



Lake Koocanusa – High-Level Assessment of a Proposed Dam

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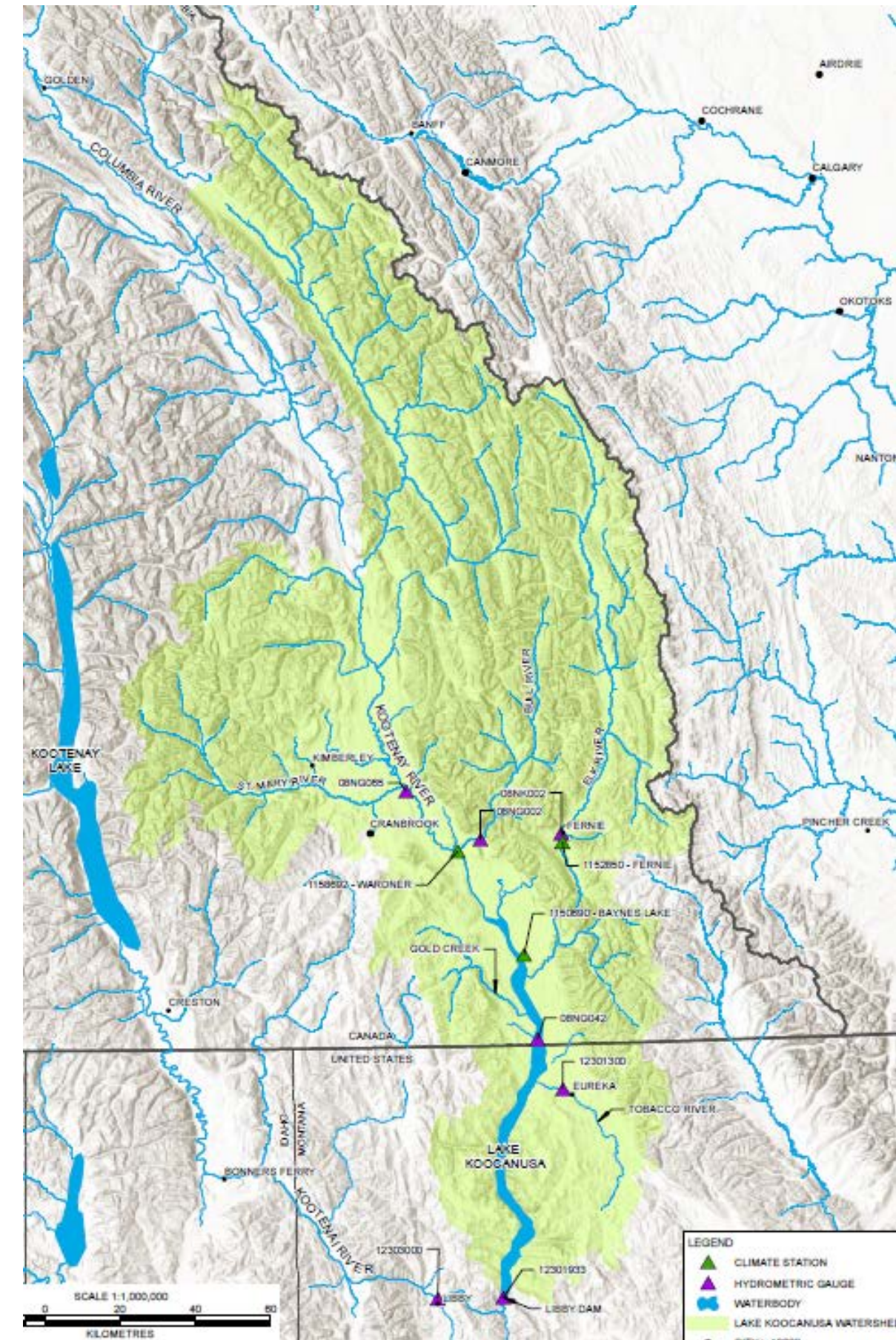


