

DECEMBER 2022
PERFORMANCE MEASURE INFORMATION SHEET
KOOCANUSA RESERVOIR: 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/ Kooconusa Reservoir	General Recreation	Total number of days/year that the reservoir water level is within the preferred range (2445-2455ft/ 745.2-748.3m) during the recreation season (June 1 to Sept 30). More is better.

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

INTRODUCTION

CBT (2004) notes that a wide variety of recreational interests are affected by reservoir elevation changes in Kooconusa reservoir. These include swimming, boating, fishing and the use of beaches. Kooconusa reservoir is a camping destination, with numerous forestry and private campgrounds. Beaches are popular and are protected from the wind. Several local businesses cater to tourists. Kikomun Creek Provincial Park is open from May 1 to September 30, but as with most of the province, outdoor activities do not ramp up until the weather warms in the spring. The park has a boat ramp on Lake Kooconusa and in 2011 a new public boat access point opened adjacent to the Kikomun Bridge with a much wider operational depth range. The Yaq̓it ʔa-knuq̓i 'it First Nation (Tobacco Plains Band) also runs a number of campgrounds and boat launches.

Kooconusa reservoir fisheries focus on rainbow trout, bull trout and kokanee. On the Canadian side of Kooconusa reservoir the fishery has been almost entirely directed at kokanee in recent decades. Historically, burbot was also a species of interest to anglers, but populations no longer support a fishery and there is no evidence at this stage that operating the reservoir differently would improve burbot populations (W. Warnock, pers. Comm.).

In 2002, Libby dam operations changed to a new procedure called VARQ or Variable Flow. This has meant that Libby dam discharges less water during the fall/winter and more water during

the spring/summer to benefit downstream fish (CBT, 2004). This has resulted in challenges with meeting preferred levels for recreational and tourism needs, especially in the early season.

PAST PERFORMANCE MEASURES

As part of the [Columbia River Treaty Review Technical Studies](#) process in 2013, three recreation-focused performance measures were developed based on a review of past studies as well as public input gathered at CRT public information sessions in spring and fall 2012 (BC Hydro, 2013a). Based on this information, objectives that provided for water access for boating and fishing, and that generally improved the quality and diversity of recreational activities, were developed. The performance measures developed to support these objectives are in Table 1 (BC Hydro, 2013b):

Table 1: Kooconusa recreation PMs from the Columbia River Treaty Technical Studies

General recreation and tourism	# of days each year reservoir elevation is between 2445-2455ft/ 745.2-748.3m, May 24 to Sept. 8. More is better.
Boat access days at Kikomun Bridge	# of days each year reservoir elevation is above 2407ft/ 734m, Victoria Day to Labour Day. More is better.
Kokanee angling	Angler days between May 24 and Sept 8 using an empirically derived relationship between reservoir elevation and kokanee length. More is better.

The angling measure used a formula that related angling days to kokanee length and reservoir elevation. Data used to develop this formula came from two creel surveys conducted in 1987 and 1997, and boat counts occurring between 1989 and 2005.

NEW INFORMATION

Recreation elevations and seasons

Since the Columbia River Treaty Technical Studies process, some local interest groups have continued to advocate for high and stable reservoir levels, particularly to support boating. For example, a public consultation process surrounding the possibility of building a weir or dam to hold water at elevated levels in the Canadian portion of the reservoir found that an acceptable level for most users is 746.7m (2450ft) during the recreation season, which starts when temperatures warm in June (Province of BC, 2021). Other users preferred full pool at 749.5m (2459ft) during the recreation season. In August 2021, the Regional District of East Kootenay passed a resolution that included a stated goal of maintaining the Kooconusa reservoir at a level between 745.2m (2445ft) and 748.3m (2455ft) from June 1 to September 30 (RDEK, 2021). A member of the committee of locals advocating for the weir is quoted in September 2021 stating that water levels should be kept consistent at 2455ft year round (Crawley, 2021); however, in a discussion with the research team, one of the group’s spokespeople indicated that 2445ft to 2455ft is preferred year round (there were no reasons given for preferring this level outside of the recreation season).

