

DECEMBER 2022
PERFORMANCE MEASURE INFORMATION SHEET
LOWER COLUMBIA RIVER: RECREATION AND TOURISM

SUMMARY

Goal: Maximize the community benefits from quality and diversity of recreation and tourism.

Recommended performance measure:

Objective/ Location	Performance Measure	Description
Recreation and tourism/Lower Columbia River	Recreation access and experience days	Total number of days per year flow at Birchbank gauge is between 40,000 and 100,000 cfs (1133 and 2832 cms), May 1 - Oct 31. More is better.

Sub-measures representing preferred elevation ranges for specific recreational activities or sites will inform detailed scenario evaluation.

Note: the available information for this performance measure is particularly questionable and the team recommends further research to bring current information into this process.

INTRODUCTION

In the upper portion of the Lower Columbia River, flows are a function of discharge out of Arrow Reservoir past Hugh Keenleyside Dam (HLK) and the Arrow Lakes Generating Station (ALGS). At Castlegar, the Kootenay River joins the Columbia River. Flows in the Kootenay River at the confluence are related to discharge from Brilliant Dam (BRD) and Brilliant Expansion Generating Station (BRX).

Recreation access and associated benefits are important in the lower Columbia River. Local communities benefit from the quality and diversity of recreation and tourism experiences through a greater quality of life, as well as through local economic development benefits that result from increased usage. A number of key factors that affect recreational and tourism quality and use include:

- diversity and abundance of fish and wildlife, since many recreational activities are focused on enjoyment of these natural resources;
- ability to safely access the water or shorelines for water-based and shore-based activities;
- visual quality of viewscales; and
- changes in river flows, since large and sudden changes have been noted to have detrimental effects on recreation interests, impacting boat navigation and safe access to shorelines, and causing stranding.

PAST PERFORMANCE MEASURES

[2004 Columbia Water Use Plan \(WUP\) Consultative Committee Report \(Section 4.6.2\)](#)

During the Columbia WUP, it was agreed that performance measures focused on boat access and shoreline access would capture most of the recreational interests in the lower Columbia

River. For boat access, the Recreation Technical Subcommittee identified preferred flows over the recreation season that would provide "good opportunity" for a broad range of interests, including access via boat ramps, usability of boat ramps and quality of boating within that range of river flows. The boat access measure was not tied directly to physical structures (i.e., boat ramps). The shoreline access measure was defined around a range of flows that constituted "good opportunity" for shore-based activities, with activities decreasing in frequency when the flow is above or below this range.

The preferred ranges of river flows drew on information reported in a 1994 study (RSMI 1994 as cited in RL&L 2001). Table 1 summarizes the flow levels highlighted in the report for the lower Columbia River. Though the measurement site is somewhat uncertain for these data, RL&L (2001) assumes they represent instream flows and would therefore be represented by measurements at the Birchbank gauge. In the RL&L (2001) report, there is uncertainty regarding whether these flows apply solely to the portion of the river downstream of the Kootenay confluence, or whether the portion between Hugh Keenleyside dam and the confluence is also considered.

Table 1: Preferred Flow Ranges for Lower Columbia River (measured at Birchbank)

Activity	Lower (cfs/cms)	Upper (cfs/cms)
Swimming	78 035 / 2209.7	99 327 / 2812.6
Sightseeing	14 195 / 402.0	102 823 / 2911.6
Shore-based angling	60 309 / 1707.8	99 327 / 2812.6
Motor boating	70 902 / 2007.7	156 035 / 4418.4
Non-motorized boating	70 902 / 2007.7	102 823 / 2911.6

The preferred flow ranges were subsequently used as a foundation to estimate the net local economic activity resulting from recreation and tourism as shown below in Table 2. It is important to note that, while RL&L (2001) assume the preferred flow ranges that underlay this performance measure are measured at the Birchbank gauge, the performance measure was based on discharges from the Hugh Keenleyside and Brilliant dams. Though flows at the Birchbank gauge are closely related to discharges from the dams, there is a difference given contributions made by unregulated streams like Pass Creek and Norns Creek.

