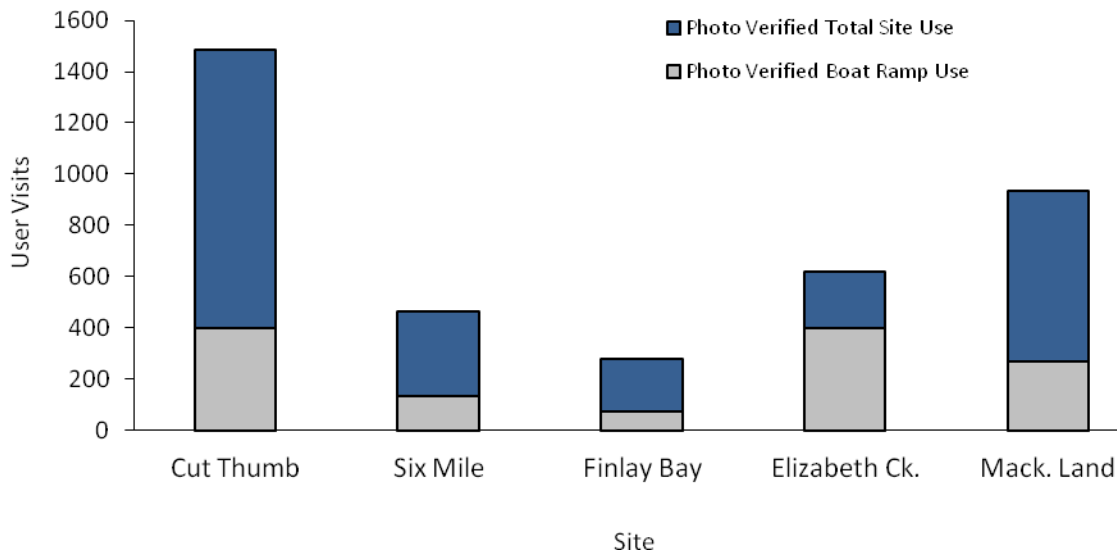


Figure 4. Proportion of users with boats by site verified by photos in Year 6 (2014) between May 14 and October 31. These values serve as the lower confidence limit for site use estimates.

Table 5. Mean duration of stay (hours) for site users with or without boats in Year 6 (2014).

Site ¹	Boaters			Non-boaters		
	n	mean	range	n	mean	range
Cut Thumb Bay	357	42.7	0.03 – 539.7	693	36.2	0.003 - 1576.7
Six Mile Bay	127	27.0	0.03 – 159.5	293	7.7	0.02 – 168.1
Finlay Bay	52	47.4	0.15 – 217.2	129	18.3	0.001 – 171.6
Elizabeth Creek	383	33.8	0.01 – 2784.7	204	0.6	0.001 – 71.4.4
Mackenzie Landing	250	25.5	0.009 - 1940.5	642	0.6	0.001 - 94.7

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

Table 6. Number of easily recognized repeat visitors per site during the Year 6 (2014) monitoring period, May 14 – October 31.

Site	Repeat visitors
Cut Thumb Bay	276
Six Mile Bay	89
Finlay Bay	22
Elizabeth Creek	146
Mack. Landing	234

Effects of reservoir elevation on boat launch use

The rate of reservoir elevation increase in the spring was higher than average yet maximum reservoir elevation in Year 6 (2014) was lower (Figure 5). Boater visits were highest at Elizabeth Creek early in the season.

Although Dunlevy was unavailable, boater visits to Elizabeth Creek were reduced likely because of local evacuation alerts and launch closures due to wildfire. Boater use appears to have peaked around early August, the mid-point of the monitoring period at all recreation sites (Figure 6).