A review of the feasibility of dam/weir construction found that, while the stable and higher water levels would benefit recreation on the Canadian portion of the reservoir, it would bring negative impacts for power generation, flood management, and downstream fisheries, especially if the elevated levels were held year-round (BGC Engineering, 2020). To avoid these negative impacts, alternative proposals to address the issue of low summer reservoir levels advocate for enhanced coordination with Libby Dam operations to promote achievement of desired elevations during the recreation season (Crawley, 2021), potentially in combination with an enhanced debris management program to remove floating debris that causes navigational challenges for boaters (Province of BC, 2021). Debris is recruited annually through Koochanusa's main tributaries during freshet (Rood, 2021). Debris issues are worst at full pool, when the high water floats debris that has collected in previous years along the shoreline.

Angling

During the initial review of proposed performance measures for the Columbia River Treaty Socio-Economic Performance Measures process, biologists expressed a number of concerns with the formula that was used during the CRT Technical Studies process to define a performance measure for kokanee angling. Concerns included:

- 1) The formula relies on size of fish and length of season, and does not consider fish abundance or level of fishing effort. Therefore, it is feasible that the PM could indicate a high number of angler days with few fish or anglers actually present.
- 2) The formula does not consider whether proposed reservoir elevations are ecologically supportive of kokanee. Therefore, it is feasible that a scenario that provides a good result for the PM could negatively impact kokanee populations which would in turn negatively impact angling in the long run.
- 3) The data used to generate the formula is out of date. Since the studies referenced in the development of the PM were undertaken (1980s to early 2000s), kokanee length has declined (Dunnigan et al., 2020) and there is anecdotal evidence that overall fishing effort has declined as a result. There is also anecdotal evidence that species not considered for the formula (e.g., bull trout) are becoming increasingly important to anglers.
- 4) The formula was developed assuming relationships between angler days and reservoir filling date that do not closely match observed data. Therefore, it is possible the formula is incorrect in practice.
- 5) The angling PM is redundant with other general recreation PMs since the only dynamic variable in practice is length of the season (which is solely determined by the number of days above 2440ft/ 743.7m).

It may be possible that higher reservoir levels earlier in the season would improve head of reservoir suitability for bull trout, as well as boat access for anglers and therefore help develop an early-season bull trout fishery in Koochanusa. Other lakes on the Kootenay and Columbia systems have early-season (March – May) bull trout fisheries, but there is currently no research-based evidence to confirm this would develop in Koochanusa as bull trout presence and

abundance through the Canadian reach is unknown, and there is no angler survey data for this time of year (Warnock, W., pers. comm.). An angler survey and corresponding fish population research are beyond the scope of the current Socio-Economic Performance Measures project but could help resource managers better understand angling trends in Koocanusa and potentially refine this performance measure.

Boat access

During the initial review of proposed performance measures for the Columbia River Treaty Socio-Economic Performance Measures process, reviewers shared that there are several other publicly-accessible boat launch ramps around the reservoir with operable ranges far narrower than the Kikomun ramp. For example, it was shared that the Big Springs boat ramp is not operable below 2440ft (743.7m). There are also a number of private boat docks or ramps around the reservoir but the team does not have information on the operable ranges for this infrastructure.

During the dam/weir consultation process, stakeholders also noted that boating hazards exist when the reservoir is at or below 2440ft (Province of British Columbia, 2021); therefore, access at lower water levels may not be a valuable measure to guide management decisions.

Summary of known elevations required/preferred for recreation

Multiple interest groups have shared their opinions that levels between 2445ft and 2555ft are best for multiple types of recreation on Koocanusa; however, individual activities have preferred elevations, and these may vary from site to site across the reservoir. Known preferred elevations are provided in Table 2 with acknowledgement that this list is an incomplete snapshot of recreation activities and preferences on the reservoir.

Table 2: Known access needs and preferred elevations for specific recreational activities on Koocanusa

Activity	Access Restrictions	Preferred Elevations
GENERAL		
General recreation		2445 – 2455ft (745.2 - 748.3m) (BC Hydro, 2013b; Crawley, 2021)
WATER-BASED		
Motorized boating	Known minimum operable elevations for public boat ramps: <ul style="list-style-type: none"> - Yaqakxaqtamki/ Kikomun Bridge: 2407ft (733.7m) - Big Springs: 2440ft (743.7m) (Green, pers. Comm.) - Ayes Ranch: unknown - Dorr Road: unknown - Englishman Creek: unknown - Gold Creek Bay: unknown - Newgate: unknown - Kikomun Creek Provincial Park: unknown 	Below full pool (2459ft/749.5m) to avoid floating stranded debris Above 2440ft (743.7m) to avoid gravel bars (Province of British Columbia, 2021)