BGC Scope of Work

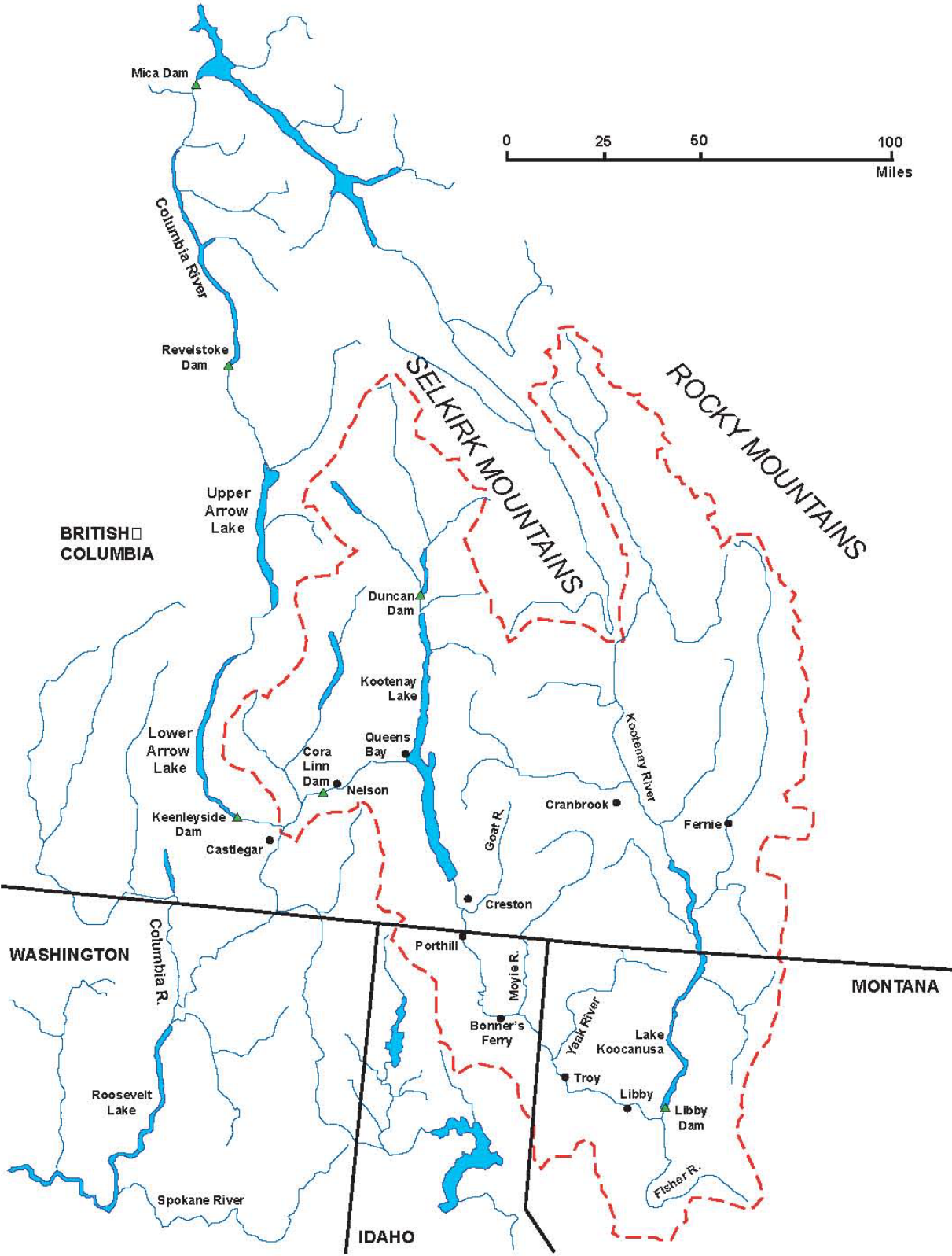
- A discussion of Variable Flood Control (VARQ FC) relative to Standard Flood Control (Standard FC) and how differences between the two operating procedures has impacted water levels on Koocanusa Reservoir
- A high-level discussion of the proposed dam on:
 - Recreation
 - Navigation
 - Hydroelectric Power
 - Flood Risk Management
 - Ecosystems
- A high-level cost estimate for the proposed dam
- A discussion of the potential issues and questions that would need to be addressed to determine whether the proposed dam is a viable option

Study Area

- Water levels controlled by Libby Dam (129 m high)
 - Dam completed in 1973
- 145 km long reservoir
- Watershed area of 23,270 km²
- 87% of the inflow comes from Canada
- Dam constructed as part of the Columbia River Treaty (CRT)
- The CRT does not require that operation of the Libby Dam be coordinated jointly by the US and BC; however, it does require for coordination of the three BC dams (Mica, Hugh Keenleyside and Duncan) between the CRT Entities.
 - Libby Dam is operated by the Bonneville Power Association (BPA) and the US Army Corps of Engineers (USACE) without input from BC Hydro