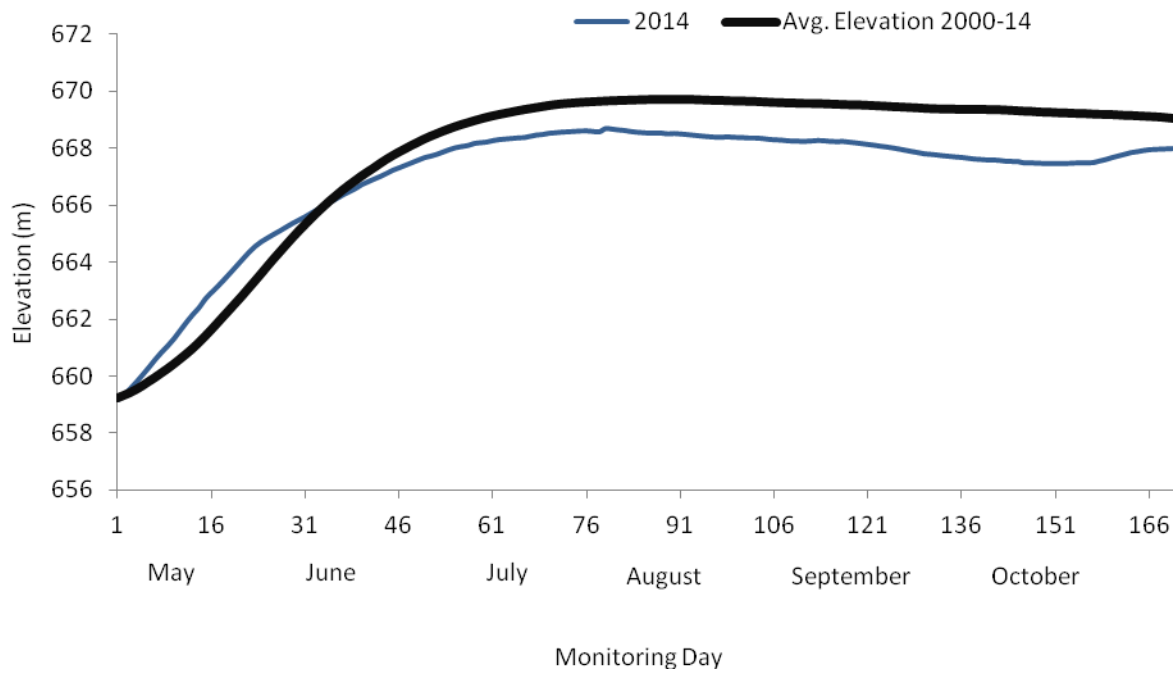


Figure 5. Williston Reservoir daily average elevation during Year 6 (2014) recreation site monitoring period compared to the mean of daily average reservoir elevation between 2000 and 2014. Monitoring day 1 corresponds to May 14 while monitoring day 171 corresponds to October 31.