	Lowest possible elevation for houseboating: 2420ft (737.6m) (Province of British Columbia 2012)	
Boat-based angling	- See boat ramp elevations above	Level at which kokanee fishing starts: 2420ft (737.6m) (Parkinson, 2012). Level at which kokanee fishing becomes ideal: 2435ft (742.2m) (Parkinson, 2012).
SHORELINE-BASED		
General shore-based recreation		2434ft (741.9m) and above (Province of British Columbia 2012)

RECOMMENDED PERFORMANCE MEASURE

Based on the information above, the research team recommends:

- a) discontinuing the boat access and kokanee angling performance measures and instead using a single performance measure (Table 3) for recreation and tourism on the Koochanusa reservoir that encompasses the interests of boaters and other recreationists; and
- b) developing a series of “sub-measures” that can be used to evaluate performance for specific activities and ensure negative results for any one activity are not obscured within the overall measure. Results for these sub-measures would be available during scenario evaluation and reported to the public for preferred scenarios. The recommended sub-measures are summarized in Table 4.

Table 3: Recommended recreation performance measure for Koochanusa

Area	Performance Measure	Dates	Critical Elevation Zone
Koochanusa Reservoir	Recreation and Tourism	June 1 – September 30	Total number of days/year between 2445ft (745.2m) and 2455ft (748.3m)

Table 4: Recommended sub-measures for analysis during the modeling process

Sub-Measure Objective	Season	Elevation Range
High water debris avoidance	Jun 1 – Sep 30	Below 2459ft (749.5m) ¹
Motorized boating access – Big Springs	Jun 1 – Sep 30	2440 t (743.7m) and above

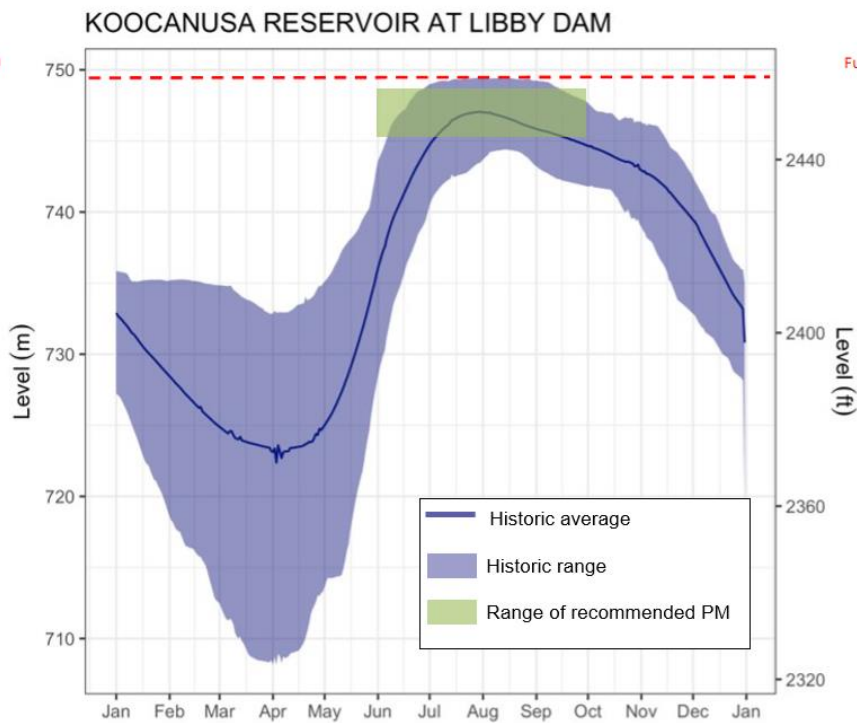
¹ The team recognizes that debris is debris is also stranded and refloated at lower elevations within the reservoir, this has not been identified as a concern for this reservoir.

Motorized boating experience preference	Jun 1 – Sep 30	Above 2440ft (743.7m)
Kokanee fishing preference	May 24 – Sep 8	2435ft (742.2m) and above
General shore-based preference	Jun 1 – Sep 30	2434ft (741.9m) and above
Kokanee fishing possible	May 24 – Sep 8	2420ft (737.6m) and above
Houseboating possible	Jun 1 – Sep 30	2420ft (737.6m) and above
Motorized boating access - Yaqaxaqtamki/ Kikomun Bridge	Jun 1 – Sep 30	2407ft (733.7m) and above

It is also recommended to consider an updated creel and/or angler preference survey to determine current angling conditions on the reservoir and confirm whether the recommended performance measure adequately captures the interests of anglers.