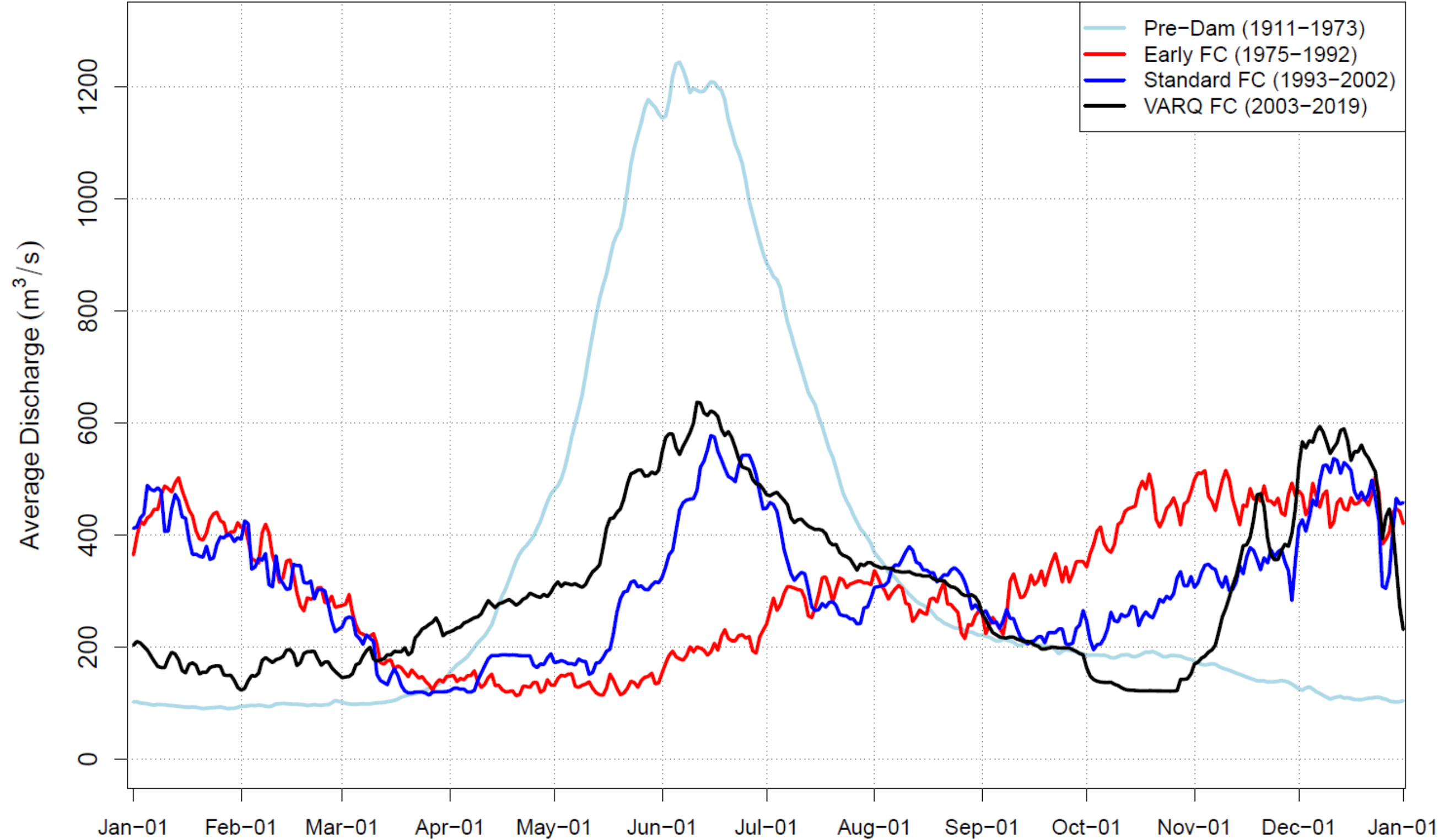
Kootenay River Basin



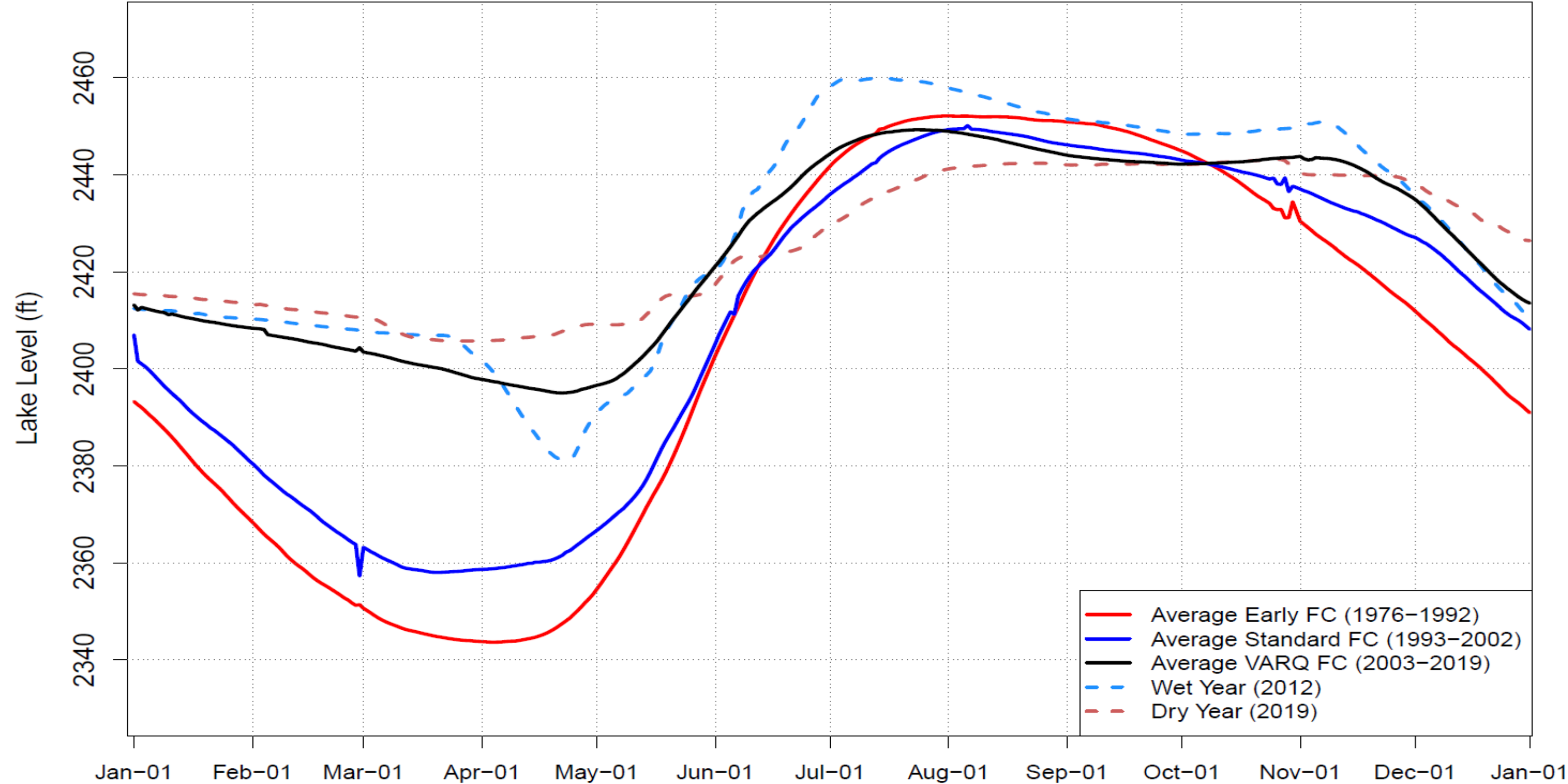
Libby Dam Operation

- Three primary operating regimes for Libby Dam:
 - **1973 to 1992 (Early FC):** Standard Flood Control regime with operation of the dam driven almost exclusively by flood control and power generation.
 - **1993 to 2002 (Standard FC):** – Standard Flood Control regime continues, and flood control remains a top priority. However, maintaining in-stream flow needs for downstream fisheries has a higher priority than power operations.
 - **2003 to Present (VARQ FC):** Variable Flood Control regime is adopted. Flood control remains a top priority. But operations for downstream fisheries continues to have higher priority than operations for power due to court ordered legal requirements to meet the needs of endangered fish species.