Table 2: Recreation performance measures from the Columbia WUP Consultative Committee Report (table 4.6 in the report)

Area	Measure	Dates	Critical Elevation Zones	Users/ Day	% Local	% Tourist	\$/ Local	\$/ Tourist	Average \$/Access Days
Lower Columbia River	Boat Access Days	1 May to 30 October	# days Hugh Keenleyside + Brilliant dams flows between 70 902 and 102 823 cfs	24	80%	20%	\$ 57	\$ 154	\$ 1,834
	Shoreline Access Days	1 May to 30 October	# days Hugh Keenleyside + Brilliant dams flows between 60 309 and 99 327 cfs	348	90%	10%	\$ 40	\$ 137	\$17,296

During the Columbia WUP process, concern was expressed about daily flow fluctuations in the lower Columbia River, where flows can change dramatically from hour to hour, day to day or week to week. Due to the influence of the Kootenay River system and lack of control over flow changes

(due to the constraints of the Columbia River Treaty), a modelling approach to capture the concerns about the dramatic fluctuation was not developed during the Columbia WUP process.

- [2010 Non-Treaty Storage Agreement consultations \(Infosheet #26\)](#) and [2013 CRT Review Technical Studies \(Info Sheet #26\)](#)

During the Non-Treaty Storage Agreement consultations in 2010 the WUP performance measures were revised, and the resulting performance measures were also used in the 2013 CRT Review Technical Studies.

The critical flow zones and the dates for shoreline access days were not changed from the WUP process. Modifications were made to the end-date of the primary season for boat-based activities (from Oct 30 to Sep 15), as well as the lower cut off for the critical flow zone (from 70,902 to 40,000 cfs/ 2,007.7 to 1,132.7 cms). These changes were based on feedback from local user groups, including indication from the West Kootenay Fly Fishers Association that boat-based angling was best at flows between 40,000 and 60,000 cfs/ 1,132.7 and 1,699 cms (it is unclear if these figures are instream flows measured at Birchbank or combined discharges from Hugh Keenleyside and Brilliant dams). The economic activity approach was dropped from the NTSA performance measures, resulting in the measures in Table 3. It should be noted that, while the performance measure was for *access days*, the critical flow zones used actually reflect the *preferences* of recreational users, and boat/shoreline access is possible at a much wider range of flows.

Table 3: Recreation performance measures used in the NTSA and CRT Technical Studies processes

Area	Measure	Dates	Critical Flow Zone
Lower Columbia River	Boat Access Days	1 May to 15 Sep	# days Hugh Keenleyside and Brilliant flow between 40 000 and 102 823 cfs (1,132.7 and 2,911.6 cms)
	Shoreline Access Days	1 May to 30 Oct	# days Hugh Keenleyside and Brilliant flow between 60 309 and 99 327 cfs (1,707.8 and 2,812.6 cms)

NEW INFORMATION

The research team is not aware of any new reports that are relevant to these performance measures. However, during initial review of this performance measure with the Columbia River Treaty Local Governments Committee (CRT LGC) and the Columbia Basin Regional Advisory Committee (CBRAC), the team received several comments, including:

- The river segment upstream of the Kootenay confluence needs more consideration. There is a popular boat ramp across from the Lions Head pub in Robson and the segment is often used by anglers.
 - o The research team contacted the Castlegar Fly Shop and learned that the Lions Head boat ramp (the old Robson ferry landing) experiences low water issues; however, the Regional District of Central Kootenay-maintained Robson Boat Ramp, upstream, is usable at all flows so there is boating access in this area (RDCK, pers comm., 2022).
- Some boat ramps downstream of the Kootenay confluence (Indian Eddy/East Trail, Waterloo Eddy, the rudimentary ramps at Fort Sheppard, and Genelle) are inaccessible at low flows (K. Andreaschuck, pers. comm., 2022; R. Zavaduk, pers. comm., 2022),

however the team does not have verified information on the flow level when these ramps become inaccessible.