COMPARISON OF PROPOSED PERFORMANCE MEASURE WITH HISTORICAL OPERATIONS

Based on the figure below, for average monthly Kooconusa reservoir levels for 1980 to 2020, reservoir elevations are unlikely to be at the recommended minimum elevation at the beginning of June. This is because, at this time of the year, the reservoir is drawn down to hold the incoming freshet to avoid downstream flooding, and flows are also being released under the VarQ protocol for downstream fisheries. However, as the season progresses, the recommended elevation is mainly within the range of historic operations.



CALCULATIONS

For each alternative:

1. Assemble the daily simulated results for the recommended elevation range.
2. Count the number of days between the upper and lower thresholds for the recreation season.
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.

REFERENCES

BC Hydro (2013a). Columbia River Treaty Review Technical Studies: Appendix H, Development of Kootenay Performance Measures.

<https://engage.gov.bc.ca/app/uploads/sites/6/2012/07/Appendix-H-Development-of-Kootenay-Performance-Measures-FINAL.pdf>

<https://engage.gov.bc.ca/app/uploads/sites/6/2012/07/Appendix-G-Kootenay-Performance-Measure-Information-Sheets-FINAL.pdf>

BC Hydro (2013b). Columbia River Treaty Review Technical Studies: Appendix F, PM Info Sheet 52. <https://engage.gov.bc.ca/app/uploads/sites/6/2012/07/Appendix-G-Kootenay-Performance-Measure-Information-Sheets-FINAL.pdf>

BGC Engineering (2020). High Level Assessment of a Proposed Dam.

<https://engage.gov.bc.ca/app/uploads/sites/6/2021/01/19Nov2020-Koocanusa-Reservoir-Dam-Final-DRAFT.pdf>

Columbia Basin Trust (2004) A Stakeholders Summary of Preferred and Potential Negative Reservoir Levels and River Stages on the Kootenay River System in Canada - Interest Group Response Summary to proposed VarQ Alternative Flood Control Operation

Crawley, T. (2021). RDEK board advocating for consistent water levels at Lake Koocanusa reservoir. Cranbrook Townsman: Sept 23, 2021.

Dunnigan et al. (2020). Mitigation for the Construction and Operation of Libby Dam: 2020 Annual Report

Parkinson (2012). Reservoir Elevation and Angling Effort on the Canadian Portion of Lake Koocanusa. In Columbia River Treaty Technical Studies Appendix F PM Info Sheet 52: <https://engage.gov.bc.ca/app/uploads/sites/6/2012/07/Appendix-G-Kootenay-Performance-Measure-Information-Sheets-FINAL.pdf>

Province of British Columbia (2012). Columbia River Treaty Review: Summary of Interests and Values shared by Columbia Basin Residents.

https://engage.gov.bc.ca/app/uploads/sites/6/2012/07/Community-session-summary_final_Oct-30.pdf

Province of British Columbia (2021). [Exploring the Feasibility of Building a Proposed Weir/Dam on Koocanusa Reservoir](https://engage.gov.bc.ca/app/uploads/sites/6/2021/05/Koocanusa-Weir-Feasibility-Summary-Report-FINAL.pdf). Summary of Preliminary Assessment and Public Feedback. <https://engage.gov.bc.ca/app/uploads/sites/6/2021/05/Koocanusa-Weir-Feasibility-Summary-Report-FINAL.pdf>

Regional District of East Kootenay (2021). Minutes of the Board of Directors Meeting: August 6, 2021. <https://pub-rdek.escribemeetings.com/FileStream.ashx?DocumentId=11868>

Rood, S. (2021) Lake Koocanusa: Management for Recreation on a Popular International Reservoir. University of Lethbridge and Chinook Environmental Resources. [Appendix-B-Lake-Koocanusa-Recreation-SRood-Feb-2021.pdf \(gov.bc.ca\)](https://www.gov.bc.ca/eng-act/2021/02/22/Appendix-B-Lake-Koocanusa-Recreation-SRood-Feb-2021.pdf)