Dam Discharge

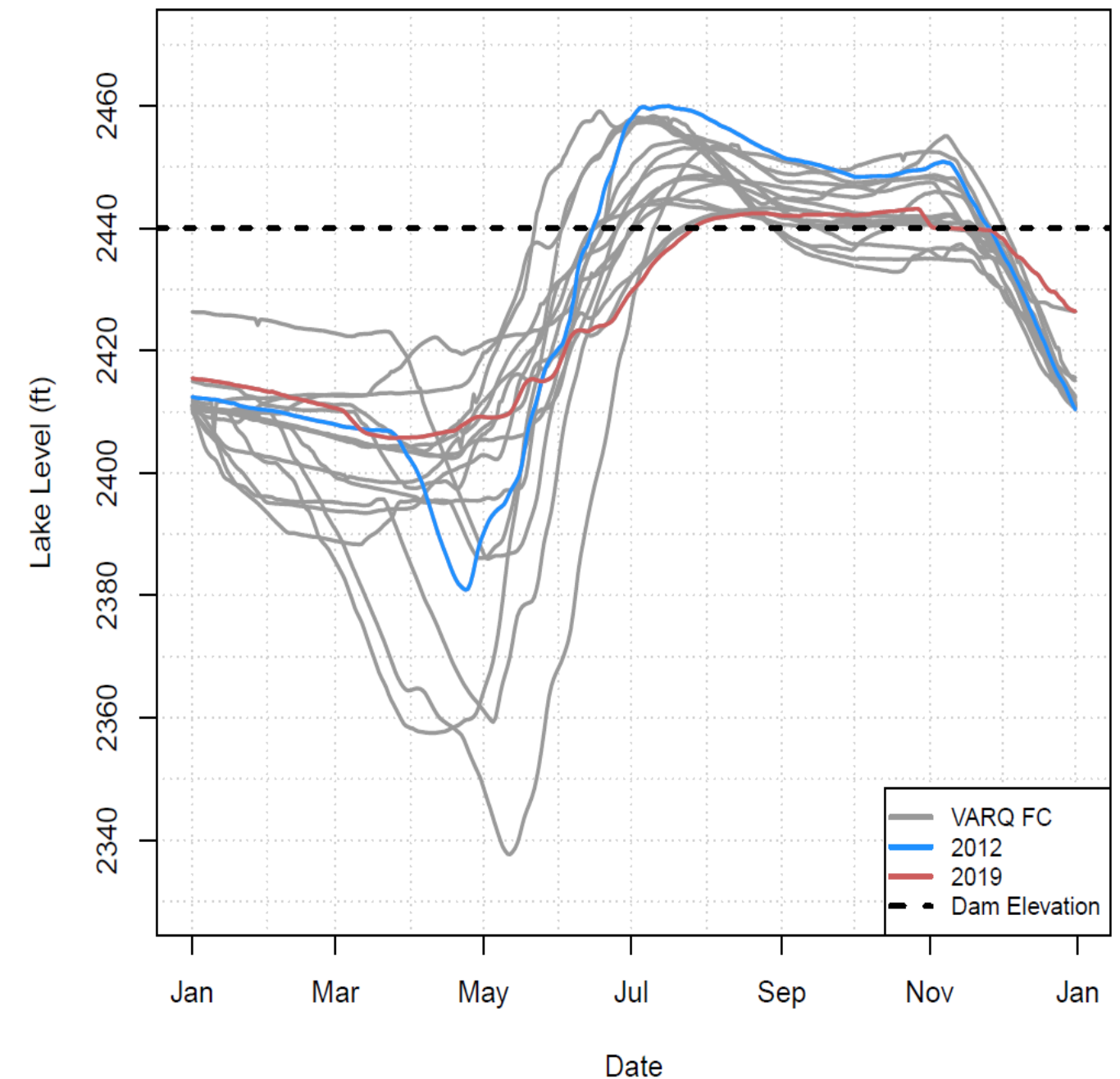


Reservoir Levels



Proposed Dam

- Canadian residents and water users have expressed concern regarding the impact of operational changes on late spring and summer water levels in Lake Koocanusa.
- Therefore, they have proposed construction of a dam across Lake Koocanusa in BC, directly upstream of the US border, to maintain the reservoir level at or above an elevation of 2440' (743.7 m) ideally from mid-May through end of September.
- On average the Koocanusa Dam would be submerged for 4-6 months a year
- The impacts of the proposed dam were evaluated for two scenarios:
 - Scenario A – maintaining the reservoir at or above El. 2440' throughout the year
 - Scenario B – > El. 2440' only during the prime recreation season of late May through September