- The research team notes there is also a boat ramp at Beaver Creek Provincial Park, downstream of Trail. The operational range for this ramp is also not known.
- Motorized boating is most common at medium to low flows. A few boats are on the river at high flows, but they tend to be 18+ foot boats with high horsepower ratings.
 - The research team notes this point conflicts with past research (i.e., RSMI 1994), which found that preferred levels for motorized boating go as high as 156,000 cfs/ 4,417.4 cms)
- Non-motorized boating activity such as canoeing and kayaking is limited. One local representative shared their opinion that most recreational paddling occurs between Celgar and the CPR Bridge at Castlegar between late May and September, with some belly-boat and personal pontoon boat fishing extending down to the Kootenay confluence.
 - The research team contacted members of the west Kootenay whitewater kayaking community for information on flows that create access to certain popular waves around Trail. One member shared that the most popular wave (Trail Wave/Hero Hole, in the Waneta area) becomes accessible at river level/stage 3.8 m and below, which translates to flows of approximately 1,400 cms/ 50,000 cfs at the Birchbank gauge. Around Rock Island (also in the Waneta area), good waves emerge at approximately 6.0 – 6.5 m (2500-3000 cms/88,000-106,000 cfs – One Shot Wave) and above 7.3 m (3500 cms/ 124,000 cfs – Industrial Hole) (D. Roscoe, pers. comm., 2022). These levels are confirmed in the local whitewater paddling guidebook (Kreuger, 2001).
- Shore-based angling effort is highest when water levels are medium to low. At higher water levels, some of these anglers will switch to boat-based angling, and others will resume angling when water levels drop and fishing effort becomes more productive.
- More information is needed on the factors that impair shoreline access below 60,000 cfs (1,699 cms). If boat access is possible at 40,000 cfs (1,132.7 cms), then shoreline access should also be possible.
 - The research team contacted BC Hydro to assess their knowledge of shoreline access restrictions on this reach, but did not learn of any issues. The 60,000 cfs (1,699 cms) number reflects the findings from the RSMI 1994 report (as cited in RL&L 2001), which was focused on *shore-based angling preference*, rather than *access*, and this preference may have more to do with angling success than shoreline access. This provides data related to the shore-based angling effort expressed in the point above for ‘medium to low’ flow levels.
- The upper cut offs for the PMs used in the NTSA and CRT Technical Studies (approximately 100,000 cfs/ 2,831.7 cms) are generally below average flows seen on this river segment for June and the first half of July.
 - The team has considered this observation. These levels are from the Columbia WUP and as noted in the paragraph above Table 1, the relevant documentation assumes they represent instream flows and would therefore be represented by measurements at the Birchbank gauge, but this is not certain. The team recommends below that further research is needed to refine current knowledge

of recreation and tourism access needs and preferences in relation to river levels.

The research team was also asked to develop a performance measure to reflect the safety concerns from the substantial daily fluctuations in flows, especially beginning on Fridays and continuing through the weekend, when recreation use is the highest. The safety concerns are primarily when the river rises quickly, boats that have been lodged on the river bank can float free and it can be hazardous to retrieve them, as well as logs are floated and moved down the river, creating boating hazards. As the changes in flows that are most hazardous occur over a number of hours, and the CRTPM model provides flows in daily time steps, it was not possible to develop a PM in this model for this interest.

Summary of known elevations required/preferred for recreation/tourism

Known access and preferred elevations are provided below (Table 4) with acknowledgement that this list is an incomplete snapshot of recreation/tourism activities and preferences on the Lower Columbia River.

Table 4: Known access restrictions and preferred elevations for various recreation and tourism activities (as measured at Birchbank gauge)

Activity	Access Restrictions	Preferred Elevations
WATER-BASED		
Motorized boating	Robson Boat Ramp: Accessible at all flows (RDCK, pers. comm) Old Robson Ferry Landing (Lion’s Head), Indian Eddy/East Trail, Waterloo Eddy, Fort Sheppard, and Genelle ramps: Inaccessible at “low” (undefined) flows (K. Andreaschuck; R. Zavaduk, pers. comm.) Beaver Creek Provincial Park boat ramp operation range is unknown.	Uncertain. RSMI (1994) states preferred levels are 70,902 – 156,035 cfs / 2,007.7 – 4,418.4 cms; however recent comments are that motorized boating is most popular at “medium” flows (K. Andreaschuck, pers. comm.)
Boat-based angling	See ‘Motorized Boating’ above	40,000 – 60,000 cfs / 1,132.7 – 1,699 cms (BC Hydro, 2010).
Non-motorized boating (canoeing/kayaking/paddle boarding, etc.)	Whitewater kayaking waves: - Trail wave/Hero hole: 50,000 cfs / 1,400 cms and below	70,902 - 102 823 cfs / 2,007.7 – 2,911.6 cms (RSMI 1994) (note conflict between these numbers