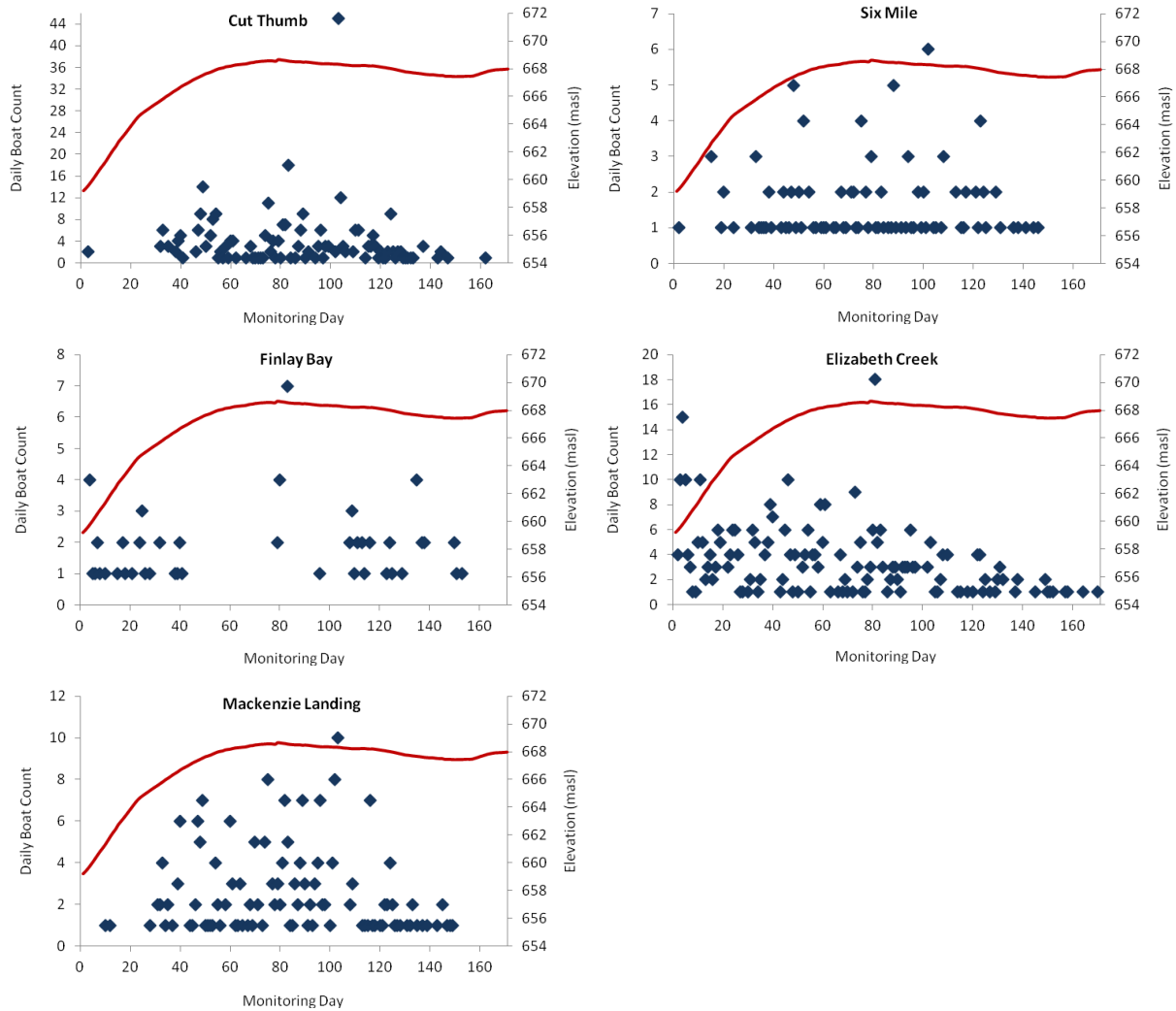


Figure 6. Daily boater use count (points) as a function of monitoring day and reservoir elevation (line) for each recreation site in Year 6 (2014). Data not complete at Cut Thumb and Finlay Bay. Dunlevy was not monitored in Year 6 (2014) due to construction. Monitoring day 1 corresponds to May 14 while monitoring day 171 corresponds to October 31.

DISCUSSION

The design and construction of low reservoir elevation launch facilities at Mackenzie landing has improved early season access to the Williston Reservoir's Parsnip Reach. However, most early season visits to Mackenzie Landing were residents without boats to view the finished boat launch. Now that potential users are aware of the improvements, early season use should increase. Cut Thumb, Finlay Bay and Elizabeth Creek also offer early season options for those launching larger boats.

Fast rising reservoir elevation benefited Six Mile more than other site in Year 6 (2014). Because the reservoir elevation rose quickly but peaked at a lower than average elevation, Six Mile Bay appealed to more multi-day users. Prior annual site use at Cut thumb and Six Mile appears to increase when peak reservoir elevation is lower and allows for more room for parking and camping. Wood debris removal, camping site expansion and improvements undertaken in Year 5 (2013) to Cut Thumb Bay for community events appear to have had a positive effect on boater use at this site.

New motion activated cameras improved photo success and are likely responsible for the increase in repeat visitors and the number of complete records. While the better performance of the cameras has enhanced the data, counter data remains the foundation for final analysis. Extended site visit duration time suggests that some boat launch users early in the season leave their boats in the water into late season. Non-boaters also left recreational vehicles at some sites occupying camp stalls for extended periods.

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APPENDIX A. SITE PHOTOS



Cut Thumb May 15 2014 elev: 659 masl



Cut Thumb alternate launch May 15 2014



Cut Thumb June 24 2014 elev: 667 masl



Cut Thumb alternate launch June 24 2014



Cut Thumb July 30 2014 elev: 668 masl



Cut Thumb alternate launch August 26 2014



Six Mile Bay May 15 2014 elev: 659 masl



Six Mile Bay May 15 2014



Six Mile Bay June 10 2014



Six Mile Bay June 10 2014 elev: 665 masl



Six Mile Bay July 30 2014 elev: 668 masl



Six Mile Bay August 26 2014 elev: 668 masl



Finlay Bay May 16 2014 elev: 659 masl



Finlay Bay May 16 2014



Finlay Bay June 10 2014 elev: 665 masl



Finlay Bay June 10 2014



Finlay Bay July 30 2014 elev: 668 masl



Finlay Bay August 27 2014 elev: 668 masl



Elizabeth Creek May 14 2014 elev: 659 masl



Elizabeth Creek June 11 2014 elev: 665 masl



Elizabeth Creek August 1 2014 elev: 668 masl



Elizabeth Creek August 1 2014



Elizabeth Creek August 28 2014 elev: 668 masl



Elizabeth Creek Nov. 4 2014 elev: 668 masl



Dunlevy August 28 2014



Dunlevy August 28 2014 elev: 668 masl



Dunlevy August 28 2014



Dunlevy August 28 2014



Dunlevy August 28 2014



Dunlevy August 28 2014



Mack. Landing April 18 2014 elev: 658 masl



Mack. Landing May 15 2014 elev: 659 masl



Mack. Landing May 15 2014 elev: 659 masl



Mack. Landing July 2 2014 elev: 659 masl



Mack. Landing August 26 2014 elev: 668 masl



Mack. Landing October 31 2014 elev: 668 masl