Dam Impact on Water Levels

| Time Period | Time Above Dam Elevation | | Time Below Dam Elevation | | Mean Reservoir Level Increase with Dam (feet) |
|--------------|--------------------------|--------|--------------------------|--------|---|
| | (%) | (days) | (%) | (days) | |
| May 15-31 | 3 | 0.5 | 97 | 16.5 | 24 |
| June 1-14 | 16 | 2.2 | 84 | 11.8 | 14 |
| June 15-30 | 47 | 7.5 | 53 | 8.5 | 8 |
| July 1-14 | 77 | 10.8 | 23 | 3.2 | 5.8 |
| July 15-31 | 90 | 15.3 | 10 | 1.7 | 0.8 |
| August 1-14 | 100 | 14.0 | 0 | 0.0 | 0 |
| August 15-31 | 97 | 16.5 | 3 | 0.5 | 0.1 |
| Sept 1-14 | 82 | 11.5 | 18 | 2.5 | 2.2 |
| Sept 15-30 | 77 | 12.3 | 23 | 3.7 | 3.8 |

- The proposed dam would raise the reservoir level for an average of 45% of the days during the main recreational season from mid-May to the end of September based on the VARQ FC operations during 2003-2019. The potential impacts would be greatest from mid-May to end of June.

Recreation Impacts

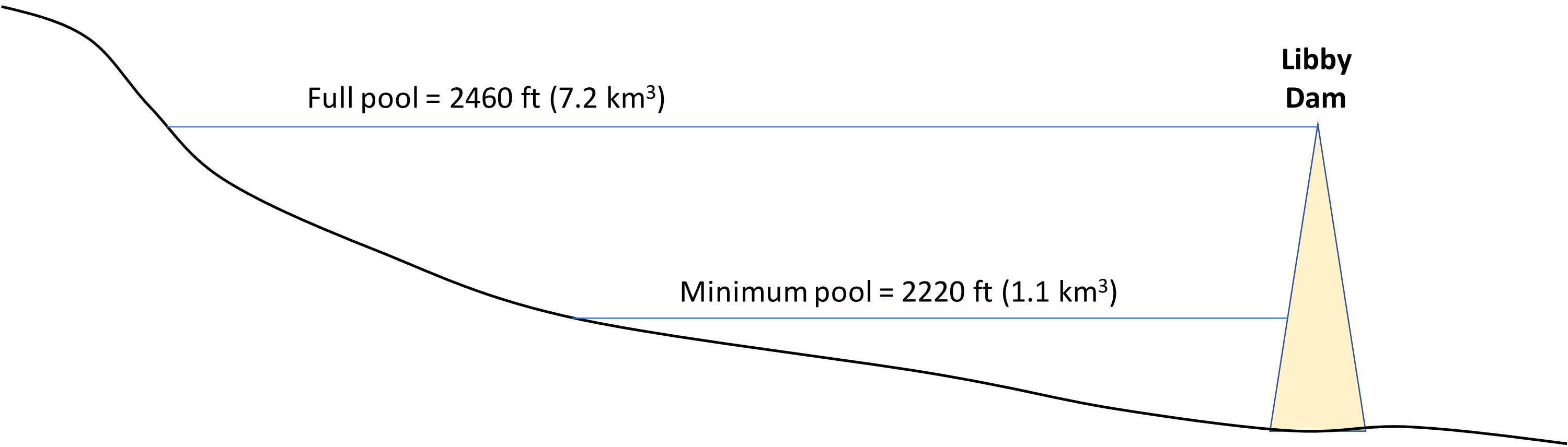
| Activity | Impact |
|----------------------|---------|
| Boating | ☑ |
| Swimming | neutral |
| Fishing | ☑ |
| Shoreline Aesthetics | ☑ |

- Overall, the recreation impacts would be positive in British Columbia with the proposed dam in place, particularly in May and June
- However, the opposite would be true on the US side of the reservoir