	<ul style="list-style-type: none"> - One Shot Wave: 2,500-3,000 cms / 88,000-106,000 cfs - Industrial Hole: 3,500 cms/ 124,000 cfs (D. Roscoe, pers. comm; Kreuger, 2001) 	and recent information shared by the whitewater paddling community)
Sailing	No information	No information
Swimming	No information	78,035 – 99,327 cfs / 2,209 – 2,812 cms (RSMI 1994)
SHORELINE-BASED		
Beach activities	No information	No information
Shore-based angling	No information	60,309 – 99,327 cfs / 1,707 – 2,812.6 cms (RSMI 1994)
Camping	No information	No information
Non-motorized travel (hiking, biking, horseback riding, cross country skiing, etc.)	No information	No information
Motorized travel (quadding, snowmobiling, etc.)	No information	No information
Nature study/wildlife viewing	No information	No information
Hunting/foraging	No information	No information

For the reasons listed below, the research team recommends further research to refine current knowledge of recreation and tourism access needs and preferences in relation to river levels, including specific levels required for boat ramp use:

- much of the research informing the table above is now dated;
- there are several activities for which no information exists;
- there is uncertainty about whether the figures from RSMI (1994) apply to the portion of the river reach above the Kootenay confluence; and
- there is uncertainty regarding the measurement site for the flows preferred by boat-based anglers.

RECOMMENDED PERFORMANCE MEASURE

Based on the information above, the research team recommends:

- amalgamating previous recreation-focused performance measures into a single combined performance measure for all recreational/tourism activities across the Lower Columbia river. This measure would be used for initial scenario evaluation; and
- creating a series of “sub measures” that reflect interests for which the research team has documented a known elevation range. The sub measures will help ensure results for the combined recreation performance measure do not obscure negative results for individual recreational interests that the team has information about. Results for these sub-measures would be available during scenario evaluation and reported to the public for preferred scenarios.

The recommended PM is measured at the Birchbank gauge, between Castlegar and Trail. Though previous performance measures used combined discharges from upstream dams, most of the data informing these performance measures is understood to be based on instream flows which are measured at the Birchbank gauge.

Combined PM

The recommended combined performance measure, detailed below in Table 5, reflects the following:

- Boat access and shoreline access PMs are consolidated to reflect the substantial overlap between elevations preferred for both activities; and
- Flow levels are rounded from those used in previous processes.

As stated previously, the team has concerns about the background data for this performance measure and makes this recommendation based on our commitment to use best available information while encouraging further research to refine the available information.

Table 5: Recommended recreation and tourism PM for the Lower Columbia River

Area	Measure	Dates	Critical Flow Zone
Lower Columbia River	Recreation Access and Experience Days	1 May to 31 Oct	# days per year flow at Birchbank gauge is between 40,000 and 100,000 cfs (1,133 and 2,832 cms)

Sub-Measures

The recommended sub-measures are summarized in Table 6. The team emphasizes that these are based on the best available information, however further research is warranted to verify and expand this list.