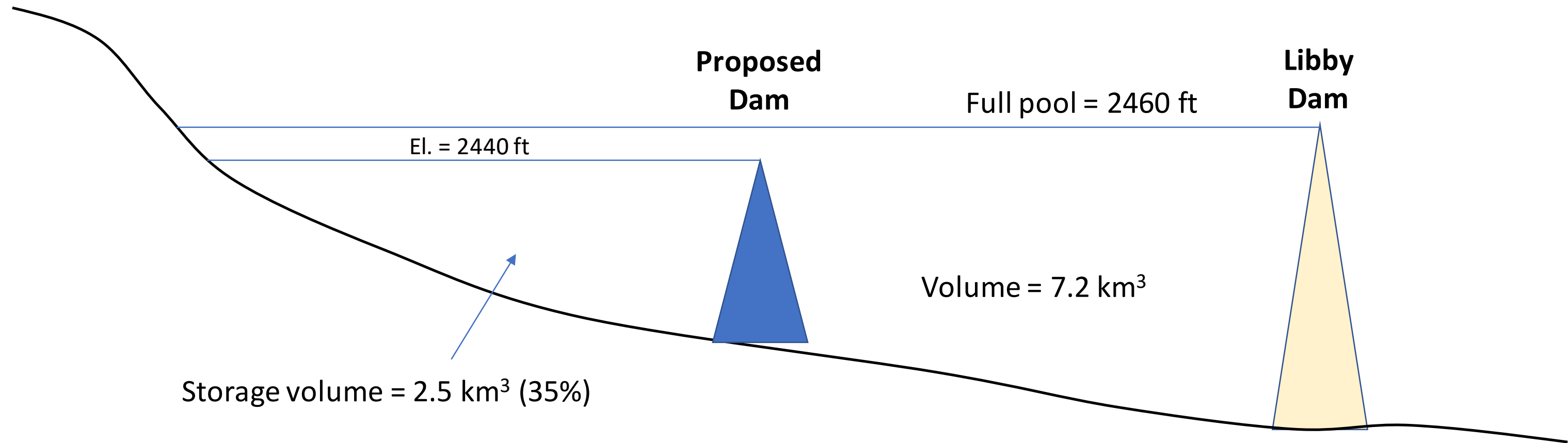
Power and Flood Risk

| Activity | Scenario | Impact |
|---------------------|----------|-------------------------------------|
| Hydroelectric Power | Annual | <input checked="" type="checkbox"/> |
| | Seasonal | none |
| Flood Risk | Annual | <input checked="" type="checkbox"/> |
| | Seasonal | none |

Power and Flood Risk



Power and Flood Risk



Ecosystems

- While a more stable reservoir level on the Canadian side of the dam would likely improve some ecosystem conditions there, the opposite would be true on the American side, where reservoir levels would need to fluctuate more to compensate for the loss of storage flexibility.
- With a dam in place, the ability of fish and other aquatic life to move throughout the Koocanusa Reservoir between Canada and the US would also be hindered. This may have negative impacts on fish spawning in Lake Koocanusa and in the upstream Kootenay River. Therefore, fish passage would need to be included in the dam design.
 - However, there would likely be residual impacts to fish movement
- The loss of Lake Koocanusa storage flexibility may also result in the US needing to modify its Libby discharge regime. Such a modification would likely impact downstream fish (e.g., Kootenai white sturgeon, salmon, bull trout).

Cost Estimate

- High-level estimated cost of dam construction is >\$400 million
- Project specific aspects that will likely increase the cost include:
 - Navigation lock
 - Fish passage
 - Site geology constraints
 - Construction accessibility
 - CRT, BC Utilities Commission, public and First Nations consultation
 - Specialized spillway and dam engineering construction (the dam must both discharge flows downstream and allow for backwatering from Libby Dam)
 - The dam will be under water for 5-6 months a year
 - The downstream face of the dam will need to be armoured

Dam Viability

- If a decision is made to continue investigating the possibility of a dam, then preliminary design work on the dam would be needed to obtain a more accurate construction cost estimate.
- A number of key questions would need to be answered:
 - What are the Canadian legal and regulatory hurdles for this project?
 - Which Canadian agency would be the “owner” of the dam? And who would pay for it?
 - Would the US agree to such a Canadian dam proposal?
 - How would the US Libby operating regime be adjusted in reaction to Canada’s operation of a dam at the Canada-US border?

Questions?