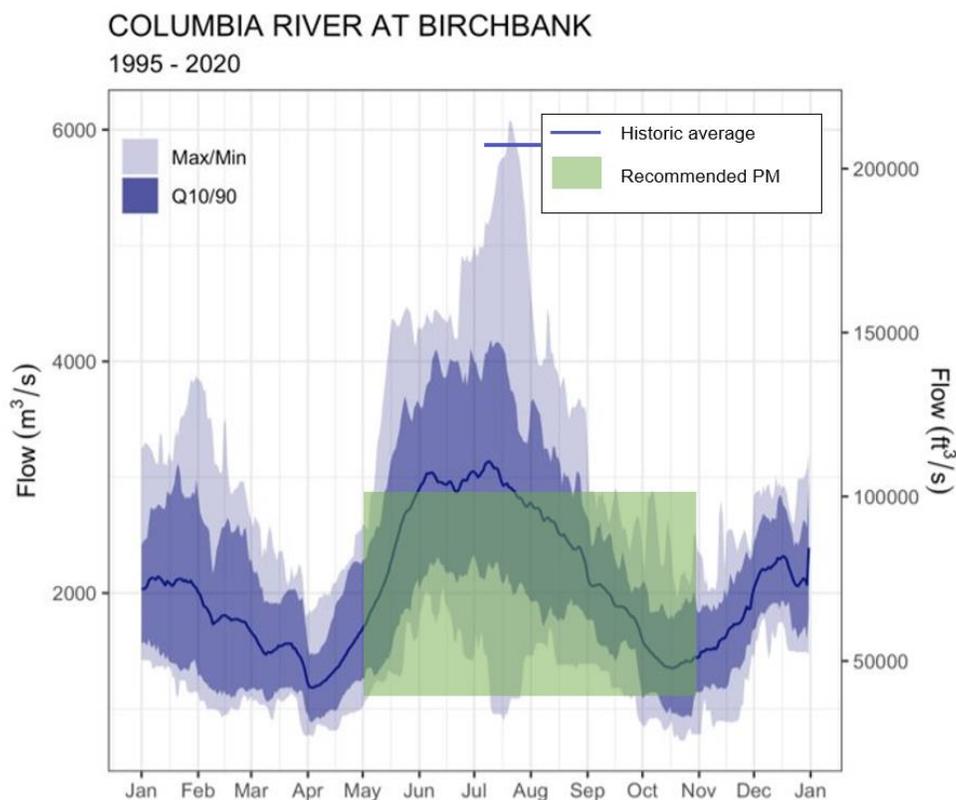
Table 6: Recommended sub-measures for analysis during the scenario evaluation process

Sub-Measure Objective	Season	Flow Range
Whitewater kayaking access: Industrial Hole	May 1 – Oct 31	124,000 cfs / 3,500 cms and above
Whitewater kayaking access: One Shot Wave	May 1 – Oct 31	88,000-106,000 cfs / 2,500-3,000 cms
Swimming	June 15 – Sep 15	78,035 – 99,327 cfs / 2,209 – 2,813 cms

Motorized boating preference	May 1 – Sep 15	70,902 – 156,035 cfs / 2,008 – 4,418 cms ¹
Other non-motorized boating (excepting whitewater kayaking)	May 1 – Oct 31	70,902 - 102 823 cfs / 2,008 – 2,912 cms
General shore-based recreation	May 1 – Oct 31	60,309 - 99,327 cfs / 1,707 – 2,813 cms
Shore-based angling	May 1 – Oct 31	60,309 – 99,327 cfs / 1,707 – 2,813 cms
Whitewater kayaking access: Trail Wave/Hero Hole	May 1 – Oct 31	50,000 cfs / 1,416 cms and below
Boat-based angling preference	May 1 – Sep 15	40,000 – 60,000 cfs 1,133 – 1,699 cms ²

COMPARISON OF RECOMMENDED PERFORMANCE MEASURE TO HISTORICAL OPERATIONS

Historical flows at Birchbank have been within the preferred range early in the season and during September to November (Figure 1). In June through August, during the freshet and when flows are augmented to support salmon migration, roughly 50% of the time flows are above the preferred range.



¹ The research team questions the validity of the upper cut off for this sub-measure given that it is above the 10th percentile of historic flows and that recent comments from community representatives suggest that “medium – low” flows are preferred by boaters

² The research team questions the validity of the lower cut off for this sub-measure given that it is below the preferred minimum flow for shore-based angling and also well below typical river flows during the recreation season.

CALCULATIONS

For each scenario:

1. Assemble the simulated results for total discharges.
2. Count the number of days over the defined recreation season for each year that the total river flows from HLK, ALGS, BRD and BRX fall within the preferred ranges
3. Summarize all statistics.

KEY ASSUMPTIONS AND UNCERTAINTIES

- Each scenario is simulated using the same set of system constraints, input assumptions (e.g., load forecasts) and historic basin inflows.
- Assumes that there is minimal recreational use outside the defined recreation season.
- Assumes that the preferred season and elevations are accurate and are capturing the essence of access issues for boating and shoreline use.

REFERENCES

BC Hydro (2005) Columbia Water Use Plan Consultative Committee Report

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